



## METHODOLOGY



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## LIMITATION OF RESPONSABILITY

The present methodology was created by qualified professionals from ECCON Soluções Ambientais (CNPJ No. 20.481.986/0001-76) and it cannot be changed or shared without prior express authorization by ECCON or by the client. The use of this methodology, if approved by ECCON, must obey all national and international laws of data protection and intellectual property, under penalty of administrative, civil, and criminal liability. ECCON is not responsible for its use, even in part, by third parties that have had access to it. If you have knowledge of improper use of this methodology, please inform the occurrence to [contato@econsa.com.br](mailto:contato@econsa.com.br).

## 1. INTRODUCTION

This Methodology was developed by ECCON's technical team, with contributions of Reservas Votorantim, to guide the execution of Payment for Environmental Services (PES) projects, adapting national and international techniques that suit the reality of Brazilian conservationist landowners.

With this Methodology, it is intended to create mechanisms capable of measuring, reporting, and verifying reductions in greenhouse gases emissions to establish carbon credits of forest origin ("Carbon Credits") that (i) meet the demand for emission neutralization in Brazil and the world; (ii) meet the demands of legal and methodological security required in international scientific and marketing environments; (iii) incorporate and measure other environmental services, and (iv) promote social benefits.

Rules and recommendations aimed at the voluntary carbon market are presented, enabling the reduction of deforestation, sustainable management of forests, and the development of scientific standards for the accounting of Carbon Credits.

This Methodology presupposes its restricted use by ECCON. Future versions may create rules for other proponents who want to make use of the Methodology.

## 2. PSA CARBONFLOR

The services provided by nature (Ecosystem Services) are essential for the conservation of biodiversity e for the well-being of human beings. Forests are capable of mitigating climate change, through carbon sequestration.

PSA Carbonflor is an environmental services payment program, created by ECCON, focused on reducing carbon emissions (see definition in item 4). This reduction is achieved through the maintenance of carbon stock and ecosystem services through avoided deforestation and forest degradation. The aim is to keep the forests standing through the constitution and commercialization of Carbon Credits.

Under the terms of the [Federal Decree n° 11.075/2022](#) (article 2, I), a carbon credit is:

carbon credit - financial, environmental, transferable asset representing the reduction or removal of one ton of carbon dioxide equivalent, which has been recognized and issued as a credit in the voluntary or regulated market.<sup>1</sup>

In other words, Carbon Credits, as long as recognized and emitted as credits, become transferable financial assets capable of enabling payment for environmental services.

According to article 3 of the [Federal Law n° 14.119/2021 \(National Policy for the Payment for Environmental Services\)](#), the following are modalities of payment for environmental services:

- I – direct payment, monetary or not;
- II – provision of social improvements for rural and urban communities;

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<sup>1</sup>"crédito de carbono - ativo financeiro, ambiental, transferível e representativo de redução ou remoção de uma tonelada de dióxido de carbono equivalente, que tenha sido reconhecido e emitido como crédito no mercado voluntário ou regulado".

- III – compensation linked to a certificate of reduction of emissions from deforestation and degradation;
- IV – green bonds;
- V – lending;
- VI – *Cota de Reserva Ambiental - CRA* (Environmental Reserve Quota), instituted by [Law No. 12.651, from May 25, 2012](#)<sup>2</sup>

For PSA purposes, the mentioned Law defines ecosystem services (i) and environmental services (ii) in article 2:

- II – Ecosystem services: relevant benefits for society generated by ecosystems, in terms of maintenance, recovery, or improvement of environmental conditions, in the following modalities:
  - a) Provision services: those that provide environmental goods or products used by humans for consumption or commercialization, such as water, food, wood, fiber, extracts, and others;
  - b) Support services: those that maintain the perpetuity of life on Earth, such as nutrient cycling, residue decomposition, production, maintenance or renewal of soil fertility, pollination, dispersion of seeds, population control of pests and potential vectors for human diseases, protection against ultraviolet solar radiation and the maintenance of biodiversity and the genetic heritage;
  - c) Regulation services: those that contribute to the maintenance of the stability of ecosystem processes, such as carbon sequestration, air purification, moderation of extreme weather events, maintenance of the balance of the hydrological cycle, minimization of floods and droughts, and the control of critical processes of erosion and land sliding of slopes;
  - d) Cultural services: those that constitute non-material benefits provided by ecosystems, through recreation, tourism, cultural identity, spiritual and aesthetic experiences, and intellectual development, among others;
- III – Environmental services: individual or collective activities that favor the maintenance, recovery, or improvement of ecosystem services<sup>3</sup>

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<sup>2</sup>Original, in Portuguese

*I - pagamento direto, monetário ou não monetário;*

*II - prestação de melhorias sociais a comunidades rurais e urbanas;*

*III - compensação vinculada a certificado de redução de emissões por desmatamento e degradação;*

*IV - títulos verdes (green bonds);*

*V - comodato;*

*VI - Cota de Reserva Ambiental (CRA), instituída pela [Lei No. 12.651, de 25 de maio de 2012](#)".*

<sup>3</sup>Original, in Portuguese

*II - **serviços ecossistêmicos**: benefícios relevantes para a sociedade gerados pelos ecossistemas, em termos de manutenção, recuperação ou melhoria das condições ambientais, nas seguintes modalidades:*

*a) serviços de provisão: os que fornecem bens ou produtos ambientais utilizados pelo ser humano para consumo ou comercialização, tais como água, alimentos, madeira, fibras e extratos, entre outros;*

*b) serviços de suporte: os que mantêm a perenidade da vida na Terra, tais como a ciclagem de nutrientes, a decomposição de resíduos, a produção, a manutenção ou a renovação da fertilidade do solo, a polinização, a dispersão de sementes, o controle de populações de potenciais pragas e de vetores potenciais de doenças humanas, a proteção contra a radiação solar ultravioleta e a manutenção da biodiversidade e do patrimônio genético;*

*c) serviços de regulação: os que concorrem para a manutenção da estabilidade dos processos ecossistêmicos, tais como o sequestro de carbono, a purificação do ar, a moderação de eventos climáticos extremos, a manutenção do equilíbrio do ciclo hidrológico, a minimização de enchentes e secas e o controle dos processos críticos de erosão e de deslizamento de encostas;*

Within PSA Carbonflor, the transacted goods, in the form of Carbon Credits, are the environmental services provided by the owners of conserved areas. It is defined that 1 Carbon Credit equals 1 ton of CO<sub>2</sub> (carbon dioxide) equivalent.

### 3. REFERENCES

For the elaboration of the Methodology, the rules and definitions brought by the following standards are considered: *VCS Standard. Version 4.2. Verra - Standards for a Sustainable Future. 20 January 2022*; *VM0007 - REDD+ Methodology Framework (REDD+ MF), in Version 1.6, from September 08, 2020*; *VM0015 - Methodology for Avoided Unplanned Deforestation, in Version 1.1, 3 December 2012*; *VM0009 - Methodology for Avoided Ecosystem Conversion, in Version 3.0, 6 June 2014*; Federal Law No. 12.187/2009 (National Policy about Climate Change); Federal Law No. 14.119/2021 (National Policy of Payment for Environmental Services); Federal Decree No. 10.828/2021 (Rural Product Ballot); Federal Decree No. 11.075/2022 (Sectoral Plans for Mitigation of Climate Change); Intergovernmental Panel on Climate Change – IPCC reports; United Nations Framework Convention on Climate Change – UNFCCC base text.

### 4. DEFINITIONS

**Adhesion:** the date on which the landowner officially adheres to PSA Carbonflor and starts using the Methodology.

**Monitoring agent:** the member in the local community who does the monitoring of the vegetation cover on-site, aiming to optimize the social-environmental benefits of the project, empower the local community, promote environmental education, allow scalability of the Project, and avoid GHG emissions from logistical displacement.

**Implementation area:** preserved native vegetation area considered for the calculation of Carbon Credits, having already discounted all land area that is not eligible by the Methodology's terms.

**Baseline scenario:** a scenario that represents the level of anthropogenic emission or remotion of CO<sub>2</sub> equivalent that would occur in the absence of PSA Carbonflor's conservation activity. It is defined by the estimate of forest cover deforestation based on the Reference Region associated with the Implementation Area.

**Local Community:** a set of people resident in a geographical area inside or close to the Implementation Area, showing the same socioeconomic and cultural characteristics. The place where habitants know and can be interested parties in the Implementation Area and surroundings.

**Carbon Credits:** reduction in greenhouse gas emissions that are negotiable in the international carbon market, measured in avoided tons of carbon equivalent (tCO<sub>2</sub>e).

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d) *serviços culturais: os que constituem benefícios não materiais providos pelos ecossistemas, por meio da recreação, do turismo, da identidade cultural, de experiências espirituais e estéticas e do desenvolvimento intelectual, entre outros;*

III - **serviços ambientais:** *atividades individuais ou coletivas que favorecem a manutenção, a recuperação ou a melhoria dos serviços ecossistêmicos”.*

**Vintage Credits:** Carbon Credits emitted from proven forest conservation in a period previous to the date of Adhesion to PSA Carbonflor.

**Primary Data:** raw data obtained directly on-site, through instruments and observation.

**Secondary Data:** data obtained through official platforms that analyzed the Primary Data in certain regions.

**Avoided Deforestation:** outcome of the activities that stop or reduce GHG emissions originated from deforestation and/or degradation, slowing or interrupting the conversion of forest and associated forest biomass (Implementation Area) in other land uses. The avoided deforestation might not occur in the absence of the conservation environmental service provided by PSA Carbonflor.

**GHG Emissions:** release of greenhouse gases and/or their precursors in the atmosphere at a specific place and time.

**Carbon Stock:** carbon pool that has the potential to accumulate (or lose) carbon over time, which for the PSA Carbonflor program includes aboveground biomass, underground biomass, plant litter, and dead wood. The amount of carbon retained inside a pool is measured in tons of CO<sub>2</sub> equivalent.

**GHG:** greenhouse gases listed in Annex A of the Kyoto Protocol of the United Nations Framework Convention on Climate Change: (i) carbon dioxide (CO<sub>2</sub>); (ii) methane (CH<sub>4</sub>); (iii) nitrous oxide (N<sub>2</sub>O); (iv) sulfur hexafluoride (SF<sub>6</sub>); (v) Hydrofluorocarbons (HFCs) and Perfluorocarbons (PFCs), whose reduction can generate Carbon Credits.

**Methodology:** a set of rules and procedures developed by ECCON for the execution of projects in the scope of PSA Carbonflor and constitution of Carbon Credits on properties with preserved or conserved native areas.

**Crediting Period:** a period of 30 years in which the contributions of carbon stocking from forest conservation and provided environmental services will be counted and, ultimately, commercialized.

**Project Period:** the period beginning at the Adhesion of the parties involved in the development of the PSA Carbonflor project.

**Landowner:** the one who has the rights to the property or possession of the land, in the terms of Brazilian law.

**Provider or Producer of Environmental Services:** owner of the land which provides environmental service and can guarantee its provision during the Crediting Period.

**PSA Carbonflor:** payment for environmental services program developed by ECCON, with the formation and commercialization of Carbon Credits to pay conservationist landowners and meet society's demands for the neutralization of GHG Emissions.

**GHG reduction:** result of the activities that reduce GHG emissions, slowing or stopping the conversion of forests in the Implementation Area into other land uses, in which the forest biomass would be lost in the absence of PSA Carbonflor.

To exemplify, GHG emissions are reduced when the conversion of a forest area into agricultural land is avoided. This way, the biomass from the forest land use (which possesses a significantly higher carbon stock than agricultural land) is not lost, because



of the environmental service provided by PSA Carbonflor. In other words, GHG reductions are the result of activities that secure the maintenance of carbon stocks.<sup>4</sup>

**Validation Report:** a report that describes the validation process of a project based on the Methodology.

**Verification Report:** a report that describes the verification process of a project based on the Methodology.

**Technical Reserve:** percentage of Carbon Credits in the Implementation Area that cannot be traded before completing 25 years of the Crediting Period. It is used as insurance against unforeseen events that may happen in the Implementation Area and that may compromise the continuity of the provision of Ecosystem Services, such as fires, invasions, and withdrawal, among others.

