riverse

Riverse Standard Rules

Scaling carbon mitigation greentechs

Version 5.0 - Feb 2023

Version opened to public consultation

Content

Glossary

Project	The activity/activities that are under consideration for carbon credit issuance.
Project developer	Person/s responsible for executing the project and applying for carbon credits.
Project output	Products or services that the project generates.
Mitigation activity	The specific processes within a project that lead to carbon removal/avoidance.
Carbon removal	Physically removing carbon from the atmosphere and storing it in biologic or geologic pools. Also called carbon sequestration.
Carbon avoidance	Avoiding greenhouse gas emissions that would have occurred without the project's mitigation activity. Also called carbon offsets.
Carbon credit	1 ton of CO2e removed or avoided by a project's mitigation activity.
Registry	The digital platform created by Riverse that tracks the issuance, purchases, and retirements of carbon credits.
Validation	First evaluation to check if a project is eligible for carbon credits.
Verification	Final evaluation of whether the expected carbon removal/avoidance occurred, based on ongoing monitoring. After verification, carbon credits are available to be purchased.
Buffer	A percentage of verified carbon credits eliminated from each project as a safeguard against overestimated or non-delivered carbon removal/avoidance. Also called a discount factor.
Provision pool	A shared account of carbon credits that each project contributes to, which can be mobilized to replace issued credits. Also called pooled risk buffer, or global buffer pool.
Monitoring	Ongoing measurement of indicators to determine whether the project delivers the expected carbon removal/avoidance.
Ex post	After the fact. Actual outcomes after the project mitigation activity has occurred.
Ex ante	Before the fact. Expected outcomes before the project mitigation activity has occurred.
Project scenario	The set of processes used to model the greenhouse gas emissions of the project.

Baseline scenario	The set of processes used to model the greenhouse gas emissions of what would happen without the project. Also called the reference scenario or business-as-usual scenario.
Crediting period	The duration over which a given project is eligible for carbon credits. Riverse limits the crediting period to a maximum of 5 years.
Commitment period	The duration over which carbon will be removed.

List of Acronyms

GHG	Greenhouse Gas
CO2	Carbon Dioxide
CO2e	Carbon Dioxide Equivalent
CH4	Methane
LCA	Life Cycle Assessment
ICVCM	Core Carbon Principles of the Integrity Council for Voluntary Carbon Market
KII	Key Impact Indicator
UN SDG	United Nations Sustainable Development Goals
TRL	Technology Readiness Level
VVB	Validation & Verification Body
ISO	International Organization for Standardization
DPD	Detailed Project Description
PA	Project application

Mission statement

Climate change and **resource depletion** are highly linked and pose imminent catastrophic threats to society. Our ever-increasing resource consumption drives greenhouse gas emissions across every step of supply chains, from production and use to waste treatment[1]. We can already see the effects:

- Atmospheric CO_2 concentrations have increased by 47% since the pre-Industrial Age, caused primarily by human activities[2]
- Global temperatures in 2022 have risen by 0.9°C, making it the 5th warmest year on record[3]
- 3.3 earths would be needed to allow the world's population to keep up with OECD-country consumption levels[4]

Furthermore, our **linear resource consumption** model of "extract, use, and dispose" is unsustainable:

- 530 kg of waste is generated per person per year in OECD countries[4]
- 91% of waste is not reused/recycled, accumulating massive amounts of pollution[5]
- Fossil fuel reserves will be depleted as early as 2070[6]

In short, **the linear economy is one of the main drivers of climate change and natural resource depletion.**

To minimize environmental impacts of this linear over-consumption, companies must implement a **circular economy** approach. This can be done by:

- Extending product lifespan
- Reconditioning products for reuse
- Recycling waste into new products
- Upcycling organic waste
- Favoring bio-based materials

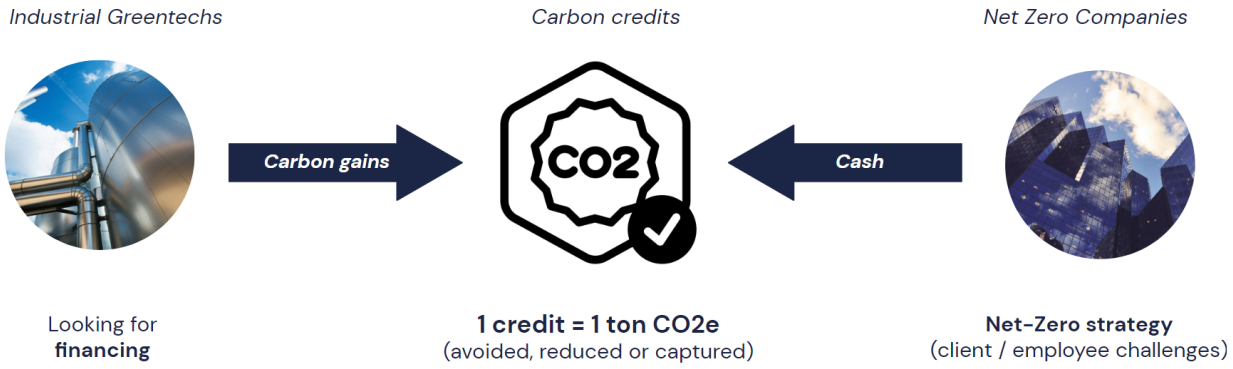
Creating a world where circular economy is the norm would allow us to massively reduce our rates of production and consumption, and the associated climate change impacts[7]. This transformation is **urgent**, and it **cannot be incremental**: it requires **systemic change** at all steps of the supply chain, from production to consumption to waste treatment.

[1] Wiedmann et al., 2020
[2] NASA 2019
[3] NASA 2022, *compared to the average of the 1951-1980 baseline period*
[4] UNICEF 2022
[5] OECD 2022
[6] BP Statistical Review of World Energy 2022 *(oil and gas)*
[7] European Environment Agency 2016

Ambitious, innovative solutions **already exist** to achieve this sustainable transformation. However, many need support to scale up, become widely adopted, and replace the status-quo.

Riverse's mission is to promote circular economy solutions and mitigate climate change impacts through carbon financing. We allow industrial European Greentechs working in the circular economy to get funding thanks to their greenhouse gas emission avoidance or removal.

This funding solution will help accelerate our transformation to a circular economy and put us on track to a global carbon-neutral future.



1. Independence & governance

a. Riverse status

Riverse is a simplified joint-stock company ("*société par actions simplifiée*") with its registered office at 24 avenue des Pépinières, 94260 Fresnes, registered in the Créteil Companies and Trade Register under number 908 082 332.

Riverse is also a mission-driven company ("Société à Mission") whose mission ("raison d'être"), within the meaning of Article 1835 of the French Civil Code, is as follows:

- The purpose of the Company is, to the greatest possible extent, to have a positive and significant environmental or social impact in the context of its commercial and operational activities. it is to carry out its activities with exemplarity and professionalism in the collective interest.
- The Company wants to position itself less as a communicator, more as an actor: in the activism of solidarity. The principles that guides the Company's *raison d'être*, insofar as the competitive and economic environment allows, are therefore the following:
    - Helping to develop solutions that have a net environmental or social impact that benefits the community and the planet;
    - Working with partners and customers who share the Company's values and mission;
    - Providing real value and impact to partners and clients;
    - Respect people and their work/life balance.

b. Riverse organization, roles, and responsibilities

The Riverse standard Governance is composed of 3 bodies, to ensure efficiency, independence, and expertise.

Entity	Function
Staff team	Oversees the day-to-day activities and decisions. They are the key point of contact for any prospective project, current project, or individual with an interest in Riverse.
Advisory Board	Ensures Riverse's activity is continuously in line with its overall

	mission as defined in its status, validates or rejects any changes in the standard rules, and suggests improvements on the standard.
Technical Committee	An expert panel, external to Riverse, that provides advice and technical reviews on specific methodological aspects or project applications.

c. Staff team

Mission, duties, and responsibilities

Riverse Staff's responsibility is to deliver the ongoing tasks required by the Standard management. The main tasks are the following:

- Improve on the existing Riverse methodological approach for Greentechs
- Develop new technical approaches to give new relevant Greentechs access to the voluntary carbon market
- Improve the certification process to make it as practical, rigorous and transparent as possible
- Increase the Standard's recognition and awareness
- Process Project applications
- Manage Riverse registry

Organization

The Climate Solutions and LCA Team has the following responsibilities:

- Validate the eligibility of project applications
- Develop and improve LCA frameworks for each project type
- Conduct specific LCA research to keep standard requirements up-to-date

The Tech Team has the following responsibilities:

- Maintain and improve Riverse registry's technical infrastructure
- Develop a practical and robust certification platform
- Automate manual tasks for all stakeholders (project developers, VVB, carbon credits resellers and buyers)

The Partnership Team has the following responsibilities:

- Develop relevant partnerships with carbon credits resellers and buyers to facilitate carbon credit sales
- Manage the relationships and accreditation with VVBs
- Develop awareness about the Riverse standard's benefits for European Greentechs

The Administration Team has the following responsibilities:

- Manage Riverse staff recruitment and human resources
- Manage Riverse organization finance
- Manage and improve Riverse operational aspects

Riverse staff members' compensation is made of a salary grid, based on position, experience and position seniority.

