Environmental Assets White Paper

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INSTITUTO TOTUM

RECs, Carbon Credits, CBIOs and GAS-REC. What are the differences?

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Understanding environmental assets – RECs, Carbon Credits, CBIOs and GAS-REC. What are the differences?

Introduction

Many regulatory and voluntary initiatives attempt to stimulate aspects of sustainability at the local, regional, national and global levels. One of the key aspects currently being addressed is greenhouse gas (GHG) emissions. This document aims to present the existing market instruments in Brazil, their connections and any restrictions or recommendations for use.

Organizations with the intention to report their GHG emissions, and as a result, reduce them, have a variety of options at their disposal. These options include actions and tools to reduce their direct emissions; activities and tools to reduce their indirect emissions associated to use of energy; and additional actions to encourage suppliers to reduce emissions that could be allocated to their products and services.

Within this range of options, there are effective internal reduction measures, changes in the energy matrix and the purchase of environmental assets that influence the reporting of GHG emissions. The knowledge of each instrument and its field of application is a critical aspect of decision making.

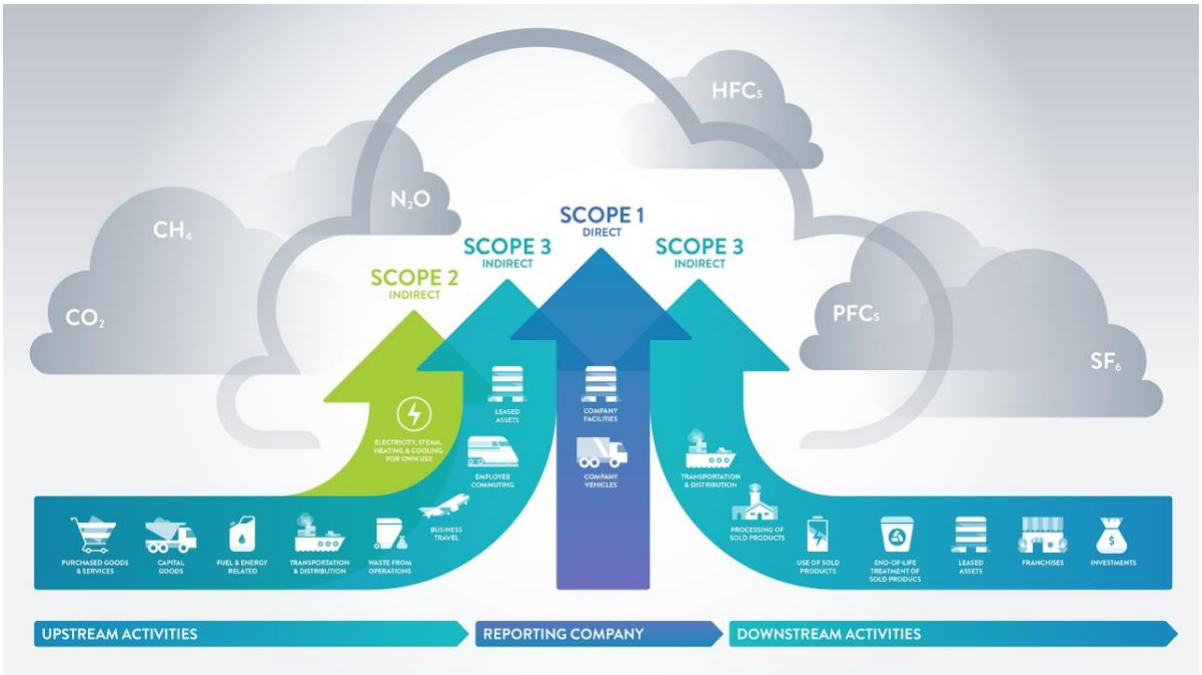
This document addresses four widely used tools, elucidating the differences and reasons why each organization should choose each type and the most common flaws in interpretation. The tools described are RECs, Carbon Credits, CBIOs (RenovaBio Program) and GAS-REC.

However, before explaining each tool, one has to clarify how organizations report their GHG emissions through internationally known standards.

GHG Emissions Reporting Platform

The GHG Protocol and CDP are platforms that most organizations in the world use to record their "carbon footprints", through an inventory of GHG emissions. Under the rules of the GHG Protocol and CDP, each organization follows a list of guides and procedures to measure its emissions and report them in an organized manner. This organized way divides GHG emissions into three different scopes: emissions that are the direct responsibility of the organization (Scope 1), emissions resulting from the purchase of energy (Scope 2) and emissions from the supply chain (Scope 3).

Emissions from own fleet, fuel-burning in stationary facilities (including purchased gas), own effluent treatment, changes in land use and fugitive emissions are some examples of own emissions, reported in Scope 1. In Scope 2 are reported emissions from the purchase of electrical and thermal energy (including steam). Emissions from business trips, employee transportation, effluent treatment by third parties, transportation and contracted logistics must be reported in Scope 3. Based on this organized panel of greenhouse gas emissions, each organization can choose strategies, including the acquisition of environmental assets, to reduce or offset (mitigate) its GHG emissions.