**Environmental Services:** individual or collective activities that favor ecosystem services maintenance, recovery, or improvement.

**Ecosystem Services:** relevant benefits for society generated by ecosystems, in terms of maintenance, recovery or improvement of environmental conditions, in the following modalities: a) provision services: those that provide environmental goods or products used by humans for consumption or commercialization, such as water, food, wood, fibers and extracts, among others; b) support services: those that maintain the continuity of life on Earth, such as nutrient cycling, waste decomposition, production, maintenance or renewal of soil fertility, pollination, seed dispersal, control of populations of potential pests and potential vectors of human diseases, protection against solar ultraviolet radiation and maintenance of biodiversity and genetic heritage; c) regulatory services: those that contribute to maintaining the stability of ecosystem processes, such as carbon sequestration, air purification, moderation of extreme weather events, maintaining the balance of the hydrological cycle, minimizing floods and droughts and the control of the critical processes of erosion and sliding of slopes; d) cultural services: those that constitute non-material benefits provided by ecosystems, through recreation, tourism, cultural identity, spiritual and aesthetic experiences and intellectual development, among others.

**Leakage:** measurable increase in GHG Emissions occurring outside the Implementation Area due to PSA Carbonflor. This calculation is deducted from the total Carbon Credits value obtained by the Project.

## 5. PSA CARBONFLOR GUIDELINES

PSA Carbonflor aims to create a systemic environment that meets (i) the need for remuneration of conservationist owners for the environmental service provided and (ii) society's demand for the generation of Carbon Credits that can be used for accounting or neutralization of greenhouse gas emissions.

### 5.1. ECCON DATA

The [ECCON Data](#), platform, managed by ECCON, is used to provide transparency and facilitate the storage of information. It is a database of forests, productive farms, and

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<sup>4</sup> Note that, although GHG removals are not addressed in this Methodology, this is the mechanism by which carbon sequestration is considered in planting activities. Broadly speaking, GHG reductions are related to the carbon stock of conserved forests, and GHG removals are related to carbon sequestration from reforestation.

rural properties, which enables environmental business opportunities, in a scalable and replicable way.

The platform will record and make available data and projects from PSA Carbonflor, including reports, Carbon Credit availability *cards*, and data from the Implementation Areas. With the launch of the Methodology, ECCON Data will take custody of the Carbon Credits in an environment with blockchain technology.

## 5.2. REGISTRATION OF IMPLEMENTATION AREAS

The registration of areas must be done on the ECCON Data platform (item 5.1), which is free, online, and involves procedures aimed at ensuring the safety of those involved. Having login and password, the owners can access the user environment, where they enter personal data, information, and photos of the property and are able to upload documents (such as a: Real Estate Certificate, registration receipt from the Rural Environmental Registry, Rural Property Registration Certificate, plans, maps, polygons, etc).

After providing all registration requirements, the property undergoes a technical analysis that verifies compliance with prospecting criteria and suitability for the environmental business.

This analysis allows identifying criteria such as:

- i. Geographical region and biome of interest;
- ii. Extension;
- iii. Overlap with protected areas, such as indigenous territories, quilombolas, and protected areas;
- iv. Permanent Preservation Areas (APPs) and Legal Reserve (RL);
- v. Unprotected areas suitable for the implementation of reforestation projects;
- vi. Vegetation cover and deforestation history.

All new subscribers digitally sign a term of service that ensures their links with the platform. The areas considered suitable are classified and published when passing through the verification filter.

The following table presents a description of the platform operations.

Table 1. Operations provided by ECCON Data

Operation	Description
Global document organization	The documents provided by registered owners are organized in simply way that all interested parties have easy access.
Cloud storage of documents	The platform has cloud data storage, a tool that has great storage and organization capacity. In addition, to consisting of a virtual environment more conducive to independently securing data, the risks of damage or loss of files and documents are significantly minimized.
Facilitated communication	Through a chat channel available in the platform's user environment, it is possible to ask questions about the registration process or environmental operations, request documents, , among other interactions.
Analysis of georeferenced information	The data from the areas submitted on the platform (in kmz, shp or, dwg format) provide the possibility of a complete assessment

	of land use, supporting the fulfillment of the eligibility criteria for rural landowners.
Geoprocessing tools	<p>Through geoprocessing tools, it is possible to verify the biome and characteristic phytophysiology of the area. Furthermore, it is possible to graphically assess the area and its overlap with layers of interest (embargoed areas, archaeological sites, conservation units, etc.)</p> <p>Georeferencing, allied to analysis techniques by remote sensing, allows a complete evaluation promoted by the application of vector and matrix data provided by competent official bodies. This method allows the verification of the selection criteria of rural landowners in a geolocalized way, making the validation process of a property more detailed.</p>

### 5.3. LANDOWNERS

The owners of the properties included in PSA Carbonflor are the holders of the Carbon Credits. Their duties are:

- i. Guarantee the continuity of conservation and, therefore, the provision of Environmental Services and the availability of Carbon Credits;
- ii. Register at ECCON Data and make available data such as property name, total area extension, an extension of the area available for business, location, photos of the property, data invasion, and existence of protected areas;
- iii. Make available the necessary documentation to comply with the Methodology.

### 5.4. CARBON CREDITS PURCHASERS

Acquirers of Carbon Credits play the role of payers of the landowners, acting, therefore, as payers for the Environmental Services provided

Beyond contributing to the construction of a low-carbon economy, the acquirers will fortify actions that benefit Brazilian biomes and conservationist rural producers.

It is worth highlighting the added value of the Carbon Credits, as they contribute to social development by inserting rural landowners into the forest carbon market, valuing the practice of conservation of national biomes and ecosystems. Thus, by purchasing Carbon Credits, acquirers will support the fulfillment of the UN 2030 Agenda for Sustainable Development.

The Methodology is in line with the National Policy for Payment for Environmental Services (Federal Law 14,119/2021) to optimize international rules compared to Brazilian legislation. In this sense, the Methodology creates rules more focused on the Brazilian context, facilitating its applicability of too projects national properties and biomes, without eliminating the possibility of meeting international demands.

When purchasing Carbon Credits from PSA Carbonflor, purchasers will have:

- Autonomy to visualize the volume of Carbon Credits and the areas to which they refer;
- Information transparency on Carbon Credits and Areas of Implementation;
- Traceability of the Environmental Services provided;
- Quality assurance of Environmental Services;

- Innovation within the carbon market, considering the pioneering spirit in the proposal to create an environment for the Valuation of Ecosystem Services and the constitution of Carbon Credits, considering the Brazilian context, its social issues, and its biodiversity.

Buyers who are legal entities will not be eligible if: (a) involved in acts of non-compliance with Law No. 12,846/2013 (“Brazilian Anti-Corruption Law”); (b) on the Register of Employers who have subjected workers to conditions analogous to slavery (Slave Labor Dirty List) before the Ministry of Labor and Welfare; (c) recognized for practices of non-compliance with environmental legislation; and (d) having reputational characteristics that could harm the perception of the quality of the Carbon Credits.

## 5.5. CONTRACTUAL INSTRUMENTS

The legal relationships at PSA Carbonflor occur between ECCON, the owners and buyers of Carbon Credits, being formalized in specific contracts.

Table 2. Contractual relations

Instrument	Adhesion Contract <sup>5</sup>	Purchase and Sale Contract <sup>6</sup>
<b>Parties</b>	ECCON and owner	ECCON e buyer
<b>Content</b>	(i) qualification of the parties; (ii) implementation steps; (iii) Methodology; (iv) remuneration; (v) obligations; (vi) declarations and warranties; (vii) hypotheses of default; (viii) deadline and possibilities of renewal; (ix) responsibilities; (x) general provisions; (xi) specification of terms used; (xi) data and documents regarding the Implementation Area.	(i) specification of the number of Carbon Credits to be acquired; (ii) Methodology; (iii) remuneration, price, and payment method; (iv) obligations; (v) hypotheses of default; (vi) period of validity; (vii) guarantees and general provisions.

## 5.6. CARBON MARKET AND PSA CARBONFLOR

The carbon market consists of transactions of GHG Emission Reductions generated in each project to offset the Emissions released by other economic activities. It was originated from the Kyoto Protocol in 1997, which allowed organizations located in Developing Countries to generate Emission Reductions that could be acquired by organizations committed to reducing their Emissions in Developed Countries with targets set out in the Protocol. Over time, other regulated regional and national markets emerged.

At the same time, we saw the formation of a voluntary carbon credit market, which is on the rise in Brazil and the world, as it is a flexible mechanism applicable to projects that seek to contribute to the reduction of deforestation and the increase of forested areas, as well as for allowing both domestic and international transactions.

<sup>5</sup> It should be noted that, depending on the conditions agreed between ECCON and the owner, the model of Adhesion Contract may be replaced by a Service Provision Contract.

<sup>6</sup> In relation to the Purchase and Sale Contract, it may be carried out between Owner and Purchaser, with ECCON's consent.

The voluntary market is related to issues of corporate social and environmental responsibility. Organizations aim to acquire Carbon Credits to offset their Emissions, not necessarily to comply with legal obligations or international protocols.

It is an interesting system for presenting the organization to the market as an agent aware of its necessary contribution to the transition to a low-carbon economy. It is noted that organizations have also been investing in forestry projects to contribute to Emission Reductions, without, however, using these Reductions to offset the Emissions generated by their activities. The rise of the ESG (Environmental, Social, and Governance) concept has further fostered the potential of the voluntary market.

The pressure for companies to be environmentally responsible is growing from their stakeholders, who prefer to invest in and buy products from companies that are aligned with ESG practices. Transparency and disclosure of information regarding environmental, social, and governance practices are also often legal obligations. In Brazil, although there are legislative gaps on the subject, it is observed that, increasingly, companies are being invited to publish information related to ESG practices.

Regarding environmental factors, the climate agenda has now become one of the main global agendas, so reducing the carbon footprint has been one of the main practices adopted by large companies in the context of their ESG agendas.

In the scope of the voluntary market, projects are developed according to identified opportunities for reducing or sequestering Emissions, and the methodology is usually validated by a third party. At the end of the project cycle, Carbon Credits are issued, which can be traded. To guarantee the high quality of the projects and the generated credits, it is necessary to adopt mechanisms and protocols that guarantee the adequate measurement and the quality and integrity of the generated Carbon Credits. Along the same lines, we seek to achieve such results in this project.

The topic of the carbon market and PES is part of the sustainable finance agenda. As mentioned above, in Brazil, one of the main laws that regulate ecosystem and native vegetation conservation is Federal Law 14,119/2021, which institutes the Payment for Environmental Services Policy. However, other initiatives aim to remunerate Environmental Service providers in Brazil, such as “CPR Verde”, provided for in Federal Decree No. 10,828/2021. This title allows rural producers and other agents working in the agribusiness chain to raise funds that will be redirected to financing the conservation of native forests and their biomes.

The forest carbon market places Brazil, and the individuals and legal entities that adhere to it, in a very competitive position, for having extensive forest and agricultural areas whose protection, conservation, or enrichment can be the object of carbon projects, through the Ecosystem Services provided, removal (carbon sequestration in reforestation projects) or reduction (GHG emissions avoided by maintaining forest carbon stock in avoided deforestation projects) of GHG emissions.

Beyond the high potential for generating Carbon Credits, projects developed in the forestry sector can generate several social and environmental co-benefits, such as the reduction of erosion, maintenance of local biodiversity, enhancement of quality and availability of water, maintenance of forest Ecosystem Services, positive effects for human health related to the reduction of deforestation and forest fires, among others.

There are, therefore, different types of projects commonly called “forest carbon projects”, depending on numerous variables: the adopted Emissions reduction methodology; the existence or not of involvement of services provided by the local community; social

benefits brought by the project (such as the strengthening of the bioeconomy); or even the purpose intended by the project developer (whether it offsets Emissions from other economic activities or just generates a positive impact on the climate). In this sense, we can find in the market Carbon Credits derived from projects for Reducing Emissions from Deforestation and Forest Degradation (REDD+), reforestation projects, projects to reduce emissions within the supply chain (carbon insets), and PES, among others.