Riverse Staff members must have a specific expertise on one of the following fields:

- Life Cycle Assessment
- Greentechs and decarbonization solutions
- Carbon markets
- Software Engineering
- Finance
- Partnership development
- Marketing & communication
- Human resources

d. Advisory Board

Link to Riverse Advisory Board Terms of Reference

Mission, Duties, and Responsibilities

The Advisory Board is independent from Riverse. It is responsible for reviewing suggested changes to the Riverse Standard Rules and to the specific rules related to the Riverse Registry procedures. These include rules concerning project eligibility, carbon credit quantification, validation, verification and credit issuance and retirement. Rules related to purchasing transactions and buyers or market intermediaries are not within the scope of the Advisory Board's mandate. Therefore, the Advisory Board will:

- Ensure Riverse's activity is still in line with its overall mission, as defined in its status
- Accept or reject changes to the Riverse Standard Rules, specifying written reasons for their decisions
- Make recommendations in aligning Riverse rules with other relevant regulations and present these recommendations for elaboration to Riverse's Management and through public consultations, as appropriate, for approval at a subsequent Advisory Board meeting.

Organization

Schedules & agenda

Typically, four meetings are held per year, for a duration of 1h30. Additional meetings can be programmed if deemed necessary by the Chair.
Notice of the time, date, and location of meetings will be provided to all members. The agenda and any supporting materials will generally be distributed to members 10 business days before the meeting.
The Secretary will take minutes at all formal Advisory Board meetings and circulate draft minutes to the Chair for reviews and comments. The final reporting of the meeting minutes and decisions will be shared by the Secretary within 10 business days.

Voting

Only Advisory Board members have the right to vote on decision items at Advisory Board meetings. When the Chair asks for votes on any issue, decisions will be made through simple majority. If the vote is tied, the Chair will have the deciding vote to determine the outcome.

Attendees

Meetings are by invitation only and the Secretary will manage attendance as directed by the Chair. The person suggesting a change or amendment will usually attend the meeting to present the proposal and answer questions from members. Additionally, the person responsible for the proposal may bring in experts for the meeting. The Advisory Board has the discretion to invite any other individuals to attend meetings as needed.

Confidentiality

As members of the Advisory Board, individuals may be privy to confidential information, including but not limited to inside information and trade secrets. However, no information can be shared with others under any circumstances. All members are bound by a confidentiality agreement and the company's Conflict of Interest Policy.

Skills

Advisory Board members must have a specific expertise on one of the following fields:

- Voluntary Carbon Markets
- Life Cycle Analysis
- Greentechs and decarbonation solutions
- Impact assessment and valuation
- Carbon market regulations

Members

Roles

- Chair: The Chair is selected from the Advisory Board by its members for a 1 year period. The Chair will be responsible for leading the Advisory Board and ensuring that all members contribute effectively.
- Secretary: The Advisory Board Secretary will be nominated by Riverse staff and approved by the Chair.
- Members: Advisory Board members are nominated by the Riverse staff and approved by current Advisory Board members through simple majority voting. The mandate is reconducted tacitly every year.

Compensation

Advisory Board members can receive financial compensation from Riverse for their commitment. This compensation is defined accordingly with every Advisory Board member.

e. Technical Committee

Link to Riverse Technical Committee Terms of Reference.

Mission, duties & responsibilities

The Riverse Technical Committee is an external entity from the Riverse organization. Its mission is to bring vast expertise to the Riverse Staff for each project type, ensuring each emitted carbon credit finances relevant projects for a truly sustainable world.

The Riverse staff will establish the Technical Committee's missions as necessary. Typical missions can be the following:

- Review a specific project application and deliver a Technical Analysis report
- Review a specific methodological aspect on their domain of expertise
- Conduct solutions-based scientific research on their domain of expertise

Organization

Appointement

Technical Committee members are nominated by the Riverse staff members, with approval from the Advisory Board. The Technical Committee should possess the following skills:

- Vast expertise on one of Riverse solution's focus
- Deep understanding of climate change challenges

Confidentiality

As members of the Technical Committee, individuals may be privy to confidential information, including but not limited to inside information and trade secrets. However, this information must not be shared with others under any circumstances, except with the approval of Riverse staff members who requested the mission. All members are bound by a confidentiality agreement and the company's Conflict of Interest Policy.

Compensation

Technical Committee members can receive financial compensation from Riverse. This compensation is defined for every mission with each Technical Committee member.

Skills

Techical Commitee members must have a in-depth expertise on one of the following fields:

- Reconditioning
- Recycling
- Bioenergies
- Bio-based materials
- Low carbon construction materials
- Biochar
- Carbonated construction elements
- Organic chemistry
- Carbon Capture Utilization and Storage
- Life Cycle Assessment
- Carbon market regulations

f. Conflict of interest, safeguards and grievance mechanisms

All Riverse ecosystem stakeholders are contractually linked with Riverse. The full list of contract templates for projects, Riverse, VVB, and buyers will be displayed soon.

Moreover, any stakeholder of Riverse's ecosystem is under Riverse Complaints and Appeals Policy.

Finally, every stakeholder within Riverse's ecosystem has to sign the Riverse Conflict of Interest Policy, to ensure all new team members respect Riverse's independence.

g. Methodologies development and stakeholder consultation

i. Methodology development

Riverse's methodological framework is based on the principles of Life Cycle Assessment (LCA) and the Core Carbon Principles of the Integrity Council for Voluntary Carbon Market (ICVCM).

The program runs on a core generic methodology, which is then adapted to specific solution types by adding project-specific requirements. The project-specific requirements are available in Appendix B.

Based on the current team and board members' competencies, Riverse accepts solutions falling under the following types:

- Reconditioning: Processes to collect, clean, repair, and test products, guaranteeing them a second life to avoid their premature disposal.
- Recycling: Industrial processes which transform waste into reusable compounds, which detain guaranteed qualities to be substitutable for materials originating from extracted resources.
- Bioenergies: Collection of biowaste to produce sustainable energy vectors (such as biogas, biohydrogen)
- Bio-based materials: Mechanical processes transforming bio-based raw-materials into products that have equivalent functionalities, to replace carbon-intensive products
- Low carbon construction materials: Processes to produce substitution materials and products with far lower emissions
- Biochar production facilities: carbonated compounds produced from biowaste which can be reintroduced into the ground
- Carbonated construction elements: accelerated transformation of calcium oxide contained in hydraulic binders into calcium carbonate through the effect of carbon dioxide contained in the air.

Technical documentations for every solution type are published here to provide specifications and directions for easier use of the generic framework.

Modifications of the core methodology and developments of new solution types are communicated and submitted to public consultations.

ii. Stakeholder consultation

All the latest versions of the methodology and technical documentation are published on Riverse's website. This allows for everyone to be able to comment on every document. Comments are reviewed on a quarterly basis in collaboration with Technical Advisors and Advisory Committee members.

Each contributor or commentator to the methodology or technical documentation receives an update once their remark has been treated by Riverse and the relevant governance entities.

Comments are collected by this form here and reviewed on a quarterly basis.

h. Registry governance

The Riverse registry is openly accessible through Riverse's website registry.riverse.io, and displays all the relevant information to ensure maximum transparency and traceability of carbon credits:

- Project/program information, including program documentation, detailed calculations, audit/verification/monitoring statements, as well as reports and legal representations
- Transparent issuance tracking, transfer and retirement / cancellation of units
- Individually identified units through unique serial numbers containing sufficient information to avoid double counting (type, geography, vintage)
- Unit status (issued, transferred, retired/canceled), with full traceability of the chain of custody

2. Types of credits issued

Two main types of credits are issued by Riverse: removal and avoidance credits. Both types are measured by calculating the difference in GHG emissions of the carbon removal/avoidance scenario compared to the baseline scenario. Life cycle assessment (LCA) is used to calculate the GHG emissions of both scenarios (see details in the General LCA Methodology).

a. Removal credits

Carbon Removal Credits (CRC) come from projects that physically remove carbon (present in short-lifetime biomass or in the atmosphere) and convert it into a long-term chemical and biological stable compound (i.e. high resistance to degradation process when placed in the environment). Carbon sequestration must be ensured for a minimum of 100 years in order to be considered "removed" (otherwise it may be considered an avoidance credit, see below).

For instance, carbon captured in biomass by photosynthesis is stabilized in biochar, and its return to the atmosphere is delayed by at least 100 years compared to the parent biomass. Credits are calculated by evaluating the removal projects' net GHG emissions (i.e. carbon removal and emissions) compared to the baseline scenario's (i.e. what would have occurred in the absence of the project). Carbon credits related to this project are issued on Riverse's registry under the mechanism label "removal".

They represent one ton of carbon dioxide equivalent[8] captured and stored:

$$1\ CRC\ =\ 1t\ CO_2eq$$

Projects applying for removal credits must pay specific attention to the permanence criteria and reversal risks (detailed below in section X.1.a...).

b. Avoidance credits

Carbon Avoidance Credits (CAC) represent avoided GHGs that would have occurred without the project's intervention.

These credits are typically generated by projects that either replace fossil fuels with cleaner energy sources or replace products with lower-emitting alternatives. CACs are

[8] *Carbon dioxide equivalent (CO2eq): A measure that normalizes all types of GHG emissions to a common unit. To calculate the CO2eq for a given activity, measures are made using the global warming potential (GWP) at 100 years, which are provided in the IPCC AR6 from 2021. The GWP of a gas represents the relative effect it has on global warming, compared to CO2. For example, the GWP of methane (CH4) over a 100-year time horizon is 27-30, because its contribution to global warming is 27-30 times as strong as CO2.*

calculated by comparing GHG emissions of the project to the ones of a reference or baseline scenario that would have occurred without the project. They are classified on Riverse's registry under the mechanism label "avoidance".

They represent one avoided ton of carbon dioxide equivalent [1]:

$$1\ CAC\ =\ 1t\ CO_2eq$$

The baseline scenario is hypothetical and does not actually occur. This type of credit must be screened with specific attention given to criteria such as additionality and substitution.

CACs include both absolute reductions in emissions and smaller increases in emissions. More details on this distinction are provided in the Annex.

c. Baseline scenario

The choice of the baseline scenario largely influences the amount of carbon credits issued. The baseline scenario defines the emissions levels against which a project's emission avoidance or removal is determined. Choosing an appropriate baseline scenario is therefore critical. It can be defined using the most recent data (i.e. values from year n-1), from current market averages (year n), or from data projections (year n+1, n+2...). Projects must justify why the chosen baseline scenario was appropriate for their calculations.

The Riverse methodology specifies that, when facing uncertainty regarding baseline and project scenarios, a conservative scenario has to be chosen to avoid the risk of overestimating carbon credits.

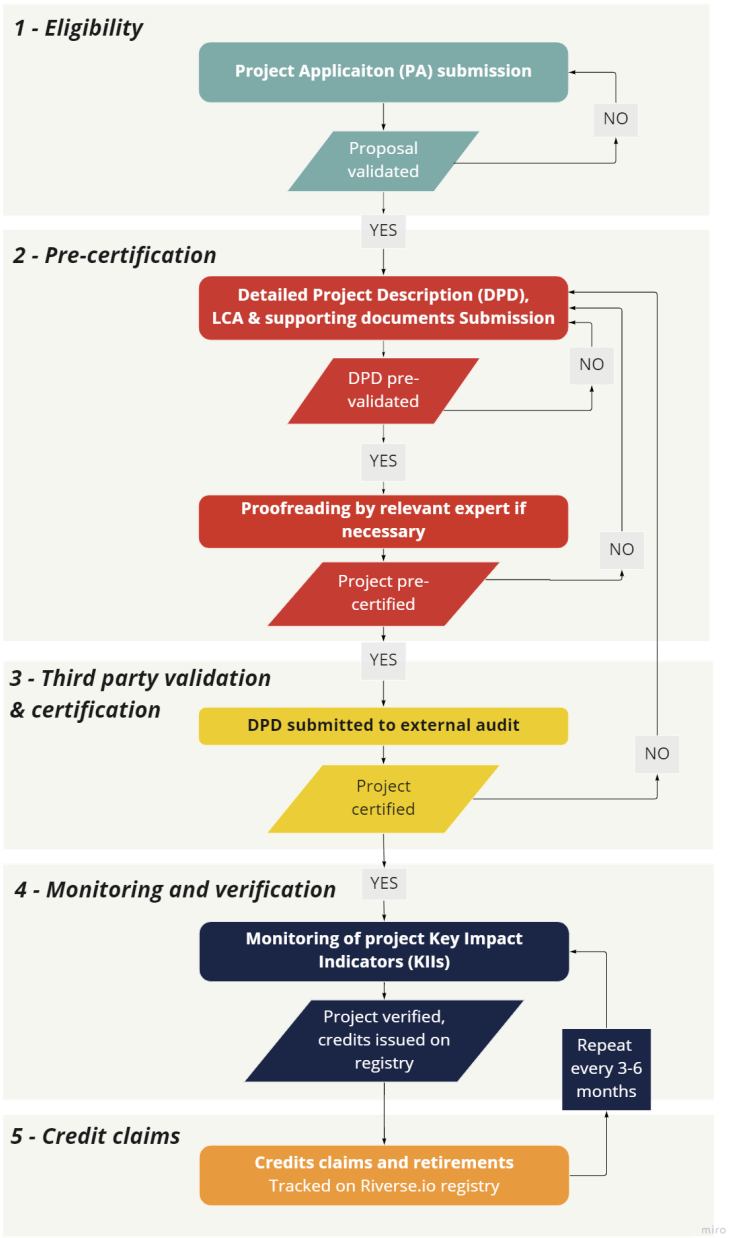
In case of high uncertainty in the baseline scenario, the Riverse team may require an additional buffer on the final amount of carbon credit emissions on the order of 5-15% (see Buffer section below).

More details on selecting a baseline scenario are available in the General LCA Methodology section.

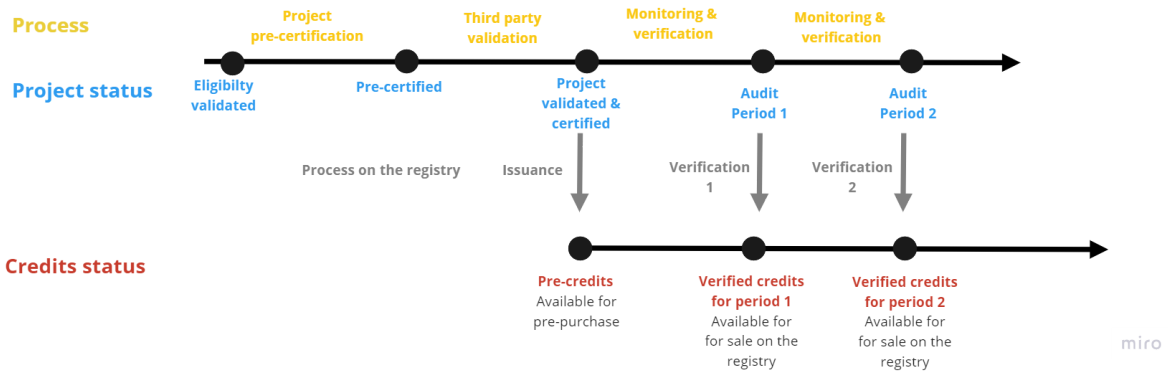
3. Validation, Verification and Certification Process

a. Overall validation and verification process

Overview of the process:



The issuing and verification process works in parallel to the project process as following:



The overall certification process is composed of the following steps:

Step 1 - Eligibility evaluation

- The **Project Application (PA)** form is filled by the project developer to assess eligibility.
- A presentation meeting takes place between the project developer and Riverse. The PA is updated by the project developer if needed.
- The PA is either validated or declined, with explanations sent to the developer.

Step 2 - Pre-certification

- The project developer is given access to the Riverse certification platform.
- The **Detailed Project Description (DPD)** is completed on Riverse's platform.
- The DPD is reviewed by Riverse's climate team, who may ask additional questions or request additional data.
- If necessary, the DPD is sent to an expert for proofreading and review.
- The DPD is validated and the project is **pre-certified**.

Step 3 - Third-party validation and certification

- Contractual commitment is established between the **third-party validation and verification body (VVB)** and the project developer for the validation audit.
- The DPD is made accessible to the VVB on Riverse's platform.
- The VVB's questions concerning the DPD are answered by the project developer.
- The DPD is validated by the third party.
- A summary of the audit's exchanges is attached to the project's certification report.
- The project is **certified**.
- **Pre-credits** are issued for pre-purchase agreements.

Step 4 - Monitoring & verification

- On a quarterly or bi-annual basis, **Key Impact Indicators (KII)** are measured by the project developer and uploaded to the platform.
- KIIs and their measurement sources are verified.
- Pre-credits turn into **credits**, and are issued according to the actual project outcomes.
- Credits are on the registry and can be sold.

Step 5 - Credits claims

- All transactions (sales, transfers, claims) are tracked on the platform.

b. Eligibility evaluation

The Project developer must submit a **Project Application (PA)** proposal in order to start the certification process. In this step, Riverse's team evaluates whether the project may be eligible for carbon credit issuance based on the general information provided. If the project is determined eligible for carbon credits, the project developers may proceed to the following step, pre-certification.

In case of a negative answer, a refusal report is sent by Riverse's team to the project developer, justifying the decision. There is no time limit between sent submissions.

This step is free of charge for project developers.

The PA form is available online here. It contains the following information:

- Company name
- Contact details
- Project scope / Product definition
- Technology type
- Applied sector
- Answers to certification criteria: additionality, co-benefits, TRL, rebound effect, substitution...
- Environmental impact assessment, such as carbon accounting or life cycle assessment (LCA), of the project scenario compared to a baseline scenario.

c. Pre-certification

After passing the eligibility evaluation, project developers begin the **pre-certification** process by submitting a **Detailed Project Description (DPD)** on the Riverse platform.

The DPD also serves as the final document to be sent to the third-party Validation and Verification Body (VVB).

It contains the following information:

- Full LCA of the project and baseline scenario
- Verification KIIs definition
- Project presentation
- Production / Set up roadmap
- Justification that the project meets all 14 criteria described below
- Visual reports from the project site

The Riverse team evaluates the DPD and any supporting documents to ensure they respect Riverse's:

- General LCA Methodology,
- the sector-specific methodology,
- and the certification criteria.

For projects different from any project previously certified by Riverse or where the degree of uncertainty is high, Riverse's staff can advise a full or partial proofreading of the DPD submission by a relevant domain expert from the Riverse Technical Committee. This proofreading is optional, fees depend on the expert's pricing and are charged to project developers.

During the DPD evaluation in this stage, the Riverse team may implement safeguards to prevent credit overcounting. The first safeguard is eliminating credits as a **buffer** taken from the total emission avoidance/removal, and is only applied to certain projects. The main safeguard, applied to all projects, is the **provision pool,** where a fraction of credits from each project is transferred to pose as insurance against project non-delivery. These two mechanisms are detailed below.