Thus, to promote the potential for economic development, social equity, and ecological balance, PSA Carbonflor inserts conservationist owners into the carbon market, providing the strengthening of conservation as an environmental business in Brazil. The Carbon Credits generated in PSA Carbonflor, under the terms of the Methodology, will be priced based on the valuation of the Ecosystem Services generated for human well-being and carbon sequestration. There is also a social component (co-benefits) in the valuation of the payment, complying with the Agenda for Sustainable Development.

The high costs of international certification processes, linked to obstacles related to Brazilian legislation and biomes, prevent conservationist landowners from participating in this market. In this sense, PSA Carbonflor adapts to the national reality, seeking, through the valorization of national biomes and the inclusion of conservationist owners, the generation of high-quality Carbon Credits, and the strengthening of forest carbon in Brazil.

## **6. PROPERTY ELIGIBILITY CRITERIA**

These are the eligibility criteria of the Methodology for the selection of properties:

- i. Existence of conserved native vegetation. Exotic vegetation is not eligible.
- ii. Proof of completed registration at ECCON Data;
- iii. No overlap with Integral Protection Conservation Units, as defined in article 8 of Law No. 9,985/2000;<sup>7</sup>
- iv. No overlap with lands of traditional populations, such as indigenous peoples and quilombolas;
- v. Forest cover history of at least 10 years before the Adhesion to PSA Carbonflor;
- vi. Documentary regularity according to item 9.3.

## **7. ADHESION AND CREDITING PERIOD**

Adhesion corresponds to the date on which the owner adheres to PSA Carbonflor and submits to the Methodology.

The Crediting Period can be retroactive to the Adhesion, limited to 8 (eight) years, in case there is formal and known evidence of activities aimed at stopping deforestation, maintenance or increasing of Carbon Stock, and the provision of Environmental Services. In this case, the retroactive date can be considered for the counting of reduction of GHG Emissions and issuance of Carbon Credit, being considered the start date of the Crediting Period, which will have a duration of 30 years.

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<sup>7</sup> As established by Law 14,119/2021, in its article 9, item III, Private Reserves of Cultural Heritage ("RPPNs") are eligible for environmental services in private properties, as well as buffer zone areas and ecological corridors covered by native vegetation, in terms of Law No. 9,985, of July 18, 2000.

## 8. REPORTS TO BE PREPARED

3 types of reports are foreseen during the Project Period: Validation Report (“VaR”), Verification Report (“VeR”), and Validation and Verification Report (“VVR”).

Table 3. Methodology Products.

Report	VaR	VeR	VVR
<b>Description</b>	Methodology application report determining (i) characterization, (ii) calculation criteria, and (iii) monitoring Methodology	Report that reaffirms the adequacy of the assumptions determined in the VaR and attests to the results of periodic monitoring.	A report comprising the junction of the first VaR and the result of the first monitoring and its respective VeR for cases in which Vintage Credit is considered.
<b>Frequency</b>	Every 10 years on renewal of the Baseline from the <b>Accreditation Start Date</b> .	Intervals from 1 to 3 years, according to the suitability identified by the proponent from the <b>Project Start Date</b>	N.A.
<b>Condition</b>	The document must be produced on the <b>Project Start Date</b> and may consider Vintage Credit of up to 8 years.	It can only be issued after VaR when monitoring activities are performed for a given period.	Simultaneous occurrence is only possible when there is Vintage Credit to be accounted for in the first VaR.

Validation is the independent assessment of the project by the PSA Carbonflor regulatory and management institution (ECCON) that determines whether the project complies with the rules and guidelines established by the PSA Carbonflor Methodology. In turn, verification is the independent periodic assessment of GHG Emission Reductions that have occurred as a result of the project activity during a given monitoring period.

The verification report can only be prepared after the first monitoring event, carried out by the rules and guidelines established by the Methodology.

### 8.1. GENERAL REQUIREMENTS

- i. Validation can occur before the first verification or at the same time as the first verification. The product will be a Validation and Verification Report (VVR)
- ii. The report must clearly show possible material errors, omissions, and false declarations, both for validation and verification.
- iii. The materiality threshold concerning associated error, omissions, and representations relating to total reported GHG Emission Reductions shall be five percent for small projects and one percent for large projects.

- iv. When an Owner or an Implementation Area presents a scenario of Methodology deviation, its immediate exclusion is necessary or, if there is a sufficiently technical, legal, and methodological basis, the Methodology review.

## 9. VALIDATION REPORT

The Validation Report (“VaR”) is the document that will describe a project carried out in an Implementation Area, based on the Methodology. This report is valid for 10 years when the Baseline will be reviewed.

An executive summary must be presented, in the beginning, with the main information of the Project.

### 9.1. VaR SUMMARY

The Validation Report must have the items described in the table below

Table 4. VaR Summary.

Item	Description
Introduction	Brief description of the project and its objectives, according to the scope of maintaining the forest carbon stock through the provision of the PSA Carbonflor environmental conservation service.
PSA Carbonflor Guidelines	Resume the guidelines set for project contextualization. See item 5
Proponent	Introduce the company or organization responsible for preparing the VaR, following the Methodology guidelines.
Involved entities	It must contain the description of eventual companies and/or organizations involved in the VaR in the modalities of: <ul style="list-style-type: none"> <li>i. financing;</li> <li>ii. elaboration of technical parts;</li> <li>iii. product offering.</li> </ul>
Strategic Audience	It must define which people or interest groups will be impacted and which may impact a before or during after the implementation of the Project.
Project Periods	See item 9.2
Eligibility Criteria	See item 9.3
Characterization of the Implementation Area	See item 9.4.
Justifications for Implementation of PSA Carbonflor	See item 9.5.
Calculation Criteria	See item 9.6.
Monitoring Plan	See item 9.7.



## 9.2. PROJECT PERIODS

It is the duration of the Project, during which payments will be made for the Environmental Services provided, according to the particularities of each type of project and the choice of the proponent.

Once the parameters presented in item 7 are determined, the temporal variables adopted for the PES project under development must be described and justified.

Present the temporal information in a table format like the example below.

Table 5. Project Period example table.

Dates	Crediting Period	Project Period
Start date	Beginning of the provision of proven environmental service (dd/mm/yy).	From the Adhesion Date, when the contractual arrangements between the proponent and the parties involved are signed (dd/mm/yy).
End date	30 years after	End date of the Crediting Period.

In case the Crediting Period begins before the Adhesion, formal evidence dealing with the retroactive start of conservation activities must be provided.

## 9.3. ELIGIBILITY CRITERIA

Eligibility criteria are divided into (i) documentary criteria; and (ii) location criteria, as shown in the table below. Compliance with the VaR must be demonstrated, with a description of each document and proof of its regularity and applicability.

Table 6. Orientations – Eligibility Criteria.

Documentary Criteria	
Holder's documents	Make holder's documents available. If an individual, copy of CPF/RG/CNH. If it is a legal entity, extract from the CNPJ and copy of the articles of association.
Rural Environmental Register (CAR)	Present CAR extract and, preferably, the shapefile used for the declaration.
Real estate certificate or Term of Ownership	Obtain, preferably, the real estate certificate issued no more than 90 days ago. If there is no registration, obtain a transcript, term of ownership, or another document that demonstrates, with legal certainty, the ownership of the property.
Rural Property Registration Certificate (CCIR)	Provide updated CCIR.
Certificate of civil proceedings	This certificate demonstrates the existence or non-existence of civil proceedings on behalf of a person or company. The issue in the Court of Justice of the State where the property is located.

<b>Certificate of criminal proceedings</b>	This certificate demonstrates the existence or non-existence of criminal proceedings on behalf of a person or company. The issue in the Court of Justice of the State where the property is located.
<b>Certificate of municipal and state taxes</b>	This certificate demonstrates the existence or non-existence of fiscal and tax debts on behalf of an individual or company.
<b>Federal Revenue Debt Certificate</b>	This certificate demonstrates the existence or non-existence of debts with the Federal Revenue on behalf of a person or company. The issue is on the Federal Revenue website.
<b>Certificate of Labor Processes</b>	This certificate demonstrates the existence or non-existence of labor lawsuits on behalf of a person or company. The issue at the Regional Labor Court where the property is located.
<b>Ibama embargo certificate</b>	The embargo, made by IBAMA, is a punitive and preventive practice to inhibit nonauthorized deforestation, enabling the recovery of the ecosystem. The Negative Certificate is important to attest to the regularity in terms of vegetation suppression.
<b>Localization Criteria</b>	
<b>Overlap with Protected Areas</b>	List the overlapping elements. The following are mandatory: <ul style="list-style-type: none"> <li>• Cavities and caves</li> <li>• Geological sites</li> <li>• Archaeological sites</li> <li>• Indigenous territories</li> <li>• Quilombola Territories</li> <li>• Conservation Units</li> </ul>
<b>APP e RL</b>	Justify the applicability of APPs and RLs by Law No. 14.119/2021
<b>Forest cover history in the last 10 years</b>	Support the investigation of forest cover in the period of 10 years before the beginning of the Crediting Period. According to guidelines described in the VCS Standard (see item 3)

It should be noted that among the documentary criteria, this Methodology considers mandatory the presentation of (i) Real Estate Certificate or Certificate of ownership and (ii) CAR, the other documents mentioned above being at the discretion of the proponent.

#### 9.4. CHARACTERIZATION OF THE IMPLEMENTATION AREA

It is considered that the Implementation Area can be made up of areas belonging to more than one property, which meets the eligibility criteria, and which together will add up to the amount of net area for counting Carbon Credits.

##### 9.4.1. LOCATION

The location of the Implementation Area must be characterized according to the parameters indicated in the table below:

Table 7. Implementation Area location parameters.

Parameters	Description	Textual source
<b>Biome</b>	Point out the biome(s) in which the Implementation Area is located.	Official and up-to-date government sources. As state platforms; IBGE; MMA and others.
<b>Area name</b>	Characterize the name(s) of the property(s) and ownership.	Ownership documentation is provided by the owner.

Parameters	Description	Textual source
<b>Municipalities</b>	Point out the municipality(ies) in which the Implementation Area is located.	Official and up-to-date government sources. As state platforms; IBGE; and others.
<b>Hydrography</b>	Characterize the hydrographic region in which the Implementation Area is located. Mention watershed, management units, and watercourses.	Official and up-to-date government sources. As state platforms; IBGE; and others.
<b>Socioeconomic</b>	Characterize the socioeconomic region in which the Implementation Area is located. Mention predominant economic activities; economic indicators; development indicators.	Official and up-to-date government sources. As state platforms; IBGE; and others.

The cartographic products below must be presented, as appropriate. Cartographic sources must follow the same rigor as textual sources, verifiable, transparent data, published by government entities, or peer-reviewed scientific articles.

- Location Map;
- Hydrography Map;
- Socioeconomic Indicators Map.

#### 9.4.2.MEETING THE ELIGIBILITY CRITERIA

Describe and support how the Implementation Area meets each of the eligibility criteria listed in item 9.3. The table below guides the development of this item.

Table 8. Guidance table for meeting eligibility criteria.

Documentary Criteria	
<b>CAR</b>	Describe all CARs surveyed. Mention area information, relevant dates, issuing agency, among others, and any information that the Owner(s) consider relevant. Use documents provided by the Owner, national source (SICAR), and state sources of CARs.
<b>Real Estate Certificate</b>	Present in a table format, containing the name of the area (farm or property), which documentation is referred to, date of documentation, extension in hectares, and the Owner, as well as a column of relevant observations;
<b>Other documents</b>	Present a description of all collected documents. Mention area information, relevant dates, issuing agency, among others, and any information that the Owner(s) consider relevant.
Location Criteria	
<b>Overlap with protected areas</b>	Find up-to-date geospatial data from official sources such as state and federal government platforms, CECAV, CPRM, IPHAN, FUNAI, INCRA, and MMA, among others to perform mandatory overlays (listed be, low) and others selected by the proponent. <ul style="list-style-type: none"> <li>• Cavities and caves</li> <li>• Geological sites</li> <li>• Archaeological sites</li> </ul>

	<ul style="list-style-type: none"> <li>• Indigenous lands</li> <li>• Quilombolas territories</li> <li>• Full Protection Conservation Units</li> </ul> <p>Present the cartographic product with the result of the overlaps and describe them.</p>
<b>APP e RL</b>	<p>Present a description of identified APPs and RLs relating to Real Estate Certificates identified properties.</p> <p>Present cartographic product of the location of APPs and RLs, when applicable.</p>
<b>Forest cover history in the last 10 years</b>	<p>Through historical data of land use and occupation, present a comparison, using cartographic products, of the forest cover in the properties that will compose the Implementation Area in the 10 years before the beginning of the Crediting Period.</p> <p>Use up-to-date and official data sources such as state geospatial data platforms, IBGE, and INPE, among other state and federal databases, as well as well-established reference databases such as Google Earth, MapBiomias, satellite imagery geoprocessing analysis, among others.</p>

In short, the cartographic products below must be presented, as appropriate.