Once the DPD is proofread by an expert from the technical committee (an optional stage) and validated by the Riverse team, the project is considered "**pre-certified**" and enters the third-party validation and certification phase.

i. Buffer

Some projects may be asked to eliminate a fraction of their estimated carbon credits to create a buffer against carbon credit overestimation. This may occur when high uncertainty is identified, for example, in the baseline scenario choice or the project's measured data. Credits that are eliminated as a buffer are not issued and will not appear on the registry. This buffer may vary from 0% to 15% of estimated credits.

Projects must fill out the Risk Evaluation Tool in the DPD to determine the amount of credits added to their buffer. Risk is based on criteria such as permanence, reality, leakage, and rebound effects (detailed below).

ii. Provision pool

Credits from each project are transferred to the provision pool, where they act as an insurance against the non-delivery of certified credits. This allows all projects and credit purchasers to share risk and benefit from safeguards against credit non-delivery.

Each project automatically deposits 10% of its certified credits to the provision pool. During the pre-certification process, the project may be asked to contribute extra credits to the provision pool if it has high risks of violating criteria such as additionality, permanence, leakage, and rebound effects. This provision volume is estimated at certification and regularly reviewed during ongoing verification.

Credits are withdrawn and transferred from this pool if certified credits are reversed or canceled (see details in the Cancelation section). This way the number of credits issued by Riverse remains the same, and only the number of credits in the provision pool may be disrupted.

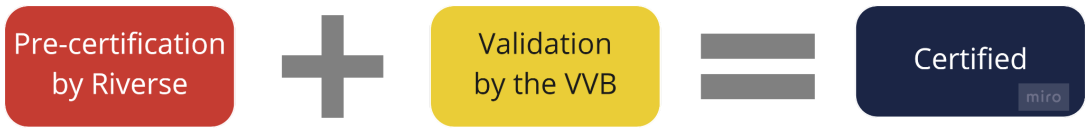
If credits from the provision pool replace credits that have already been claimed, they are given to the credit purchaser, regardless of any price difference. If they replace unclaimed credits on the registry, they are placed on the registry at their original price.

d. Third party validation & certification

Once a project's DPD has been pre-certified internally by Riverse, it is submitted to an external accredited third-party verification and validation body (VVB) for **validation**. The VVB audits the same information as Riverse does during pre-certification: adherence to the general methodological framework, the sector-specific methodology, and the certification criteria. In this stage, the VVB may request additional information or ask questions to the project developer.

This stage is charged to the project developer directly by the VVB. VVB audit processes and fees vary by project.

Once validated by the VVB, the DPD is accepted and the project is considered **certified**. The project's pre-credits are issued on the Riverse registry, and are converted to credits once verified during the monitoring process.



i. Third-party VVB commitment

By accepting the audit assignment, the external auditor agrees to:

- declare whether impartiality and independence are compromised (this may be the case if the auditor is already in a relationship with the project owner)
- allow Riverse to disclose the results of the audit, the name of the firm, and the names of the people involved in the audit
- respect confidentiality clauses (on processes, materials, quantities)
- sign Riverse's Conflict of Interest Policy and VVB Agreement.

ii. VVB conditions for accreditation

VVBs must be accredited by Riverse in order to validate DPDs for Riverse-issued credits. To be accredited, VVBs must:

- have the ISO 14065 accreditation or equivalent (i.e. COFRAC ISO:17029)
- have more than 5 years of auditing experience, including at least 2 years in environmental auditing
- Sign Riverse's Conflicts of Interest Policy

iii. VVB application Process

Upon receipt of the VVB application form, Riverse reviews the information provided and responds once the review is complete. Riverse rejects applications where it determines that the applicant does not possess the required competencies.

Upon application approval, Riverse asks the VVB to submit a signed copy of the Riverse Conflict of Interest Policy, to ensure all parties respect Riverse's independence.

Once the Riverse VVB Agreement is executed, the VVB can begin conducting audits under Riverse programs. The VVB organization is added as an approved VVB on Riverse's website.

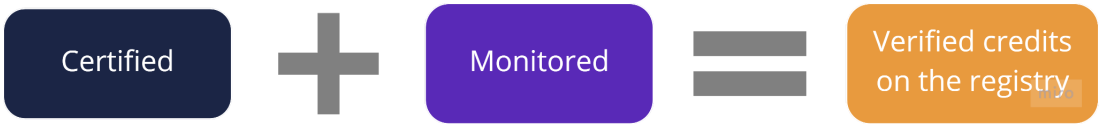
e. Verification

The verification process is constituted of the regular ongoing checks to ensure that the project mitigation activity and estimated pre-credits ensue as expected. In this step, **key impact indicators (KIIs)** for each project are monitored and submitted regularly. Substantial KII changes may result in cancellation of credits. More details are provided below in the following sections.

Riverse's verification framework is included in the project's subscription to the platform.

After the project developer submits KIIs, the Riverse team updates the carbon avoidance/removal estimates and calculates the **actual carbon avoidance/removal that**

occurred. The corresponding pre-credits are converted to **credits**, and are issued on the Riverse registry to be claimed.



i. Key Impact Indicators

During the LCA conducted to calculate GHG emissions of the project, **KIIs** are identified and reported in the DPD. These are parameters with high variability and importance that need to be audited continuously to measure the impact of the project and the number of credits to be issued. KIIs should represent processes that can be measured automatically. A project should have 3-5 KIIs.

KIIs should represent parameters that are:

- changing (over time or depending on the process)
- measurable on site
- responsible for at least 10% of the project's overall impact

KII that are directly linked to the project's main function/output (such as mass of waste recycled/reconditioned, kWh in biogas production) must be accounted for.

KIIs may be related to:

- energy (kWh)
- number (for instance: number of products)
- quantity: masses, liquids
- transportation: t.km, km
- chemical composition

Sources for each KII must be identified in the DPD. These sources, or measurement methods, must be:

- auditable and documented: a process (human or preferably digital) can be put in place that leads to these results. It is not subject to interpretation.
- digitalized: sources will ultimately be associated with carbon credits, they must be at least digitized if not already digital.

Sources may include:

- bills: to trace kg of batteries bought
- chemical test reports: for %C
- production order: for product quantities

ii. Monitoring

A **monitoring plan** is provided in the DPD that defines the source and frequency of measurement for each KII. The aim is to facilitate the ongoing, regular verification processes to ensure data quality in project monitoring. On a regular basis (every 3, 6, or 12 months), projects upload KIIs to the Riverse platform for monitoring and verification of their impact.

In case of a process change or substantial shift in a KII value, the project developer must notify Riverse's team, who decides if the process change is validated or needs further auditing. If the process change is substantial, the LCA, validation, and certification steps will need to be re-executed.

iii. Cancelation

Pre-credits may be canceled on the registry for several reasons:

- lack of measurement source for a KII
- change in KII or overall process, so that the project no longer avoids/removes carbon as expected
- change in external factors causing the project to lose its additional status (i.e. change in regulation that makes the project activities required)

If pre-purchase agreements were made between buyers and project developers, the provision pool will not be used to replace canceled pre-credits.

Verified credits can be canceled retroactively only if it is revealed that the information used to certify the credits was incomplete or inaccurate, causing the project to not meet a certification criterion.

If verified credits are canceled, Riverse transfers credits from the provision pool to offer the credit buyer an equivalent number of credits. These replacement credits must come from the same mechanism (avoidance or removal) as the canceled credits. They may have a higher price than the canceled credits, but the buyer is not responsible for paying the difference.

4. Certification list of criteria

To be eligible for Riverse-certified carbon credits, the mitigation activity must occur in Europe[9].

The following criteria are qualitatively evaluated during the eligibility evaluation step using the PA. Once the project advances to the pre-certification stage, detailed information is required in the DPD to ensure that each criteria is met.

#	Name of criteria	Description	Input from project developer
1	Measurability	The avoided/reduced GHG emissions are quantitatively and rigorously measured.	The methods and results of a life cycle assessment (LCA) that meets the General LCA Requirements. List of proposed Key Impact Indicators (KIIs). If using a sector-specific methodology not yet approved by Riverse, sources and justification for the methodology.
2	Real	The emission removals/avoidance has actually occurred, according to the monitoring plan. Credits are ex-post.	Measured, monitored KIIs that demonstrate the delivery of project outputs and critical parameters in the LCA. Updated LCA results using the monitored KIIs, proving the project delivered emission removals/avoidance.
3	Additionality	The project activity would not have occurred without the sale of carbon credits.	Justification of Regulatory Additionality, plus at least one of the following: Financial, Prevalence, or Technological Additionality.
4	Permanence	Carbon will be removed/avoided for at least 100 years, and the project outcomes will not be reversed.	A commitment period justified by reliable scientific and technical sources. An evaluation of potential causes for carbon sequestration reversal and their likelihood.