- Overlap Map with protected areas;
- APP and RL map;
- Comparative maps of historical land use in the 10 years before the beginning of the Crediting Period.

### 9.4.3.LAND USE

Describe how land is used and occupied in the Implementation Area, according to the parameters indicated below.

Table 9. Land Use Characterization Parameters.

Parameters	Description
<b>Use of primary data</b>	Field surveys or interviews of all points of interest that may affect the properties that will form the Implementation Area. Search geolocated data for each element.
<b>Use of secondary data</b>	Survey of all points of interest that may affect the properties that will form the Implementation Area through Satellite Image, Google Earth, MapBiomias, and others.

The cartographic products below must be presented:

- Map of Land Use and Occupancy in the Implementation Area. (Containing all land uses on the property(s) that contain the Implementation Area. Such as roads, buildings, open areas, protected areas, etc.).

### 9.4.4.FAUNA AND FLORA

In this item, the general environmental characteristics of the biotic environment of the Implementation Area must be presented, including attributes of the local fauna and flora. The data can be obtained according to the parameters below.

The characterization of vegetation must be done through Primary Data, validated in the field, as well as through Secondary Data, through the information contained in scientific articles from academic institutions and reference publications and in official public databases. The characterization through Secondary Data should also include the support of remote sensing and geoprocessing techniques.

Below, there are the parameters that must be considered for the collection of Primary and Secondary Data regarding vegetation.

Table 10. Parameters for vegetation survey.

Parameters	Description
Use of primary data	Field survey of all points of interest that may affect the properties that will form the Implementation Area. Search geolocated data for each element.
Use of secondary data	Survey of all points of interest that may affect the properties that will form the Implementation Area through Satellite Image, Google Earth, MapBiomias, and others.

Such characterization of the Implementation Area must contain, at least, but not limited to, the attributes described in the table below.

Table 11. Vegetation characterization attributes.

Attributes	Description	Textual sources (secondary data)	Primary data
Biome	Point out the biome(s) in which the Implementation Area is located.	Official and up-to-date government sources. As state platforms; IBGE; MMA and others.	Field validation through observation of plant species and forest structures typical of the biome.
Phytophysiology	Characterize the phytophysionomies present in the Implementation Area	Official and up-to-date government sources. As state platforms; IBGE; MMA and others.	Field validation through observation of plant species and forest structures typical of the biome and phytophysiology.
Ecological Succession Stage	Characterize the stage of ecological succession in the Implementation Area	Satellite images and geoprocessing techniques can support the successional stage estimation.	Field validation through observation of plant species and forest structures typical of the biome and phytophysiology that indicate ecological succession.
Vegetation Conservation Degree	Characterize the degree of vegetation conservation in the	Satellite images and geoprocessing techniques that	Field validation through observation of plant species and forest

Attributes	Description	Textual sources (secondary data)	Primary data
	Implementation Area.	can support the estimation of the fragment's degree of conservation, as well as the presence of risk factors (invasions, deforestation, fires, etc.)	structures typical of the biome and phytophysiology indicate the conservation of the fragment, including the presence of endemic and threatened species. Validation of disturbance factors.
<b>Formation of continuous vegetation corridors</b>	Check the continuity and connection of vegetation fragments, to identify ecological corridors and their importance for the landscape of the region.	Satellite images and geoprocessing techniques can support the estimation of the degree of conservation and continuity of the fragment and connections with adjacent fragments.	Field validation through observation of the forest structure, continuity, and connection of the fragment, supported by drone and satellite images.

The characterization of the vegetation will aim to provide a diagnosis of the vegetation in the area of interest, to recognize the environmental health of the ecosystem and its protected state of conservation, ensuring significant benefits to the climate, communities, and biodiversity.

The cartographic products below must be presented, referring to the vegetation of the Implementation Area, as appropriate.

- Biome and Phytophysiology Map;
- Land use Map, including vegetation;
- Map containing Implementation Area and surrounding landscape, including identified potential disturbance factors.

The characterization of the fauna should be carried out, mostly, through Secondary Data, through literature review in search of information contained in scientific articles, inventories, management plans, and other reference publications, and official databases such as Scielo and Google Scholar.

The search must be carried out by taxonomic groups (mammals, herpetofauna, etc.) since most studies are conducted separately to detect regional fauna, information should be sought in the municipalities to which the Implementation Area belongs and neighboring municipalities, considering the similarity of habitat and forest physiognomies present in the surroundings.

A list of species of possible occurrence must then be presented for the Implementation Area, containing, at least:

- i. Scientific name;
- ii. Popular name;
- iii. Taxonomic classification;
- iv. Endemism;
- v. Threat status (based on official state, national, and global lists);
- vi. Migratory species (birds);
- vii. Consulted sources.

And any information considered relevant about habitat and other similarities of the species found.

Also, the chance encounters with the local fauna during the field visits carried out on site should be considered in the lists. Encounters with fauna specimens can be recorded occasionally during displacements, field expeditions, and even through third parties residents, etc.), and can be considered Primary Data. Such data must be incorporated into the species list, as long as there is identification by a specialist. It is recommended to differentiate, in the list, this type of record as “occasional encounter” or “third party record” when indicated by someone outside the project. Additionally, if the property has carried out its own research or through partnerships with scientific institutions and/or researchers, the data obtained can be aggregated as primary data, provided that all parties agree.

#### **9.4.5. DEVELOPED ACTIVITIES**

Describe all activities developed in the Implementation Area, addressing at least:

- Economic activities;
- Cultural activities;
- Social and environmental activities.
- Service provision activities.

Official governmental textual sources or from owner reports should be used. Present photographs, graphics, and cartographic products as needed.

#### **9.4.6. DIMENSIONS OF THE IMPLEMENTATION AREA**

In this item, the dimensions of the Implementation Area must be presented and characterized, that is, the entire forested area eligible for the application of the Methodology.

The constraints and the method used to determine the area value of the Implementation Area must be demonstrated, as well as pointing out the elements removed from the total area of the property(s) and the perimeter of the forested area.

### **9.5. JUSTIFICATIONS FOR IMPLEMENTATION OF PSA CARBONFLOR**

Present a practical scenario justifying the execution of the PSA in the selected property(s). In this sense, the benefits and differences of the project must be demonstrated.

Specifically, the following topics should be addressed.

### 9.5.1. ECOSYSTEM AND ENVIRONMENTAL SERVICES

Although the Carbon Credits to be issued in PSA Carbonflor for the Implementation Area only reflect the sequestration and stock of carbon, it is important to highlight that the Carbon Credits generated have added value by providing several other Ecosystem Services to society.

Thus, all types of Ecosystem Services provided in the Implementation Area must be described, following the criteria of the Common International Classification of Ecosystem Services ("CICES") and the tabulation presented in that document.

Once identified, for each of the Ecosystem Services, it is necessary to provide an environmental service, which, as defined in Law n° 14.119/2021, involves “*individual or collective activities that favor the maintenance, recovery or improvement of ecosystems*”<sup>8</sup>.

It is important to emphasize that the PES is, per se, the payment for the Environmental Services provided, and not for the existing Ecosystem Services, that is, it demands planning and a sequence of actions for its execution.

A table must be presented listing identified Ecosystem Services and which Environmental Services are provided for each one, according to the example table below. The table to be developed must be based on CICES criteria and codes.

Table 12. Identified Ecosystem Services and Provided Environmental Services.

Identified Ecosystem Services		Provided Environmental Services (example) <sup>9</sup>
Provision services	Water, food, wood, fibers, etc.	Planting of agroforestry species.
Support services	Pollination, seed dispersal, maintenance of biodiversity	Maintenance of native vegetation.
Regulation services	Carbon sequestration (code 2.2.6.1), air purification, and water cycle maintenance.	Recovery of water body APP.
Cultural services	Recreation and tourism (code 3.1.1.2).	Development of programs with the local community.

<sup>8</sup> Article 2, III, of Law No. 14.119/2021.

<sup>9</sup> The table is an example of measures to be taken as environmental services. For each Project, the individualities of the ecosystem, the area and the investment in the services provided must be analyzed. The table of each Project must then be developed, considering these particularities.



### 9.5.2. LOCAL PRESSURES AND FOREST DEGRADATION VECTORS

To recognize the importance of forest conservation in a region, and, therefore, of a project that aims to guarantee the environmental conservation of a certain area, it is important to recognize the agents of degradation to which the place may be subjected.

To identify possible pressures caused by anthropogenic processes that may impact the project area, regional analysis is necessary, which allow the identification of current and future degradation vectors that could potentially reach the surrounding area of the Implementation Area.

As local pressures, factors that represent threats to local phytophysionomies and factors related to social or economic activities that need control are analyzed, such as tourist or extractive activities. On a regional scale, factors of threats to the biome, history of land use, identification of social and economic aspects, identification of legal and illegal activities, trends in urban and agricultural expansion, mining interests, government plans, and projects must be considered, among others.

For the research and development of the chapter, the information provided by databases of official bodies must be used, such as forest inventories, databases from the Brazilian Institute of Geography and Statistics (“IBGE”), from the Institute of Applied Economic Research (“IPEA”), from the Annual Mapping Project of Land Use and Coverage in Brazil (“MapBomas”) , from the National Institute for Space Research (“INPE”), among federal and state agencies, in addition to scientific publications of relevance to each project.

The analysis can be presented through texts and maps that demonstrate the current and future degradation vectors identified.

### 9.5.3. PROJECT CONTRIBUTIONS TO SUSTAINABLE DEVELOPMENT

Based on the need to promote the Sustainable Development Goals (SDGs), this justification must present the Project’s contributions to the SDGs, listing them and demonstrating which actions will be carried out in order to achieve the SDGs, as well as which are the expected results, in table format, as seen below:

Table 13. Example table of the justification “Project Contributions to Sustainable Development”<sup>10</sup>

SDG <sup>11</sup>	Description	Project Contributions	Expected results
13 – Action against global climate change	13.3 Improve education, raise awareness and human and institutional capacity on climate change mitigation, adaptation, impact reduction,	Implementation of biannual programs and workshops with the local community in the PES Project region. Dissemination of the Project and its category, with clarification of the doubts of the local population.	Expand the knowledge of the regional population on the modality of financial return for the conservation of vegetation. Become aware of the urgency of climate action.

<sup>10</sup> The table is an example of measures to be taken to ensure the Sustainable Development Goals. For each Project, the social, environmental and investment individualities in the contributions to be made must be analyzed. The table of each Project must then be developed, considering these particularities.

<sup>11</sup> The SDG classification is available at: <https://sdgs.un.org/goals>.

SDG <sup>11</sup>	Description	Project Contributions	Expected results
	and early warning	Local monitoring agents program.	Reduction of displacements of Project developers in the field. Decreased carbon footprint in the monitoring stage.
1 – Ending poverty in all its forms, everywhere	1.5 – By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social, and environmental shocks and disasters	The Project aims to insert conservationist landowners into the forest carbon market, consequently increasing the income of landowners who, in the past, had no counterpart for the conservation of their areas through the conservation of forests, the maintenance of the local climate is guaranteed, preventing events such as erosion and landslides from occurring.	Increase in the income of conservationist landowners. To protect, through the maintenance of forests, vulnerable communities from extreme weather events.
6 – Clean water and sanitation	6.6 – By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers, and lakes	The Project, by encouraging the conservation of forests, contributes to protecting water bodies such as rivers, lakes, or aquifers, guaranteeing the maintenance of the quality and availability of the resource.	Guarantee the protection of water bodies through the conservation of forests.

## 9.6. CALCULATION CRITERIA

To obtain the amount of Carbon Credits available in the Implementation Area, in order to apply the calculation criteria in which this Methodology is based, the steps listed below must be followed.