[9] European Union countries plus Switzerland and United-Kingdom

5	Unique	Carbon credits are only counted once and are not double-issued or sold.	Signed contract committing not to use another certification body or label to issue carbon credits for the given project.
6	Co-benefits	Projects must provide additional positive impact towards environmental and social sustainability.	Identify at least two additional UN SGDs or other sustainability indicators that the project contributes to. Justify the co-benefits with LCA results or KIIs.
7	Substitution	The products/ services generated as project outputs must appropriately, realistically, and efficiently be substituted to those of the baseline scenario, rather than create new demand.	Proof that the project outcome has appropriately similar technical and performance specifications to substitute for the baseline scenario.
8	Environmental & social do no harm	Projects must not contribute to environmental or social damage.	Evaluate the risk type, likelihood, and severity the project poses for each UN SDG, or other relevant sustainability indicator. Action plan to prevent/manage any substantial risks.
9	Leakage	The project's avoided GHG emissions must not be indirectly transferred elsewhere.	Evaluate the leakage type, likelihood, and severity the project may incur. Action plan to prevent/manage any substantial leakage.
10	Rebound effect	Efficiency-improvement projects must not lead to increases in overall consumption.	Evaluate the rebound effects type, likelihood, and severity the project may have. Action plan to prevent/manage any substantial rebound effects.
11	TRL	The technology readiness level must be 6 or higher.	Provide proof of technological progress and/or production capacities either in an operational environment or lab.
12	Targets alignment	Project's emission reductions must be aligned with the emission reduction targets for their	LCA results showing that the percentage difference between the project and baseline scenario is aligned with the sector target emission reductions.

		sector.	
13	Minimum impact	Projects must qualify for a minimum amount of carbon credits.	LCA results showing the sum of avoided/removed emissions for the project scenario over the crediting period is at least 1000 tCO2eq.
14	Independently validated	A Riverse-accredited third party must validate the project's proposal.	Submit DPD to an audit by a third-party VVB.

1. Measurability

Each project must prove its impact with a comparative life cycle assessment (LCA). The LCA should cover all life cycle stages where there are potential differences between the project and the baseline scenario. The LCA must at least include the indicator of global warming potential over 100 years due to airborne emissions of GHGs (in kgCO2eq).

The comparative approach must use the same functional unit (FU) for both baseline and project scenarios. The FU must be quantified, qualitatively described and geographically and temporally defined.

More detailed LCA rules and descriptions are available in the General LCA Methodology below.

Riverse provides tools to allow project developers to conduct their own LCA. Alternatively, project developers may use a preexisting recent LCA, if it is:

- representative of the current processes
- aligned with the quality and rigor defined in the Riverse LCA Rules
- provided by a company demonstrating at least 2 years of expertise in LCA

When LCA methodologies are not sufficiently adapted or relevant to the project, projects' LCA can be supported by a specific methodology, including peer-reviewed literature. In this case, scientific and technical reviews will be added to the project's case.

A list of key impact indicators (KIIs) must be provided along with the LCA. These parameters' values are important to the LCA results, are subject to change, and will be used for monitoring over time.

Inputs from project developer

- The methods and results of a life cycle assessment (LCA) that meets the General LCA Requirements
- List of proposed Key Impact Indicators (KIIs)
- If using a sector-specific methodology not yet approved by Riverse, sources and justification for the methodology

2. Real

A carbon credit is real if it represents an actual net emissions avoidance/removal that has occurred, as opposed to an estimated future avoidance/removal. Certified credits issued by Riverse are all ex-post, meaning the mitigation activity that leads to emission removal/avoidance has already taken place. In contrast, Riverse pre-credits are ex-ante, meaning they come from solutions that are *expected* to be implemented.

During the verification process, project developers follow their monitoring plan to prove that the estimated emission removal/avoidance has occurred, and was not overestimated due to artificial, incomplete, or inaccurate emissions accounting.

To prove that a carbon credit is real, project developers must track KIIs during the mitigation activity and share them with Riverse through monitoring documents. KIIs should demonstrate that the project:

1. Delivered its expected outputs: the project actually occurred and executed its functions
2. Reduced/avoided emissions: KIIs can be critical parameters in the LCA, which have a large influence on emission calculations. Tracking these parameters can help justify that the emissions of the actual mitigation activity are coherent with the expected emissions.

The Riverse registry includes a **provision pool**, where 10% of each projects' credits are automatically transferred. This pool of credits acts as a safeguard/buffer in case of overestimation of projects' true emissions.

Inputs from project developer

Measured and monitored KIIs that demonstrate the delivery of project outputs

Measured and monitored KIIs representing critical parameters in the LCA

Updated LCA results using the monitored KIIs, proving the project delivered emission removal/avoidance

3. Additionality

Carbon credits issued by Riverse must fund carbon-negative solutions that **would not have occurred without the project's mitigation activity**. This principle, called additionality, ensures that climate financing spurs additional action to fight climate change, rather than subsidizing actions that would have happened anyway.

Carbon credits cannot be issued for projects which would have occurred regardless of the sale of carbon credits, or for carbon removal/avoidance which would have occurred without the intervention of the project. Several types of additionality are described below. All projects must demonstrate their Regulatory Additionality, plus at least one type of additionality in the DPD.

a. Regulatory additionality

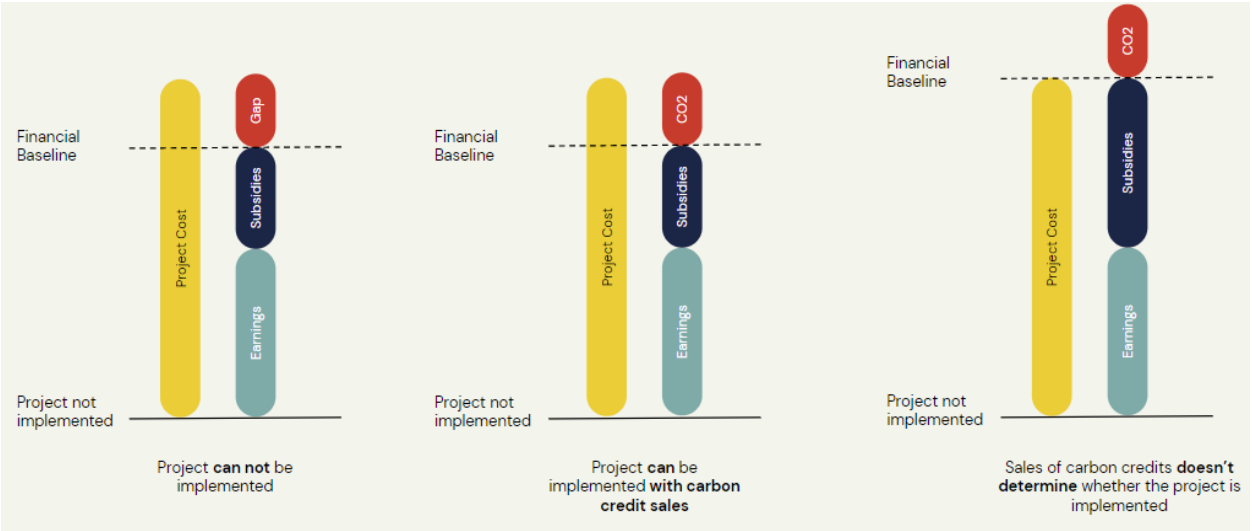
The project must demonstrate there is no existing or expected law, regulation, statute, legal ruling or other regulatory framework that makes the implementation of the project compulsory. All projects must meet this requirement.

Inputs from project developer

Description of the regulatory environment concerning the project's mitigation activity.

Description of current or expected regulations or incentives that promote the project's solution.

b. Financial additionality



A project is considered additional if the funding it receives from sales of carbon credits enables the project to occur or expand. The project must prove its financial additionality by demonstrating that either 1) it is not sufficiently profitable to be developed or 2) additional funding would allow for the solution's short term expansion.

For a project to demonstrate that it is not sufficiently profitable to be developed, it must justify either:

- a higher cost for the project scenario compared to the baseline scenario, that prevents or significantly delays its deployment
- administrative constraints that could be overcome by additional funding.

To demonstrate that additional funding would allow the project to expand, it must prove either:

- that its current financial situation does not allow for expansion
- its current financial situation reduces or limits its potential impact

Inputs from project developer

One of the following:

- Price-gap analysis between the baseline scenario and project's solution
- Study on administrative constraints that can be overcome with additional funding
- Business plan that demonstrates that without funding the project cannot be scaled up

c. Prevalence additionality

A project's mitigation activity may be profitable yet not pervasive in the region/sector for a number of reasons. It may not be widely adopted because it is a new technology, or simply because it is not the norm. This barrier of common practice may be overcome with financing from carbon credits by allowing, for example, for competitive pricing, which may facilitate the adoption of the mitigation activity over the prevailing status-quo option.

Inputs from project developer

Comparison of the project mitigation activity and the prevailing status-quo option.

Explanation of why the project mitigation activity cannot be adopted as common practice without carbon credit financing.

d. Technological additionality

Technological barriers may exist that prevent the mitigation activity from occurring or expanding. This may include access to equipment, infrastructure, or skilled labor. Funding from sales of carbon credits may allow projects to overcome these barriers.

Inputs from project developer

Description of the technological barrier, and how financing from carbon credits would allow the project to overcome this barrier.

4. Permanence

Permanence refers to a situation where the project's **emission avoidance/removal stays constant** for the committed-upon duration. Alternatively, a project may be non-permanent due to, for example, natural disaster (fires, drought, pests) or project mismanagement. The mitigation activity then only results in a temporary carbon removal or avoidance, which has a limited effect on climate change abatement.