Table 14. Summary of calculation criteria.

<b>Project limits</b>	Delimitation step of: <ul style="list-style-type: none"> <li>• Spatial limits</li> <li>• Time limits</li> </ul>
<b>Carbon pool</b>	Step of defining the carbon pools that will be considered in the project. Among: Aboveground biomass (mandatory), belowground biomass, plant litter, dead wood, and soil carbon.
<b>Technical reserve</b>	Step of defining the percentage of credits retained by the project's Technical Reserve.

<b>Baseline scenario</b>	Delimitation step of the Baseline Scenario parameters.
<b>Historical deforestation rates in the reference region</b>	Step of determining the historical rate of deforestation in the reference region, so that it can be used as a premise in the Baseline calculations.
<b>Baseline GHG Reductions</b>	<b>Carbon Stock Estimates</b> Step of determining the carbon stock in all pools selected by the proponent. It may be in its entirety: <ul style="list-style-type: none"> <li>• Carbon stock in trees (aboveground and belowground biomass);</li> <li>• Plant litter carbon stock;</li> <li>• Dead wood carbon stock;</li> <li>• Soil carbon stock</li> </ul>
	<b>Summary of Reductions</b> According to the Baseline Scenario, the GHG Reductions made possible by forest conservation are estimated.
<b>Project GHG Emissions</b>	Estimate of GHG Emissions that may eventually be released into the atmosphere by the Implementation Area and its activities.
<b>Leakage</b>	Leakage verification step and incorporation into estimates, if Leakage is different from zero
<b>Net GHG Reductions and Emissions</b>	Step to equate the estimated Reductions minus the predicted Emissions to obtain the volume in tons of CO <sub>2</sub> equivalent corresponding to the Implementation Area.

### 9.6.1. PROJECT LIMITS

It is necessary to delimit spatial and temporal limits for which the ecosystem service can be considered and the Payment for Environmental Services accounted for. The table below guides the demonstration of such limits.

Table 15. Guidance table for delimitation of Project Limits.

<b>Spatial limits</b>	
<b>Implementation Area</b>	<ul style="list-style-type: none"> <li>• Present the net area of the Implementation Area, as shown in item 9.4.6.</li> <li>• Present the documentary base and coordinates that allowed the delimitation of the area (eg CAR, georeferenced registrations, descriptive memorial, etc.)</li> <li>• Present characterization of phytophysiognomies present in the Implementation Area, indicating the respective carbon stocks (tC/ha).</li> <li>• Present a map featuring the Implementation Area and phytophysiognomies.</li> <li>• The phytophysiognomies database must be current and come from official primary or secondary sources (such as BDIA/IBGE)</li> </ul>
<b>Reference region</b>	The Reference Region is the spatial boundary considered for purposes of comparison with the Implementation Area. In this area, deforestation rates, degradation agents,

	<p>deforestation vectors, and land use and cover patterns are analyzed and subsequently compared with the Implementation Area, allowing for a better definition of strategies for monitoring and conserving carbon stocks.</p> <ul style="list-style-type: none"> <li>• It should consider characteristics like the Project Implementation Area, such as (i) phytophysiology, (ii) biome (iii) soil type, (iv) altitude, and (v) vectors and agents of deforestation. The region does not need to be a continuous area, presenting an extension in the area (ha) ≥ Project Implementation Area.</li> <li>• A map must be produced featuring the Reference Region and its geolocation.</li> </ul>
<b>Temporal limits</b>	
<b>Crediting Period</b>	Provide the date specification, start DD/MM/YYYY and end DD/MM/YYYY (30 years, maximum period).
<b>Reference Region Validation Period</b>	Provide the date specification, start DD/MM/YYYY and end DD/MM/YYYY (10 years).
<b>Baseline validity</b>	Provide the date specification, start DD/MM/YYYY and end DD/MM/YYYY (10 years).
<b>Monitoring</b>	Provide the date specification, start DD/MM/YYYY, and indicate the periodicity and/or interval between monitoring events, as per the instructions in item 8.9.2.

### 9.6.2. CARBON POOLS

For the definition of the Baseline Scenario, it is necessary to select the carbon pools to be considered in the accounting of Carbon Credits. This Methodology considers aboveground biomass carbon stock mandatory for the estimates of GHG reduction in the Baseline scenario.

Present the selection in table form, as shown below, indicating which are the selected pools and justifying the choice and significance of each one, considering the specifics of the project.

Table 16. Carbon pools considered for the Baseline scenarios.

	<b>Carbon pool</b>	<b>Included/excluded</b>	<b>Justification</b>
<b>Baseline Scenario</b>	Aboveground biomass	<i>Fill in</i>	<i>Fill in</i>
	Belowground biomass	<i>Fill in</i>	<i>Fill in</i>
	Plant litter	<i>Fill in</i>	<i>Fill in</i>
	Deadwood	<i>Fill in</i>	<i>Fill in</i>
	Soil	<i>Fill in</i>	<i>Fill in</i>

### 9.6.3. TECHNICAL RESERVE

Good practices in forest carbon projects determine the establishment of a Technical Reserve, which corresponds to a percentage of Carbon Credits in the Implementation Area that cannot be sold before the 25th year of the Crediting Period.

It is a kind of insurance against unforeseen events that may happen in the Implementation Area and that may compromise the continuity of the provision of Ecosystem Services, such as fires, invasions, and withdrawal, among others. In this way, the reserve acts as a risk mitigation measure.

The percentage of the Technical Reserve, for this Methodology, is 10% (ten percent). A different percentage for the Technical Reserve may be applied, as long as it is justifiable and presented in a transparent and verifiable manner.

#### 9.6.4.METHODOLOGY DEVIATION

Describe and justify any methodology deviations applied to the project activity, providing evidence to demonstrate the following:

- The deviation does not harm the project's conservative estimate of GHG Emissions reduction;
- Deviations refer only to estimation, monitoring, or measurement criteria and procedures, and do not relate to any other part of the Methodology.

#### 9.6.5.BASELINE SCENARIO

The Baseline Scenario represents the equivalent CO2 Emissions that would occur in the Implementation Area in the absence of the PES project and the environmental conservation service. It is the estimate of hypothetical deforestation of the forest cover of the Implementation Area.

The Baseline Scenario must consider the following aspects:

- Valid for a fixed period of 10 years from the start date of crediting. Being reassessed for readjustment in new VaRs.
- The land use change that is the basis of the deforestation hypothesis is justified in the Reference Region.
- Objectively describe the Baseline Scenario, identifying the agents and vectors of deforestation, complement indicating and characterizing the alternative scenarios for land use that would occur in the absence of the project.

#### 9.6.6.HISTORIC DEFORESTATION RATES IN THE REFERENCE REGION

This step should quantify (hectares/year) the historical deforestation rate during a 10-year historical reference period within the reference region. The rate should be applied to the estimates of GHG Reductions (see item 9.6.9) to quantify deforestation pressure in a regional context, highlighting the importance of the environmental service provided by the project

To obtain the deforestation rates in the Reference Region, the orientations in the table below must be followed.

Table 17. Obtaining the historical deforestation rate of the Reference Region.

Historic Deforestation Rate in the Reference Region	
Access to official Secondary Data	Collect data that will be used to analyze deforestation during the historical reference period within the Reference Region.

<b>Map the historic deforestation</b>	Through geoprocessing tools, obtain the progress of deforestation annually in terms of area.
<b>Calculate the historical deforestation rate</b>	$i_{deforestation} = \frac{\sum(\text{Area deforested in the RR during the 10year period (ha)})}{10}$ RR = Reference Region
<b>Results</b>	The result of the calculations should be the forest area at the beginning and end of the historical reference period, and the number of hectares deforested for each interval of the historical reference period.

### 9.6.7. BASELINE GHG REDUCTIONS

Based on the variables previously determined, it is assumed that the Implementation Area will be deforested in the same way as the Reference Region and its historical deforestation rate, and the amount of GHG that would be released into the atmosphere in this deforestation event is calculated, obtaining, thus, the value of Carbon Stock that the Implementation Area is storing with its conservation.

To obtain the summary of the GHG Reductions in the Baseline (item 9.6.7.2) the carbon stocks must be calculated for all the pools selected by the proponent, according to the following item.

#### 9.6.7.1. CARBON STOCK ESTIMATES

Baseline net GHG Reductions for all carbon pools should be calculated according to the equations set out below:

$$\Delta C_{RLBt} = \Delta C_{\acute{a}rvore\ BL,t} + \Delta C_{MM\ LB,t} + \Delta C_{SE\ LB,t} + \Delta C_{COS\ LB,t} \quad \text{Equation 1}$$

Where:

$\Delta C_{RBSL,t}$	=	Baseline net GHG removals by pools in year $t$ in Reforestation activity; tCO <sub>2</sub> -e
$\Delta C_{\acute{a}rvore\ BL,t}$	=	Change in Carbon Stock in tree biomass at baseline within the project boundary in the year $t$ ; tCO <sub>2</sub> -e
$\Delta C_{MM\ LB,t}$	=	Change in Carbon Stock in deadwood biomass at baseline within the project boundary, in the year $t$ ; tCO <sub>2</sub> -e
$\Delta C_{SE\ LB,t}$	=	Change in Carbon Stock in the baseline plant litter biomass within the project boundary, in the year $t$ ; tCO <sub>2</sub> -e
$\Delta C_{COS\ LB,t}$	=	Change in soil organic Carbon Stock at baseline within the project boundary, in the year $t$ ; tCO <sub>2</sub> -e

$$\Delta C_{DELBt} = \Delta C_{\acute{a}rvore\ BL,t} + \Delta C_{MM\ LB,t} + \Delta C_{SE\ LB,t} + \Delta C_{COS\ LB,t} \quad \text{Equation 2}$$

Where:

$\Delta C_{DELBt}$	=	Baseline net GHG removals by pools in year $t$ in Avoided Deforestation activity; tCO <sub>2</sub> -e
$\Delta C_{\acute{a}rvore\ BL,t}$	=	Change in Carbon Stock in tree biomass at baseline within the Implementation Area in the year $t$ ; tCO <sub>2</sub> -e

$\Delta C_{MM\_LB,t}$	=	Change in Carbon Stock in deadwood biomass at baseline within the Implementation Area, in the year $t$ ; tCO <sub>2</sub> -e
$\Delta C_{SE\_LB,t}$	=	Change in Carbon Stock in the baseline plant litter biomass within the Implementation Area, in the year $t$ ; tCO <sub>2</sub> -e
$\Delta C_{COS\_LB,t}$	=	Change in soil organic Carbon Stock at baseline within the Implementation Area, in the year $t$ ; tCO <sub>2</sub> -e

It is worth noting that:

- Only the pools selected by the proponent are considered in the carbon stock equation.
- The above and below-ground biomass stock estimates presented will be valid in the Baseline Scenario, thus being considered as the stock at the start date of crediting. That is, such estimates will be treated as constant for 10 years. In the new VaR, the inventory estimates should be revised.

### (A) COLLECTION OF BIOMASS DATA

For the projection of the carbon stock estimate for the selected pools, access to data from the following sources is considered:

Table 18. Guidance for collecting biomass data.

Biomass data collection	
Primary Data Collection	Sample measurements and/or combined with remote sensing;
Secondary Data Collection	<ul style="list-style-type: none"> <li>i. Existing data applicable to the local situation (data available in the literature, referring to scientific and verifiable studies);</li> <li>ii. National data (e.g. from the national forest inventory or the national greenhouse gas inventory (GHG));</li> <li>iii. Data from neighboring countries with similar conditions;</li> <li>iv. Global application data.</li> </ul>

#### 9.6.7.1.1. CARBON STOCK ESTIMATE – TREE BIOMASS ( $C_{ARVORE,I}$ )

To choose the estimation method, it is recommended to apply the method according to the specifications established in the table below:

Table 19. Methods for estimating carbon stock in biomass.