Permanence should be ensured through:

- a **commitment period**: projects determine the duration a mitigation activity commits to, and then whether the credit faces reversal risks. Commitment

periods are the duration over which sequestration or abatement activities have permanence horizons, and differ from crediting periods (the timeframes during which avoidance or removals are eligible for issuance as verified carbon credits).
- a contribution to the **provision pool**: all projects must contribute 10% of their verified credits to the provision pool. In case of carbon avoidance/removal reversal or failure to deliver a project, these credits will replace the canceled credits.
- **reliable information**: the project must disclose all information required to calculate the commitment period
- **risk assessment**: an evaluation of the risk of reversal, outlining potential causes for reversal and their likelihood

The commitment periods are defined within the following ranges:

- Short-term storage
    - Estimated duration: less than 100 years
    - Examples: biobased construction
- Medium-term storage:
    - Estimated duration: between 100 and 1000 years
    - Examples: biochar, bio-oils
- Long-term storage
    - Estimated duration: over than 1000 years
    - Example: deep storage of CO2

Projects with all of the above commitment lengths can be eligible for carbon credits, although more long-term carbon removal indicates higher-quality credits. This difference in quality will be reflected in the price of the credit.

For carbon removal credits, the primary non-permanence risks are physical, i.e. leakage from geologic or biologic reservoirs. Therefore these projects need to document how the reservoirs are managed and secured during the committed time period.

For carbon avoidance credits, there are no inherent risks of physical reversal once the project has been completed and its credits have been verified. However these projects face information risk, where credits may be canceled if it is discovered that inaccurate information was originally provided, leading to an overestimation of carbon credits.

Inputs from project developer *for carbon removal projects*

A commitment period justified by reliable scientific and technical sources

An evaluation of potential causes for carbon sequestration reversal and their likelihood.

5. Unicity

Unicity refers to the unique sale of carbon credits, which is fundamental for the environmental integrity of carbon trading. **Carbon credits must only be counted once**, and shouldn't be double-issued or sold.

This is maintained by ensuring that credits are not 1) double counted by being issued in multiple registries, or 2) claimed by both the credit seller and buyer.

Any project wishing to have its GHG emission gains certified using the Riverse standard must sign the platform agreements before moving to the DPD phase committing not to use another certification body or label to issue carbon credits for the given project.

Riverse reserves the right to verify that credit sellers do not claim the same carbon credits that are issued and sold in the registry. In order to ensure transparency, all pre-credits and credits are visible on the Riverse registry, which is accessible online along with all other project information.

Each pre-credit or credit is traced with a unique identification number from issuance to retirement (see more at chapter 4. Registry).

Project developers and buyers should not count carbon credits directly in their carbon accounting, and should instead follow recommendations by Bilan Carbone®[10], GHG Protocol[11] or Net Zero Initiative[12].

Inputs from project developer

Contractualization with Riverse committing to not use another certification body or registry to issue carbon credits for the given project.

6. Co-benefits

All Riverse certified projects must have a **positive systemic impact** by having two quantifiable and verifiable environmental or social co-benefits. These must be in addition to their climate change benefits, which are already accounted for in the

[10] The Association Bilan Carbone in Guide Méthodologique Bilan Carbone V8.6 §3.4 Puits, réservoirs et compensation carbone excludes carbon credits from organization's Bilan Carbone®
[11] The GHG Protocol recommends counting purchased offsets/credits separately from a company's own carbon footprint.
[12] According to the Net Zero Initiative methodology, project developers can count their emissions removal/avoidance in Pillars A, B, or C, in the "In my value chain" lines. Buyers account for purchased credits in Pillars B or C, in the line "Outside my value chain".

issuance of carbon credits. The United Nations Sustainable Development Goals (UN SDGs) are used as a framework to measure co-benefits. Projects may claim positive co-benefits relating to any of the following SDGs, which are deemed most relevant to Riverse's program focus:

Sustainable Development Goals	Sub-Objectives[13]	
 **6 - Clean water and sanitation**	6.3	Improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials
	6.4	Increase water-use efficiency
	6.5	Protect and restore water-related ecosystems
 **7 - Clean and affordable energy**	7.2	Increase substantially the share of renewable energy in the global energy mix
	7.3	Double the global rate of improvement in energy efficiency
	7.4	Facilitate access to clean energy research and technology
 **8 - Decent Work and Economic Growth**	8.2	Achieve higher levels of economic productivity through diversification, technological upgrading and innovation
	8.3	Support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises
	8.4	Improve global resource efficiency in consumption and production
	8.5	Achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities
 **9 - Industry, innovation, and infrastructure**	9.4	Upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes

[13]https://unstats.un.org/sdgs/indicators/Global%20Indicator%20Framework%20after%202022%20refinement_Eng.pdf

 **11 - Sustainable Cities and Communities**	11.6 11.a	Reduce the adverse per capita environmental impact of cities, including air quality and municipal and other waste management Support positive economic, social and environmental links between urban, peri-urban and rural areas
 **12 - Responsible consumption and production**	12.2 12.4 12.5 12.8	Achieve the sustainable management and efficient use of natural resources Achieve the environmentally sound management of chemicals and all wastes throughout their life cycle Reduce waste generation through prevention, reduction, recycling and reuse Ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature
 **14 - Aquatic life**	14.1 14.3	Prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution Minimize and address the impacts of ocean acidification
 **15 - Life on earth**	15.1 15.5	Ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services Reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species

This table is meant to provide useful examples. Other relevant UN SDG sub-objectives or sustainability indicators may also be used.

For quantification of these benefits, the project can use either its LCA results or KIIs.

Inputs from project developer

Identify at least two UN SGDs that the project contributes to as co-benefits, along with its carbon removal/avoidance.

Justify the co-benefits with LCA results or KIIs.

7. Substitution

The products/services generated as project outputs must appropriately, realistically, and efficiently substitute those of the baseline scenario. This shows that projects truly substitute pre-existing products/services and **stop project outputs from creating new demand**. To ensure this, project outputs must have similar performance metrics to the baseline scenario and deliver equivalent functions.

Quantified performance metrics (for example, a thermal resistance of 5m²K/W), should be identified and compared between the baseline and the project scenario.

The LCA should use an appropriate functional unit that reflects the performance of the two scenarios (see more details in the General LCA Methodology).

Inputs from project developer

Proof that the project outcome has sufficiently similar technical and performance specifications to substitute for the baseline scenario.

8. Environmental and Social Do No Harm Safeguards

In addition to proving that projects have multiple benefits, they must prove that they **do not contribute to environmental and social damage**. DPDs must provide enough detail to validate that project deployment does not significantly harm any of the 17 UN SDGs. The risk of harm to **each** UN SDG should be explicitly evaluated in DPDs by filling out the **Environmental and Social Risk Table**. This includes, for each UN SDG, the potential types of harm, the likelihood of harm, and the potential severity of harm. The entire life cycle of the project should be evaluated for environmental and social risks, including the production, use, and waste treatment stage. Co-products and residual waste must also be considered.

The Riverse team or VVB can require additional proof that projects avoid these risks. Note that non-compliance with Environmental and Social Do No Harm requirements can disqualify project certification.

A project that causes a smaller increase in emissions compared to the baseline scenario harms the environment by contributing to climate change (see detailed description in the Annex section Avoided emissions: absolute decrease VS. smaller increase). This type of project is not considered harmful if it meets “Targets alignment” and “Substitution” criteria.

Inputs from project developer

Evaluate the type, likelihood, and severity of risk the project poses for each UN SDG, based on the UN SDG sub-objectives.

Action plan to prevent/manage any substantial risks.

9. Leakage

Carbon leakage refers to the indirect transfer of GHG emissions rather than the absolute avoidance/removal of emissions. This is sometimes referred to as "burden shifting". Carbon leakage may occur for a number of reasons, for example:

- If the emissions policy of a country raises local costs, then another country with a more relaxed policy may have a trading advantage. If demand for these goods remains the same, production may move offshore to the cheaper country with less strict environmental standards, and global emissions will not be reduced.

- If environmental policies in one country add a premium to certain fuels or commodities, then the demand may decline and their price may fall. Countries that do not place a premium on those items may then increase demand and use the excess supply, negating any benefit.

Project developers must justify why leakage is not expected to occur, based on market analysis, background research and precedents. The Riverse team may perform additional research, and discovery of significant leakage risks may disqualify projects for carbon credits. In case of small leakage potential, the Riverse team can require an additional leakage buffer on the final amount of carbon credit emissions during pre-validation phase or VVB during third-party audit.

Expected leakage should be included in the project LCA if it's highly likely, as well as within the system boundaries of the LCA.

Inputs from project developer

Evaluate the type, likelihood, and severity of leakage the project may incur, based on market analysis, background research, and precedents

Action plan to prevent/manage any substantial leakage.

10. Rebound effects

The rebound effect is a concept in economics that designates an increase in consumption caused by lifting barriers to the use of a good, service, or technology. The extra resources made available are then used for increased consumption of the same product, or for the consumption of other products. In other words, it is the emergence or re-emergence of symptoms (pollution, overconsumption…) that were either absent or controlled before the project took place.

Applied to energy consumption, the rebound effect characterizes a perverse and paradoxical effect of progress in energy efficiency: improved efficiency leads to an increase in the use of energy-powered devices and tools, and therefore of the energy needed to manufacture and operate it.

This paradoxical rebound effect comes into play in a broad way for all areas of resource use and their environmental impact.

Inputs from the project developer

Evaluate the type, likelihood, and severity of rebound effects the project may have.

Action plan to prevent/manage any substantial rebound effects.

11. TRL

Technology Readiness Levels (TRLs) are a method for understanding the technical maturity of a technology during its acquisition phase. TRLs allow engineers to have a consistent reference for understanding technology evolution, regardless of their technical background. The project must at minimum reach TRL 6, which is described in the table below.