Method for estimating carbon stock in tree biomass – Avoided Deforestation			
Protected Area with public conservation commitment?			
Yes			No
What is the successional stage of forest cover?			
Initial	Medium	Advanced	Measurements of samples.
↑ $\Delta C$	↑ $\Delta C$	⇌ $\Delta C$	
Measurements of samples		Modeling estimation of tree	

**(B) MODELING ESTIMATE OF TREE GROWTH AND STAND DEVELOPMENT**

This method is applicable for estimating the carbon stock projection in tree biomass. Under this method, existing data can be used in combination with tree growth models to predict tree growth and the development of stands (natural or planted) over time. Stand parameters such as number of stems per hectare or basal area per hectare, diameter class structure, and species composition at different points in time are projected from presumed good forestry and forest management practices (e.g. planting density, survival rate, thinning and pruning operations and respective calendar)

Tree growth (e.g. diameter or height increment) can be projected considering tree growth data from past experience (e.g. age diameter curves, yield tables, yield curves), while also considering relevant site factors (e.g. soil, terrain, slope, aspect, precipitation) and standing parameters.

The estimated projection of carbon stored in tree biomass is not subject to uncertainty control, although project proponents should use the best available data and models that apply to the project site and tree species.

**(C) MEASUREMENTS OF SAMPLING PLOTS**

Under this method, the carbon stock in trees is estimated based on measurements of sampling plots. Sampling plots are installed in one or more strata (e.g. types of phytophysiognomies). Regarding the sample design, it is considered:

Table 20. Sample design parameters.

Sampling method	Plot size
<ul style="list-style-type: none"> <li>• Random sampling</li> <li>• Systematic sampling</li> <li>• Double sampling</li> </ul>	<ul style="list-style-type: none"> <li>• Fixed area</li> <li>• Variable area</li> </ul>

Clearly present the sampling method, the type of plot, and the variables measured. Providing the relevant references and equations used when defining the sample design, as well as the rationale for the calculation to define sample sufficiency.

Area stratification is recommended whenever there is spatial variability in the carbon stock, conditioned by environmental factors (eg soil, altitude, and phytophysiognomy). After validation of the Baseline Scenario, at each monitoring event, the proponent can add or remove strata, if justifications are given.

The steps presented below must be observed for estimating the Carbon Stock in tree biomass when applying the Plot Measurement Method:

**Step 1.** Determine the dimensions (diameter and height, for example) of the trees within each plot, considering all individuals with a diameter at breast height (DBH) ≥ 5 cm.

**Step 2.** Select or develop an appropriate and validated allometric equation for each phytophysiognomy or each species or family identified in the inventory. Any selected equation can only be used if applicability has been demonstrated and validated in any guidelines:



- i. The equation is used in the national forest inventory, or the national GHG inventory;
- ii. The equation has been used in the country's forestry sector for ten years or more;
- iii. The equation was derived from a dataset of at least 30 trees sampled, and the value of the coefficient of determination ( $R^2$ ) obtained was not less than 0.85.

**Step 3.** Determine the aboveground and belowground biomass value of the plot (i.e. tree biomass per hectare at the center of the plot) as follows (all time-dependent variables refer to the measurement time):

$$b_{j,p,i} = \frac{B_{\acute{a}rvore,p,i}}{\acute{A}rea_{parcela}} \quad (1)$$

$$B_{\acute{a}rvore,p,i} = \sum_j (B_{\acute{a}rvore,j,p,i}) \quad (2)$$

$$B_{\acute{a}rvore,j,p,i} = \sum_l (B_{\acute{a}rvore,j,p,i,l}) * (1 + R_j) \quad (3)$$

Where:

$b_{j,p,i}$	=	Aboveground and belowground tree biomass per hectare in sample plot p of stratum i; t.. ha <sup>-1</sup>
$B_{\acute{a}rvore,p,i}$	=	Aboveground and belowground tree biomass in sample plot p of stratum i; t. ha <sup>-1</sup>
$\acute{A}rea_{parcela}$	=	Size of the sample plot in the stratum i; ha
$B_{\acute{a}rvore,j,p,i}$	=	Above and below ground tree biomass of species group and/or phytophysiognomy j in sample plot p of stratum i; t.
$B_{\acute{a}rvore,j,p,i,l}$	=	Biomass of trees l of species and/or phytophysiognomy j in sample plot p of stratum i; t.
$R_j$	=	Root-shoot relationship for tree species; t. ha <sup>-1</sup> . $R_j = e^{\frac{(-1,085+0,9256*\ln B_{\acute{a}rvore,j,p,i,l})}{B_{\acute{a}rvore,j,p,i,l}}}$

**Step 4.** Determine the average carbon stock in trees within the tree biomass estimation strata:

$$C_{\acute{a}rvore} = \frac{44}{12} * CF * A * \sum_{i=1}^m w_i * \frac{b_{j,p,i}}{n_i} \quad (4)$$

Where:

$C_{\acute{a}rvore}$	=	Carbon stock in trees in the strata; t CO <sub>2</sub> eq
CF	=	Carbon fraction of tree biomass; t C (biomass t) <sup>-1</sup> . A default value of 0.47 will be used.
A	=	Area of stratum i; ha
$w_i$	=	Weight of stratum i about the total area of tree biomass estimate ( $w_i = \text{stratum area}/\text{Project area}$ ); dimensionless.

$b_{j,p,i}$	=	Tree biomass above and below ground per hectare in sample plot p of stratum i; t. ha <sup>-1</sup>
$n_i$	=	Number of sample plots in stratum i.
44/12	=	The molecular weight ratio of CO <sub>2</sub> to carbon, tCO <sub>2-e</sub> t C <sup>-1</sup>

#### 9.6.7.1.2. CARBON STOCK ESTIMATE – PLANT LITTER ( $\Delta C_{SE\_LB,t}$ )

The carbon pool stored in plant litter can only be considered when the biomass remains in situ and is not removed from the project limits by any type of human activity.

Conservatively, for all strata, the carbon stock in plant litter is estimated as:

$$\Delta C_{SE\_LB,t} = DF_{Li} * \Delta C_{\text{arvore\_BL},t}$$

Where:

$\Delta C_{SE\_LB,t}$	=	Change in Carbon Stock in the baseline plant litter biomass within the Implementation Area, in year t; t CO 2-e
$DF_{Li}$	=	Conservative factor that expresses the carbon stock in the litter as the percentage of 1% of the carbon stored in the biomass of the trees <sup>12</sup> ; percentage
$\Delta C_{\text{arvore\_BL},t}$	=	Change in Carbon Stock in base tree biomass within the Implementation Area in year t; t CO 2-e

A different value for the default factor  $DF_{Li}$  can be applied, provided it is justifiable and presented in a transparent and verifiable manner.

#### 9.6.7.1.3. CARBON STOCK ESTIMATE – DEAD WOOD ( $\Delta C_{MM\_LB,t}$ )

The carbon pool stored in dead wood can only be considered when the biomass remains in situ and is not removed from the project limits by any type of human activity.

Conservatively for all strata, the carbon stock in dead wood is estimated as:

$$\Delta C_{MM\_LB,t} = DF_{DW} * \Delta C_{\text{arvore\_BL},t}$$

Where:

$\Delta C_{MM\_LB,t}$	=	Change in Carbon Stock in baseline deadwood biomass within the Implementation Area, in year t; t CO 2-e
$DF_{DW}$	=	Conservative factor that expresses the Carbon stock in dead wood as the percentage of 1% of the carbon stored in the biomass of the trees <sup>13</sup> ; percentage
$\Delta C_{\text{arvore\_BL},t}$	=	Change in Carbon Stock in base tree biomass within the Implementation Area in the year t; t CO 2-e

<sup>12</sup>A/R Methodological tool. **Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities.** Version 03.1. UNFCCC. Available at: <https://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-12-v3.1.pdf>.

<sup>13</sup>A/R Methodological tool. **Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities.** Version 03.1. UNFCCC. Available at: <https://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-12-v3.1.pdf>.

A different value for the default factor  $DF_{DW}$ , can be applied, provided it is justifiable and presented in a transparent and verifiable manner.

#### 9.6.7.1.4. ESTIMATE OF SOIL ORGANIC CARBON STOCK ( $C_{COS_{LB,t}}$ )

Soil organic carbon stock (COS) is conservatively estimated by applying the standard value of average soil carbon ( $\Delta COS$ ) under primary vegetation for each of the soil-vegetation associations described in Table 23.<sup>14</sup>

The tables below should be consulted to identify the vegetation and soil categories to obtain the soil-vegetation association and the respective carbon stock.

Provide evidence and justification for choosing the soil and vegetation categories that condition the default COS value adopted.

Table 21. Categories of aggregate classes of vegetation in the national territory adapted from Bernoux et al. (2002).

Vegetation Categories	
V1	Open Amazon Forest
V2	Dense Amazon Forest
V3	Atlantic Forest
V4	Deciduous Seasonal Forest
V5	Semi-Deciduous Seasonal Forest
V6	Mixed Ombrophilous Forest
V7	South Savanna
V8	Amazon Savanna
V9	Cerrado
V10	South Steppe
V11	Caatinga
V12	Pantanal
V13	Mountain and Highland Ecological Refuges
V14	Pioneer Formation Areas
V15	Sandy Areas and Oligotrophic Woody Vegetation of Wetlands

Table 22. Categories of aggregate classes of soil in the national territory adapted from Bernoux et al. (2002).

Soil categories	
S1	Soils with high-activity clay
S2	Latosols with low activity clay
S3	Non-Latosols with low activity clay
S4	Sandy soils
S5	Hydromorphic soils
S6	Other Soils

<sup>14</sup> [Quarta Comunicação Nacional do Brasil à Convenção-Quadro das Nações Unidas sobre Mudança do Clima by Ministério da Ciência, Tecnologia e Inovações - Issuu](#)

The Carbon Stock values presented in Table 23 correspond to the median values presented by Bernoux et al. (2002).

Table 23. Soil carbon stock by soil-vegetation association.

Vegetation categories	Soil categories					
	S1	S2	S3	S4	S5	S6
	$\Delta COS$ tC/ha					
V1	50.9	47.5	48.9	41.1	43.6	78.7
V2	32.2	51.9	46.9	50.6	52.7	48.1
V3	58.3	52.3	42.9	63.3	35.8	417.8
V4	46.7	30.8	40	25.9	32.7	31.8
V5	40.9	44.3	37.4	27	53.6	31.6
V6	98.8	102.5	56.8	0	85.4	0
V7	64.2	90.9	51.6	0	74.2	32.8
V8	48	19.8	38.1	43.7	34.6	29
V9	24.4	43.1	36	19.2	66.5	32.9
V10	66	46.6	61.2	0	33.8	49.9
V11	24.2	25.8	26.2	15.1	25.1	20.9
V12	33.8	0	35.2	35.4	105.2	21.7
V13	34.1	50.4 <sup>1</sup>	39.9	0	0	0
V14	73	41.3 <sup>1</sup>	33.1	50.2	59.2	37.2
V15	50.9 <sup>2</sup>	46.8	48.1	61.7	90.5	120.9

Source: Bernoux et al. (2002). <sup>(1)</sup> Only value reported <sup>2</sup> See particularities described in Bernoux et al. (2002).

Conservatively for all strata, soil organic carbon stock is estimated as:

$$C_{SOLO\_LB,t} = \Delta COS * A$$

Where:

$C_{SOLO\_LB,t}$	=	Change in baseline soil organic carbon stock within the project boundary in year t; t CO 2-e
$\Delta COS$	=	Conservative factor that expresses the average value of soil organic carbon stock by soil-vegetation association; tC ha <sup>-1</sup>
$A$	=	Stratum area i; ha

Other methods of obtaining Soil Organic Carbon Stock must follow the parameters of the METHODOLOGY DEVIATION item.

### 9.6.7.2. SUMMARY OF BASELINE GHG REDUCTIONS

Present the results of the Summary of Baseline GHG Reductions according to the table model presented below, providing the final result, considering all the pools selected by the proponent, in tons of CO<sub>2</sub> equivalent.

Table 24. Example table for GHG Reductions at Baseline.

Year	Above ground biomass C stock (tC.ha <sup>-1</sup> .ano <sup>-1</sup> )	Below ground biomass C stock (tC.ha <sup>-1</sup> .ano <sup>-1</sup> )	Plant litter C stock (tC.ha <sup>-1</sup> .ano <sup>-1</sup> )	Dead wood C stock (tC.ha <sup>-1</sup> .ano <sup>-1</sup> )	Soil C stock (tC.ha <sup>-1</sup> .ano <sup>-1</sup> )*	Baseline C stock (tC.ha <sup>-1</sup> .ano <sup>-1</sup> )	Baseline (tCO <sub>2</sub> e.a no <sup>-1</sup> )
Fill in	Fill in	Fill in	Fill in	Fill in	Fill in	Fill in	Fill in
...	...	...	...	...	...	...	...