TRL #	Description
1	Basic principles observed
2	Technology concept formulated
3	Experimental proof of concept
4	Technology validated in lab
5	Technology validated in relevant environment
6	**Technology demonstrated in relevant environment**
7	System model or prototype demonstration in operational environment
8	System complete and qualified
9	Actual system proven in operational environment

Inputs from project developer

Provide proof of technological progress and/or production capacities either in an operational environment or lab.

12. Targets alignment

Projects must have sufficiently large avoided emissions compared to the baseline scenario, to ensure that carbon credits promote technologies that will remain viable and low-impact in the near future. Riverse does not issue credits for projects with only meager improvements over the baseline scenario. Avoided emissions must be aligned with the sector's target emission reductions from 2020 to 2030[14].

[14] Source: Stratégie National de Bas Carbone, ADEME, 2020.

The target reductions are:

Sector	Target emission reduction (2020 to 2030)
Transport & mobility	25%
Construction & housing	45%
Agriculture	11%
Industry & waste	28%
Energy	40%

Inputs from project developer

LCA results showing that the percentage difference between the project and baseline scenario is aligned with the sector target emission reductions.

13. Minimum impact

The project must justify a minimum emission reduction/avoidance of 1000 tCO2eq over the crediting period of the project.

The total crediting period of a project is limited to 5 years. This is to oblige project developers to regularly reassess their technology against evolving baseline scenarios and background context.

Inputs from project developer

The sum of avoided/removed emissions for the project scenario over the crediting period must be at least 1000 tCO2eq.

14. Independently Validated

Each Riverse sector-specific methodology is first validated by the Riverse Advisory Board, ensuring that the methodology:

- Is compliant with the Integrity Council for the Voluntary Carbon Market (ICVCM) recommendations to certify highest quality carbon credits
- Uses rigorous and conservative LCA methods, aligned with LCA standards such as ISO 14040/14044, GHG Protocol
- Is appropriately adapted to the sector, based on recent scientific literature
- Can be reasonably and reliably followed, considering the data and analytic demands
- Robustness of verification process over time

For independent validation of projects, each DPD is audited by an accredited, independent and competent third-party VVB, on the following elements:

- Compliance with Riverse's methodology specifications
- Rigor and accuracy of the LCA
- Validity of verification KIIs, supporting documents, and monitoring plan

VVBs must be compliant with Riverse's accreditation rules described in section Third Party Validation and Certification.

Inputs from project developer

Submit DPD to an audit by a third-party VVB.

5. Registry

The registry is managed by Riverse to track and securely manage carbon credits as digital assets along their life cycle.

a. Credit pools

Credit pools are defined as a number of credits with the same project, mechanism and vintage year. Credit pools are bundled during transactions.

A project is uniquely described on the registry by:

- project ID
- project name
- name of the project developer
- location
- type of mechanism (avoidance or removal)
- crediting period

Credits are uniquely described on the registry by:

- unique identifier
- project ID
- vintage year (year of verification)

Type of mechanisms are defined on the registry as:

- “removal”: for all removal credits (as defined in §Types of credits issued)
- “avoidance”: for all avoidance credits (as defined in §Types of credits issued)

b. Status

Credits can have different statuses on the registry, as shown in the workflow diagram in the following: §Validation, Verification and Certification process.

Status	Definition
Certified	"certified" credits are pre-credits, and are issued after the VVB audit to give visibility to buyers on the volume of expected credits, which enables pre-purchase agreements
Verified	credits are "verified" after a monitoring period if the project meets the expected KII, with the production and emissions as estimated
Canceled	credits can be "canceled" if : The project does not meet the expected KII, the production is lower than estimated, or emission reductions are lower than estimated
Retired	a credit is "retired" when a buyer claims it

c. Pre-credits & Pre-purchase agreements

Pre-credits (or certified credits) are issued upon certification (after Riverse pre-certification and third party validation) for the projected volume of emission avoidance/removal over the project's lifetime. They are conservatively calculated.

Pre-credits are only used to track pre-purchase agreements for buyers and their property rights can not be transferred to the buyer until the mitigation activity occurs and they are verified (hence become credits).

For pre-purchase agreements, the provision pool will not be used to replace pre-credits for which the verification was not possible.

d. Verification

The crediting period is defined during the certification process, with a maximum of 5 years. During this period, KII are monitored as the mitigation activity occurs and is verified on a regular basis (usually every 3-6 months). For verification, project developers upload their sources to the Riverse platform to prove the KII were delivered.

Once proofread, pre-credits associated with the given period either change status into "verified" credits or are canceled.

During the verification phase, we can face 3 situations: exact estimation, over-estimation and under-estimation.

Below is an example for 100 pre-credits over the audit period:

	Actual, monitored tCO2e avoided or removed	Verified credits	Canceled credits
Case 1: the project produced exactly as expected, thus all the credits issued for this period are verified	100	100 credits verified: - 90 to the project - 10 credits go to the provision pool.	0
Case 2: the project did not deliver the expected KII, thus the relevant credits are canceled	80	80 credits verified: - 72 to the project - 8 to the provision pool	20 canceled
Case 3: the project produced more impact than expected, thus all the credits plus new credits are issued	120	100 credits verified and 20 new credits issued/verified: - 108 to the project - 12 to the provision pool	0

Note that the actual portion of credits going to the provision pool may vary by project.

When a buyer purchases verified credits from the registry, the emission reductions are guaranteed. The program secures a 10% provision pool of verified credits to act as an insurance/buffer in the case of non-delivered or over-estimated credits. These credits cannot be traded, and are to be used to cover the risk of unforeseen losses in carbon stocks in the project portfolio. These credits can replace any previously-sold credits in the event of a reversal due to fire, pests, drought, or other events, which can affect the permanence of the carbon sequestration inherent in the sold carbon credits.

6. General LCA Methodology

Carbon credits are calculated using life cycle assessment (LCA). This method involves modeling environmental impacts of all material and energy flows across the life cycle of a product or service. It uses a "cradle to grave" perspective, considering life cycle stages such as extraction of raw materials, processing, use, and end of life waste treatment.

Carbon credits are calculated by comparing the GHG emissions of the project scenario to the emissions of a baseline scenario, or reference scenario, that would have occurred without the implementation of the project. The difference in GHG emissions between the two scenarios translates to the amount of GHG emissions the project can be credited with avoiding/removing, and the number of credits they may be issued. Details on selecting the baseline scenario are in the section above.

Calculations of GHG emissions for the baseline and project scenarios must follow a robust, recognized methodology for LCA or similar life-cycle based method, such as:

- Carbon footprint (as defined in ISO 14067)
- Life Cycle Assessment, cradle-to-grave (ISO 14040/14044)
- GHG Protocol's Product Life Cycle Accounting Standard
- FDES (according to the NF EN 15804+A1 standard)
- European Union PEF (Product Environmental Footprint)

Detailed sector-specific methodologies are provided for each type of project covered by Riverse. These include guidance on aspects of LCAs such as dealing with multifunctionality (i.e. system expansion, substitution, allocation), recycling/circular processes, and specific data requirements. LCAs must follow both the General LCA Methodology and the relevant sector-specific methodology.

If a Riverse sector-specific methodology does not exist for a given project type, documented scientific research can be proposed to establish an LCA method. This measurement will then be evaluated by Riverse's Technical Committee of other experts and validated during by an external third party if necessary.

The General LCA Methodology is described below according to the main steps:

- Definition of the scope
- Collecting material and energy flow data
- Environmental impact calculation (at least climate change impacts/GHG emissions).

Definition of the scope

Functional Unit

A functional unit is the **reference value to which all impacts are normalized**. The same functional unit must be chosen for the project and baseline scenarios, to ensure an appropriate comparison between the two scenarios.

Functional units should include characteristics such as:

- Type of product/service
- Amount
- Performance specifications
- Geographic location
- Duration (where relevant)

Some examples of functional units are:

- 1 kWh of electricity produced in France
- 1 m2 of wall insulation for a house with a lifetime of 10 years, in Germany
- 1 ton of treated textile waste in the UK

System Boundary

The system boundary must include stages directly involved in the life cycle of the project, such as raw material extraction, delivery of supplies, processing, manufacturing, distribution, use, retail, distribution, and waste treatment. Important indirect stages may also be included in separate results, such as leakage sources and rebound effects.

It is highly recommended to provide diagrams depicting the system boundary of the project and baseline scenario. These should detail what is included in the analysis, the cut-off points for upstream and downstream processes, and groupings of processes into main life cycle stages.

A 3% cut-off rule is used to determine what processes within the system boundary may be excluded from the LCA. Processes with the lowest contributions to impacts, which account for a total of 3% of impacts, may be excluded from the LCA. These processes should be identified and justified with a screening study, or by using examples of LCAs of similar projects.

Baseline scenario selection

The baseline scenario represents the status-quo market average that would have occurred without the project activity. This scenario is selected using the **specific** technology/technologies that the project activity **substitutes**. For example, when the market average is a mix of technologies, the specific technology in the mix that is replaced by the project should be selected for the baseline scenario.

When it is impossible to subdivide and select a single representative technology, the market average mix can be adapted to better represent the project alternative. This can be done by selecting several of the most similar technologies, or removing several particularly dissimilar technologies. Any adapted market mix should cover at least 75% of the market.

If the project activity is multifunctional, the baseline scenario must cover all of the project's functions. This may result in several unrelated sub-scenarios that make up the baseline scenario.