### 9.6.8. PROJECT GHG EMISSIONS

The GHG Emissions in the Implementation Area must be evidenced and accounted for, to specify the discounts in the estimation of the volume of Carbon Credits referring to deforestation activities in the Implementation Area. Emissions are obtained through the following formulas.

$$GEE_{Projeto} = E_{CFi,t} + E_{Bio\ i,j} + N_2O_{i,j}$$

Where:

$GEE_{Projeto}$	=	Greenhouse gas emissions as a result of deforestation activities within the Implementation Area in stratum i in year t; t CO <sub>2</sub> e
$E_{CFi,t}$	=	Emissions from the combustion of fossil fuels in stratum i within the Implementation Area in the year t; t CO <sub>2</sub> e
$E_{Bio\ i,j}$	=	CO <sub>2</sub> and non-CO <sub>2</sub> emissions due to biomass burning in stratum i in year t; t CO <sub>2</sub> e
$N_2O_{i,j}$	=	Direct N <sub>2</sub> O emission as a result of nitrogen application on alternative land use in stratum i within the Implementation Area in the year t; t CO <sub>2</sub> e

Other methods of estimating GHG Emissions within the Project Implementation Area must follow the parameters of the METHODOLOGY DEVIATION item.

### 9.6.9. LEAKAGE

The assessment of leakage consists of observing, according to the activities developed in the Implementation Area and surroundings, what would be the possibilities that the implementation of PSA Carbonflor and the remuneration through the sale of Carbon Credits would generate displacement of deforestation to other places, such as side effects.

- A) For Baseline estimates, Leakage can be considered zero when:
- i. The Owner has no evidenced intention to generate deforestation in another location;
  - ii. Implementation Area has been focused on conservation and sustainable use for at least 10 years;

- iii. When, if any, the incidence of illegal logging in the Implementation Area, the accumulated biomass extracted does not exceed the percentage of 5% of the total biomass stock.

B) When Leakage Emissions cannot be considered equal to zero, the project must:

- i. Allocate a Leakage Belt, around the property(s) with an area (ha)  $\geq$  90% of the Implementation Area, where Leakage Emissions must be estimated and monitored. The belt must be allocated in the immediate surroundings considering a radius of 5 kilometers under the forest cover of the Implementation Area. Observing the similarity of environmental aspects (eg. soil type, altimetry, and phytophysionomies) and social (deforestation agents and vectors) aspects, compared to the Implementation Area.
- ii. Describe how the potential sources of Leakage are defined and how they are calculated and considered in the estimation of Net Reductions and Emissions of GHG;
- iii. Present a description of the measures adopted to mitigate potential leaks arising from the project.
- iv. Present cartographic product indicating the location and characteristics of the selected Leakage belt.

When the Implementation Area is not continuous, that is, composed of discrete parcels, the Leakage Belt can be allocated around a single property, observing the minimum required area extension (see item B, 'i' above). In this case, consider the sum of all discrete area parcels to calculate the equivalent area of the Leakage belt.

The estimate of GHG Emissions in the Leakage Belt is calculated from the application of the equation:

$$GEE_{vazamento} = \Delta C_{DELbT} * i_{desmatamento}$$

Where:

$GEE_{vazamento}$	=	Greenhouse gas emissions as a result of the displacement of deforestation activities to the Leakage belt in stratum i in the year t; t CO <sub>2</sub> e
$i_{desmatamento}$	=	Deforestation rate in the Reference Region; ha.year <sup>-1</sup>

Other methods of estimating GHG Emissions caused by the displacement of deforestation activity due to the implementation of the project must follow the parameters of the item DEVIATION OF METHODOLOGY.

#### 9.6.10. NET GHG REDUCTIONS AND EMISSIONS

To obtain the volume of tons of CO<sub>2</sub> equivalent available for the generation of Carbon Credits in the Implementation Area, the Reductions provided by conservation must be equated by deducting all Emissions and Leakages considered by the proponent, according to the equation below.

$$\begin{aligned}
 \text{Net GHG (tCO}_2\text{e)} &= \text{Reductions} - \text{Project Emissions} - \text{Leakage} - \text{Reductions} - \text{Project} \\
 &\quad - \text{Vazamento} - \text{Reserva T cnica} \text{ Technical Reserve}
 \end{aligned}$$

Quantify the Net GHG Emissions Reductions, summarizing the main results using the table below. Specify the breakdown of annual GHG Emissions Reductions.

Table 25. Example table for GHG Reductions and Emissions results.

Year	Estimation of reductions and removals at Baseline (tCO <sub>2</sub> e/year)	Leakage Emissions Estimate (tCO <sub>2</sub> e/year)	Estimate Emissions in the Implementation Area (tCO <sub>2</sub> e/year)	Accumulated Reductions (Year 2-Year 1) (tCO <sub>2</sub> e/year)	Technical Reserve (tCO <sub>2</sub> e/year)	Net reduction of GHG Emissions (tCO <sub>2</sub> e/year)
Year 1	Fill in	Fill in	Fill in	Fill in	Fill in	Fill in
Year 2	Fill in	Fill in	Fill in	Fill in	Fill in	Fill in
Year 3	Fill in	Fill in	Fill in	Fill in	Fill in	Fill in
...	...	...	...	...	...	...

## 9.7. MONITORING PLAN

The purpose of the Monitoring Plan is to monitor GHG Reductions and Emissions during the Crediting Period in the Implementation Area.

Monitoring of the Implementation Area encompasses continuous activities for surveillance of the area, to detect changes in land use or occurrences such as fire, suppression of vegetation, or other activities that may influence the quantification of carbon stocks over time.

Carbon stocks will be subject to periodic verifications, carried out through targeted methods, to integrate the Monitoring Plan.

The table below presents the monitoring modules that must be carried out at PSA Carbonflor, when applicable, as well as the responsible parties. It should be noted that Verification Monitoring and Baseline Review are mandatory and result in VeR and VaR reports.

Table 26. PSA Carbonflor Monitoring Guideline.

Monitoring	Activity	Frequency	Report
Monitoring of Project Implementation and GHG Emissions	Surveillance and Verification of GHG Emissions	Constant	VeR
Forest Coverage Monitoring	Surveillance	Annual	
Leakage Monitoring	Surveillance	Annual	
Monitoring of changes in the Carbon Stock	Stock verification	1 to 3 years	VaR
Baseline Review	Baseline Scenario Validation.	10 years	

- Monitoring of Project Implementation and GHG Emissions:** Continuous monitoring of the internal management processes and operations of the property(ies) that make up the Implementation Area. Prevention and reporting of deforestation events or other occurrences verified by a team on-site to the PSA

Carbonflor management team, for proper records and methodological calculations. Include evidence in the Verification Report.

- **Forest Coverage Monitoring:** Annual monitoring using geoprocessing techniques to investigate changes in forest cover in the Implementation Area. Include evidence in the Verification Report.
- **Leakage Monitoring:** Annual monitoring through geoprocessing techniques to investigate possible leaks. Include evidence in the Verification Report.
- **Monitoring of changes in the Carbon Stock:** measurement of carbon stocks in all selected pools, applying one or a combination of the monitoring methods presented in item 9.7.1. After carrying out the monitoring activities of carbon stocks in the respective pools, the results must be reported in the VeR, together with the other monitoring modules (except for the Baseline Review module).
- **Baseline Review:** Validation of VaR assumptions, calculations, and conclusions. Production of a new Validation Report.

In this item, the monitoring to be carried out, the monitoring activities, and the frequency and appointment of those responsible should be listed. Present in table form, as shown above.

### 9.7.1. MONITORING METHODS

Each monitoring module follows an appropriate monitoring method guided by this Methodology. The table below demonstrates how to select the monitoring method that suits the PES project under development.

Table 27. Guidance for Selection of Monitoring Method.

Monitoring Method - Avoided Deforestation			
Protected Area with public conservation commitment?			
Yes			No
What is the successional stage of the forest cover?			
Initial	Medium	Advanced	Forest Inventory - mandatory; Remote Sensing - optional
↑ ΔC	↑ ΔC	↔ ΔC	
Forest Inventory - mandatory; Remote Sensing - optional		Demonstration of Non-Decrease and/or Remote Sensing.	

After selection, each method should be justified and presented in a table format, according to the guidelines below.

#### 9.7.1.1. FOREST INVENTORY

If the method of measuring plots has been adopted in the Baseline Estimate, the proponent may consider the same sampling design (allocation of plots) for monitoring events.

See the method in item (c) MEASUREMENTS OF SAMPLING PLOTS of this Methodology.



### 9.7.1.2. REMOTE SENSING

Through Geographic Information Systems ("GIS"), remote sensing techniques will be used to monitor the Implementation Area over the 30 years of the Crediting Period, and also to support the calculation of areas for validation of carbon stocks held every decennial.

The Remote Sensing assessment must follow the following guidelines:

Data usage	
<b>Satellite images</b>	The use of satellite images, with a resolution of 30 meters (LandSat or Sentinel), or greater, up to 2 meters (CBERS4A or others), allows specific analyzes and calculations in fire events, changes in land use, unscheduled suppression of vegetation, and identification of deforested areas. It also allows the use of tools that cover vegetation indices, such as the Normalized Difference Vegetation Index ("NDVI") and Enhanced Vegetation Index ("EVI"), among other possible techniques to be worked together for an integral analysis of the area.
<b>Secondary data</b>	Remote sensing techniques can be combined with Secondary Data from projects made available by official bodies, such as INPE, IBGE, MapBiomas, and SOS Mata Atlântica, among others, for better correspondence and detection of events that may occur more realistically.
<b>Drones</b>	Drones with high-resolution RGB cameras can be used for monitoring the vegetation cover, being an important tool for the analysis of large areas and/or remote and difficult-to-access areas. Also, when associated with lidar sensors, which emit laser beams in the near-infrared (IR) band, they make it possible to model the land surface three-dimensionally and quantify tree biomass, favoring forest carbon stock estimates.
Application	
<b>Annual monitoring of forest cover in the Implementation Area</b>	<p>This is surveillance monitoring. Remote Sensing helps to verify adverse events that generate changes in land use, forest cover, and any disturbance that impacts carbon storage.</p> <p>This monitoring must be carried out annually by the proponent, who, in turn, stores this information to report in the next VeR.</p>
<b>Annual leakage monitoring</b>	<p>This is surveillance monitoring. Remote Sensing helps in the verification of possible displacements of land use conversion in the surroundings of the properties that make up the Implementation Area.</p> <p>This monitoring must be carried out annually by the proponent, who, in turn, stores this information to report in the next VeR.</p>

It is worth mentioning that regardless of the method selected for monitoring, it is necessary to adopt procedures and protocols of good practices, to gather

comprehensive documentation of all measurements and data collection, processing, post-processing, classification, and evaluation of the data collected. The procedures must be described and detailed enough to allow the replication of sampling, aiming at controlling and guaranteeing the quality of data management.

### 9.7.1.3. METHOD OF DEMONSTRATION OF NO-DECREASE

The method of demonstration of no-decrease is based on the approaches suggested by the IPCC, and procedures, methodologies, and tools approved by the UNFCCC and VCS, more specifically, the methodological tool *AR-TOOL14 - Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities, Version 04.2.*<sup>15</sup>

This method is considered efficient when there is a need to present a Verification Report and certification at a time when the increase in biomass in the project, since the previous verification, may not be large enough to justify the cost of conducting a forest inventory.

The condition of the forest cover established in the Implementation Area refers to the stability of the Carbon Stock in the pools estimated for the Baseline Scenario. Therefore, the constancy of the stock over time is considered since the vegetation of the Area is in an advanced successional stage and has been protected through environmental control and surveillance procedures favorable to conservation. Therefore, in this scenario, it is expected that the stock will remain stable during the Crediting Period. The assumption could not be considered true if we were dealing with forests in the early stages of regeneration, where there is a tendency for growth and increase in biomass with the advancement of natural regeneration of the ecosystem.<sup>16</sup>

In this way, the Methodology applies the method of “demonstration of no-decrease” for verification and validation of the Baseline Scenario in the monitoring events of the Implementation Area, assuming that all analyzes and estimates of the Carbon Stock, in the pools under verification, will be conducted through good monitoring practices, within the 90% confidence interval, as was done with the estimates at time zero (Baseline Scenario).