The baseline scenario only needs to include processes/life cycle stages that differ from the project scenario. For example, if the end-of-life stage of a product is equivalent for the baseline and project scenarios, then this stage may be omitted from the comparative LCA, since they won't affect the results.

Collecting material and energy flow data

All measurements from the project scenario must be verifiable and based on recent conditions. These measurements include quantities (volume, mass, number) and type of products and inputs.

All background data (i.e.: emission factors, rates of recycling, composition of national electricity grid) must be derived from traceable, unbiased, reputable sources.

LCAs must use the most recent data available. Data coming directly from the project (i.e. foreground data) should be no more than 1 year old. Background data (i.e. market averages, global statistics) should be no more than 3 years old.

For geographic accuracy, national-level background data should be prioritized. Local (region, state, city-scale) or global sources may be used if justified in the DPD.

Environmental impact calculation

Although many types of environmental impacts can be modeled with LCA, only the climate change impacts (measured in CO2e) are used to calculate the number of carbon credits to issue a project. Results from other environmental impact categories may be used to determine eligibility of a project (i.e. respecting the Do No Harm principle or for justifying co-benefits).

It is encouraged to use complementary, non-LCA environmental indicators when relevant. These may include site-specific impacts (i.e. local pollution), hazardous waste production, and local biodiversity impacts.

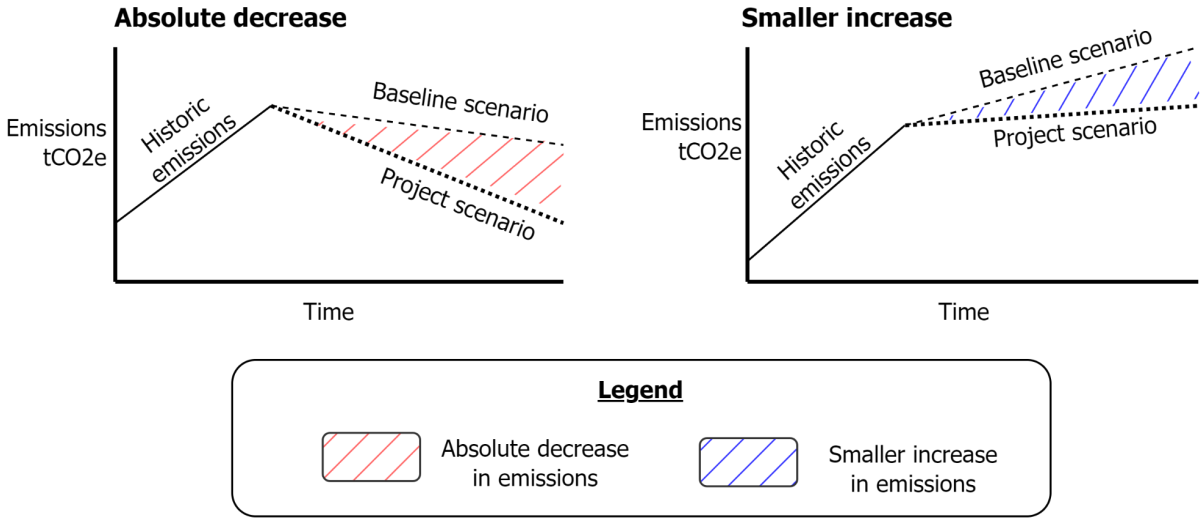
7. Appendix

a. Avoided emissions: absolute decrease vs. smaller increase

There are two types of avoided emissions: those that lead to an **absolute decrease** in emissions, and those that lead to a **smaller increase** in emissions.

Absolute decrease: there is a real absolute decrease in emissions compared to the baseline scenario.

Smaller increase: there is a relative decrease in emissions compared to the baseline scenario, but still an absolute increase in emissions. This may happen when a project intervenes in a sector with growing demand, where overall production increases, so emissions increase over time.



Both types of avoided emissions can be eligible for carbon credits under the Riverse methodology, as long as they meet the reduction targets for their sector.

b. Sector-specific frameworks

Guidance for eligibility and LCAs of specific sectors are provided below. The main sectors currently covered by Riverse are recycling, reconditioning, bioenergy and BECCS.

1. Recycling materials

Eligible recycling projects avoid incineration of waste or complex, uncommon recovery/recycling processes by offering improved, multifunctional recycling processes.

Example types of eligible recycling processes are:

- improved mechanical sorting, enabling better recycling rates
- new mechanical recycling processes, enabling recovery of otherwise wasted raw materials
- biogenic recycling using microorganisms, enabling the transformation of organic waste to usable materials
- chemical recycling processes, where all exhaust gasses are controlled and filtered

To be eligible, a project must:

1. **enable** the emission avoidance/removal, meaning most emission reductions occur thanks to a process **owned or managed by the project developer**.
2. produce evidence of emissions avoidance/removal with an LCAaccording to the General LCA Methodology.
3. enable material "loops" by collecting and valorizing waste or co-products, thus reducing raw material extraction needs
4. improve either waste collection or treatment efficiency, compared to the baseline scenario

The comparative LCA for this sector includes:

	Baseline scenario	Project scenario
Waste treatment	Average end of life of the product	Collection, sorting and transportation of product
Production of new material	Average cradle-to-gate production of new material	Recycling process creating the same material from waste product
Transport and distribution	Transport from production site to retail site or customers	Transport from recycling center to retail site or customers
Usage	-	-
End of life	-	-

Usage and end of life are not accounted for since the project and baseline scenarios produce the same materials, which will have the same usage and end of life.

Verification sources for this project type may include:

- Input tonnage of waste
- Transport distance for waste collection
- Output tonnage (valorized materials)
- Quality characteristics of the recycled materials

2. Reconditioning products / Extending end-of-life

Eligible reconditioning projects avoid incineration of waste or complex recovery processes by renewing products, allowing them a second life while skipping the waste treatment process.

Projects extending end-of-life of products and materials can involve:

- Collecting and sorting waste
- Dismantling or assessing viability
- Repairing and reconditioning products
- Transforming materials or compounds into new raw materials
- Conditioning and distributing materials and products

Example eligible types of reconditioned products include:

- hardware electronics: smartphones, computers, tablets
- batteries: cars, e-scooters
- construction materials

To be eligible, a project must:

1. **enable** the emission avoidance/removal, meaning most emission reductions occur thanks to a process **owned or managed by the project developer**.
2. produce evidence of emissions avoidance/removal with an LCAaccording to the General LCA Methodology.
3. enable material "loops" by collecting and valorizing waste or co-products, thus reducing raw material extraction needs

The comparative LCA for this sector includes:

	Baseline scenario	Project scenario
Initial waste treatment	Average end of life of the product	Collection, sorting and transportation of the product

Production of new material	Average cradle-to-gate production of new product	Sorting, quality assurance, refurbishing and reconditioning process
Transport and distribution	Transport from production site to retail site or customers	Transport from reconditioning center to retail site or customers
Usage	-	-
End of life	-	-

Usage and end of life are not accounted for when the project and baseline produce the same product. If the analysis of the product demonstrates that the reconditioned product has a shorter life than new ones (which is the case for electronics for instance), the FU must reflect this.

Verification sources for this type of project include:

- Number of input waste/products
- Transport distance for waste collection
- Output number of products
- Output tonnage of waste (i.e. waste products that were not able to be reconditioned)
- Quality assurance of the reconditioned material/product

3. Bioenergies and BECCS

Eligible projects produce energy (heat, electricity, substances used for energy purposes such as gas, liquid) and/or carbon sequestering substances. This type of project includes processes such as:

- Capturing greenhouse gasses (CH4, CO2) from the atmosphere using biogenic processes, or recovering plant biomass that has captured atmospheric CO2 through photosynthesis
- Transforming captured gas or biomass into carbon-containing substances
    - Either fixing carbon into a long-term stability output, such as bio-oils or biochars, and returning it to the earth in soil or other reservoirs
    - Or using carbon-containing substances as energy sources to be combusted, replacing fossil fuels

Eligible types of carbon capture include:

- biogenic CO2 from combustion of biomass, bioliquids or biogas (BECCS, bio-CCS)
- biogenic carbon-containing substance (bio-oil, biochar,...)

Eligible types of storage:

- application of carbon containing substance in agriculture fields
- injection of carbon containing substance into reservoir
- direct injection of CO2 into deep geological formation

To be eligible, a project:

1. must produce bioenergies from sustainably sourced biomass or **waste biomass**, a list of biomass types can be found in IPCC Appendix 4 Method for Estimating the Change in Mineral Soil Organic Carbon Stocks from Biochar Amendments (Table 4AP.1)
2. must prove 100% of the origin of the biogenic sources
3. must produce evidence of emissions reductions and capture with an LCA according to the General LCA Methodology.
4. The direct use of fossil fuels for heating the pyrolysis reactor is prohibited, unless only used for ignition/pre-heating or in a mobile unit and the emissions are fully included in the LCA.

Additional requirement for biochar producers:

The molar $HCorg/$ ratio must be less than 0.7. The $HCorg/$ ratio is an indicator of the degree of carbonization and therefore of the biochar stability. Values exceeding 0.7 are an indication of non-pyrolytic chars or pyrolysis deficiencies.

A sustainable biomass used as feedstock has to respect the following rules :

- when it is from agricultural waste, at least 30% must remain on fields
- in case of forests, or landscape, only waste can be used, and the territory must be managed sustainably
- when it is from cultures, land use change must be managed correctly
- be part of the European Biochar Certificate's Positive list of permissible biomasses for the production of biochar, available here.