In this monitoring method, each phytophysiology identified in the Implementation Area must be considered as a stratum. For each stratum where the revisited estimate is within the 90% confidence interval with respect to the Baseline Scenario estimate (t=0), the initial stock estimate will take precedence and can be considered the same.

In strata whose revisited estimate is outside (i.e. greater or less than) the 90% confidence interval with respect to the Base Scenario estimate (t=0), the new stock estimate takes precedence and will be used for the subsequent period.

This method is only applicable to estimates aimed at monitoring the Implementation Area. It is possible to demonstrate that the biomass of trees in one or more strata did not decrease if compared with the biomass of trees estimated in the Baseline Scenario. To confirm the hypothesis, it must be considered that:

- i. No logging has taken place in the strata since the previous estimate;

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<sup>15</sup> A/R Methodological tool. **Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities.** Version 04.2. UNFCCC. Available at: <https://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-14-v4.2.pdf>

<sup>16</sup> CHAZDON, R. Regeneração de florestas tropicais. Boletim do Museu Paraense Emílio Goeldi Ciências Naturais, v.7, n.3, p.195- 218, 2012.

- ii. The stratum was not affected by any disturbance (e.g. pest, fire) that could decrease the carbon stock in the trees;
- iii. The tree canopy cover in the stratum has remained the same since the previous estimate.

For analysis and confirmation of the listed conditions, remote sensing techniques applied to each case or event may be used, allowing spatial analyzes integrated with other Secondary or Primary Data.

Once the three conditions are confirmed in the Implementation Area, the no-decrease method can be considered valid.

For demonstration, all monitoring reports must prove such criteria.

The “demonstration of no-decrease” method will take precedence during the execution of monitoring periods as it can substantially reduce the cost of collecting sample data needed to achieve a level of uncertainty within the desired threshold for estimates of carbon in the Implementation Area.

From the validation of the estimates of above and below-ground biomass stocks (biomass in trees) by the non-decrease demonstration method, the constancy of the other pools is assumed given the relationship between them.

If the criteria listed for the application of the non-decrease method are not met, the deduction calculations equivalent to the calculations of Reductions in the Baseline Scenario for all pools will be applied.

## 10. VERIFICATION REPORT

### 10.1. VeR SUMMARY

The Verification Report must have the items described in the table below and presented in the following items.

Table 28. VeR Summary.

Item	Description
Introduction	Brief description of the project and its objectives, according to the scope of maintaining the forest carbon stock through the provision of the PSA Carbonflor environmental conservation service.
PSA Carbonflor Guidelines	Resume the guidelines set for the project for project contextualization. See item 5
Project Period	See item 9.2.
Eligibility Criteria	See item 9.3.
Characterization of the Implementation Area	See item 9.4.
Justification for Implementation	See item 9.5.
Project limits	See item 9.6.1.
Carbon pools	See item 9.6.2.
Methodology Deviation *	See item 9.6.4.
Monitoring Plan	Describe the organizational structure of monitoring activities, measurements of carbon

	pools, and estimation methods adopted by the project. See item 10.2.
Execution and Results of the Monitoring Plan	Describe the implementation status of the project activity(ies), including information on necessary changes to the monitoring plan and deviations from the m Methodology. See item 10.3.
Baseline GHG Reductions *	See item 9.6.7.
Project GHG emissions *	See item 9.6.8.
Leakage*	See item 9.6.9.
Net GHG Reductions and Emissions *	See item 9.6.10.

\* Consider the monitoring period for the item description.

## 10.2. MONITORING PLAN

Describe the process and schedule followed for monitoring carbon pools during this monitoring period, including details on the following:

- The organizational structure, responsibilities, and competencies of the personnel who carried out the monitoring activities;
- The methods used for measuring, recording, and storing data on monitored parameters;
- The procedures used to handle any internal audit performed and any non-conformities identified;
- Implementation of sampling approaches, including levels of accuracy achieved, sample sizes, location of sample plots, stratification, and measurement frequency;
- Where applicable, demonstrate that the required level of confidence or accuracy has been met;
- When applicable, the functions and reports of the Monitoring Agent(s).

## 10.3. EXECUTION AND RESULTS OF THE MONITORING PLAN

Describe and provide evidence on the implementation status of project activities, including information on the following:

- Implementation and execution of the project activity during this monitoring period, including any information about events that may impact GHG Emission Reductions;
- When applicable, describe how project risk factors, including those related to leakage, are being monitored and managed by the project.;
- Any other changes (eg for project proponents and other interested parties).

**ANNEX I**  
**REFERENCE LEGISLATION**

Rule	Headnote
<a href="#">Law No. 12.187/2009</a>	Establishes the National Policy on Climate Change – PNMC.
<a href="#">Decree No. 9.578/2018</a>	Consolidates normative acts issued by the Federal Executive Branch that provides for the National Fund on Climate Change, dealt with in Law No. 12,114, of December 9, 2009, and the National Policy on Climate Change, dealt with in Law No. 12,187, of December 29, 2009.
<a href="#">Decree No. 10.144/2019</a>	Establishes the National Commission for the Reduction of Greenhouse Gas Emissions from Deforestation and Forest Degradation, Conservation of Forest Carbon Stocks, Sustainable Management of Forests, and Increase of Forest Carbon Stocks – REDD+.
<a href="#">Ordinance MMA No. 288/2020</a>	Establishes the National Program for Payments for Environmental Services – Forest+, within the scope of the Ministry of the Environment.
<a href="#">Ordinance MMA No. 518/2020</a>	Establishes the Forest+ Carbon Modality.
<a href="#">Law No. 14.119/2021</a>	Establishes the National Policy for Payment for Environmental Services (PES).
<a href="#">Decree No. 11.075/2022</a>	Establishes the procedures for the elaboration of Sectorial Plans for Mitigation of Climate Changes, and institutes the National System for the Reduction of Greenhouse Gas Emissions.
Acre – <a href="#">State Law No. 2.308/2010</a>	Creates the State System of Incentives for Environmental Services - SISA, the Incentive Program for Environmental Services - ISA Carbon and other Environmental Services and Ecosystem Products Programs in the State of Acre and, other measures.
Acre – <a href="#">State Law No. 2.025/2008</a>	Creates the State Program for Certification of Family Productive Units in the State of Acre.
Bahia – <a href="#">State Law No. 13.233/2015</a>	Establishes the State Policy for Payment for Environmental Services, the State Program for Payment for Environmental Services and, other provisions.
Distrito Federal – <a href="#">Law No. 5.955/2017</a>	Establishes the District Policy for Payments for Environmental Services and the District Payment for Environmental Services Program.
Espírito Santo – <a href="#">State Law No. 9.864/2012</a>	Provides for the reformulation of the Program for Payment for Environmental Services and PES in the State established by Law No. 8,995/2008.
Espírito Santo - <a href="#">Ordinance SEAMA No. 20-R/2013</a>	Provides rules for the recognition of land use modalities as generators of environmental services that can receive rewards and/or financial support and on the criteria and percentages of bonuses.
Goiás – <a href="#">State Decree No. 9.130/2017</a>	Provides for the State Program for Payment for Environmental Services – PEPSA – and other measures.

Rule	Headnote
Goiás – <a href="#">State Law No. 18.104/2013</a>	Provides for the protection of native vegetation, institutes the new Forest Policy of the State of Goiás and, and other measures.
Maranhão – <a href="#">State Law No. 11.578/2021</a>	Establishes the Policy for Reducing Greenhouse Gas Emissions from Deforestation and Forest Degradation, Forest Conservation, Sustainable Management of Forests and Increase in Forest Carbon Stocks (REDD+), Management of Environmental Assets and Payments for Environmental Services (PES) of the State of Maranhão, called the REDD+ and PES Jurisdictional System.
Mato Grosso – <a href="#">State Law No. 9.878/2013</a>	Creates the State System for Reducing Emissions from Deforestation and Forest Degradation, Conservation, Sustainable Forest Management and, Increase in Forest Carbon Stocks – REDD+ in the State of Mato Grosso and other measures.
Mato Grosso – <a href="#">State Law No. 8.580/2006</a>	Provides for the state policy to support projects for the generation of carbon credits, and other measures.
Mato Grosso do Sul – <a href="#">State Law No. 5.235/2018</a>	Provides for the State Policy for the Preservation of Environmental Services, creates the State Program for Payment for Environmental Services (PESA), and establishes a Management System for this Program.
Mato Grosso do Sul – <a href="#">Resolution SEMAGRO No. 717/2020</a>	Establishes the Program – PES Multiple Use Scenic Rivers of Payment for Environmental Services to encourage the conservation of native vegetation, ecological restoration, and, the adoption of sustainable production systems in rural properties.
Minas Gerais – <a href="#">State Decree No. 45.229/2009</a>	Regulates measures by the Public Power of the State of Minas Gerais regarding the fight against climate change and management of greenhouse gas emissions and other measures.
Minas Gerais – <a href="#">State Law No. 20.922/2013</a>	Provides for forestry and biodiversity protection policies in the State.
Minas Gerais – <a href="#">IEF Ordinance No. 28/2020</a>	Establishes guidelines for registering the planting and harvesting of forests planted with native and exotic species in the State of Minas Gerais.
Minas Gerais – <a href="#">State Decree No. 48.127/2021</a>	Regulates, in the State, the Environmental Regularization Program, provided for in Federal Law No. 12,651, of May 25, 2012, and in Law No. 20,922, of October 16, 2013, and other provisions.
Paraíba – <a href="#">Ordinary Law No. 10.165/2013</a>	Provides for the State Policy for Payment for Environmental Services, authorizes the establishment of the State Fund for Payment for Environmental Services, and other provisions.
Paraná – <a href="#">State Law No. 17.134/2012</a>	Bio credit
Paraná – <a href="#">Resolution SEMA No. 80/2015</a>	Establishes guidelines and rules for the execution of Payment for Environmental Services projects destined for Private Natural Heritage Reserves (RPPN) in the State of Paraná.

Rule	Headnote
Pernambuco – <a href="#">State Law No. 15.809/2016</a>	Establishes the State Policy for Payment for Environmental Services, creates the State Program for Payment for Environmental Services and, the State Fund for Payment for Environmental Services.
Rio de Janeiro – <a href="#">Resolution CERHI No. 227/2020</a>	Provides for the State Register of Payment for Environmental Services – PRO-PSA.
Rio de Janeiro – <a href="#">State Law No. 5.690/2010</a>	Establishes the State Policy on Global Climate Change and Sustainable Development.
Rondônia – <a href="#">State Law No. 4.437/2018</a>	Establishes the State Policy for Climate Governance and Environmental Services - PGSA and creates the State System for Climate Governance and Environmental Services - SGSA, within the State of Rondônia and other measures.
Santa Catarina – <a href="#">State Law No. 15.133/2010</a>	Establishes the State Policy on Environmental Services and regulates the State Program for Payment for Environmental Services in the State of Santa Catarina, established by Law No. 14,675/2009.
São Paulo – <a href="#">Resolution SMA No. 89/2013</a>	Environmental Services for Private Natural Heritage Reserves – RPPN, within the scope of the Forest Remnants Program.
São Paulo – <a href="#">Resolution SMA No. 86/2017</a>	Establishes the Project for Payment for Environmental Services for the Protection of Native Vegetation – PSA PROTEÇÃO, within the scope of the Climate and Biodiversity Project in the Atlantic Forest.
São Paulo – <a href="#">State Law No. 13.798/2009</a>	Establishes the State Policy on Climate Change - PEMC.
São Paulo – <a href="#">Decree No. 66.549/2022</a>	It regulates the application, within the scope of the State of São Paulo, of Federal Law No. 14,119, of January 13, 2021, establishing the State Policy for Payment for Environmental Services - PEPSA, the State Payment Program for Environmental Services – PPSA, and the Registry State of Payment for Environmental Services Projects.