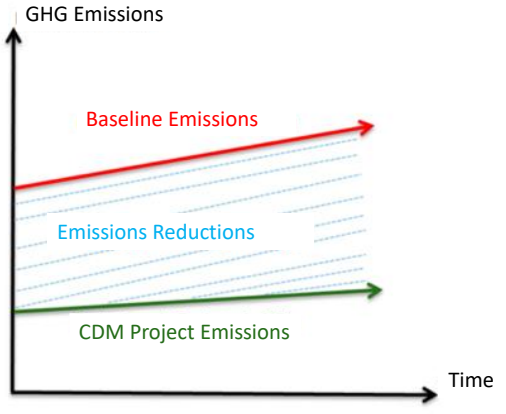


What are Carbon Credits?

A carbon credit project is a specific activity or set of activities to reduce GHG emissions, increasing carbon stocks or increasing GHG removals from the atmosphere, according to the GHG Protocol. This project must demonstrate additionality, that is, the reduction of GHG emissions from the project must be additional to what would occur in the absence of such a project. Furthermore, emission reductions must be real, permanent, verifiable and carbon credits issued after effective verification. There is a set of procedures for a carbon credit project to have its additionality proven and approved; it relies on the methodology used and external validation and verification organizations are usually involved. Carbon credit projects usually refer to the life cycle of the target project, according to pre-defined methodologies at an international level.

Carbon credits are used by organizations to offset direct and indirect emissions associated with operations, reported by the GHG Protocol platform. The "negative" emissions resulting from the carbon credit project can be purchased by organizations to reduce their emissions within Scopes 1, 2 or 3, in addition to any internal actions by the organization to reduce its emissions itself. The use of carbon credits does not actually decrease the organisation's emissions, but can be used to "cancel out" a certain amount of emissions and reduce the organisation's carbon footprint.

In the case of energy plants producing electricity from renewable sources, it is possible to apply methodologies for the generation of carbon credits. The basis of the claim is that each MWh injected by the renewable source would displace or replace the same amount of MWh generated from non-renewable sources (such as thermoelectric plants powered by oil or fossil gases). The carbon credit transaction unit, regardless of the original project, is tons of carbon dioxide equivalent avoided or reduced.



The purchase of carbon credits represents an action to reduce GHG emissions and can be applied in any scope defined in the GHG Protocol. There is no need for the company that purchases carbon credits to consume any input generated by the project or have a commercial relationship with the emission reduction project, including the possibility of purchase in different countries.

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What are RECs?

REC stands for Renewable Energy Certificate. RECs are legal instruments used in the energy markets to account for renewable electricity and allocate their shares to specific consumers.

It is a marketable instrument based on the market that represents the legal property right of the renewability attribute of a specific renewable electricity generation previously registered. A REC is created for each megawatt-hour of renewable energy that is injected into the electricity grid of a specific country or region. In markets where the REC instrument exists, such as in Brazil, electricity can only be considered renewable if the organization that makes such a claim has RECs. For a power generating plant to issue RECs, there is no need for any additional claim (see carbon credits), within voluntary markets.

Therefore, the REC is an allegation of possession of an energy renewability attribute. As the production and delivery of energy on the grid relies on renewable and non-renewable sources and physical energy cannot be traced, REC is the globally adopted way for consumers to make credible claims about the consumption of renewable energy, without risk double counting or double beneficiary.

Consumers within the same physical or legal system, who do not have RECs, are left with both the remaining renewable and the non-renewable energy to make their consumption claims. That energy mix is called the Residual Mix. In this way, consumers in the same energy grid, with the same consumption, can make different claims regarding their renewability, determined by their respective RECs purchases. Hence, in a short-term global view, RECs only reallocate an emissions profile from a given energy grid; users with RECs report emissions from allocated renewable sources and users without RECs report emissions from unallocated renewable sources plus emissions from non-renewable sources. The global system itself remains with the same “carbon footprint”. In the medium and long term, the continuous use of RECs

tends to influence new investments in the energy sector to prioritize renewable sources, reducing the “carbon footprint” of the system as a whole.

In terms of the standardized reporting of greenhouse gas inventories, for example in the GHG Protocol, RECs can be a flexible tool for companies to claim low or even zero emissions for their Scope 2 - Emissions from electricity consumption. Although RECs are an essential instrument for accounting for renewable energy, no matter how electricity is purchased or used, RECs can be purchased under the electricity purchase agreement or on an unbundled basis, as long as the number of RECs is compatible with the consumption.

The purchase of RECs does not represent a direct reduction in Scope 2 emissions, but rather factual evidence that energy with low or zero emissions was acquired by the organization. Companies that do not consume electricity cannot purchase RECs, just as RECs should not be purchased beyond their consumption, as the REC has no use for reducing Scopes 1 or 3 emissions, unless they are formally incorporated with emission reductions (see carbon credits). Furthermore, good practice indicates that the purchase of RECs by companies that consume electricity should be made within the same interconnected system or the same market. This creates a difficulty, in practice, for REC trade to be international.

What are GAS-RECs?

The GAS-REC Certification tracks biogas from biogas production plants through the supply chain to prove that the gas consumer purchases the renewable part of the gas consumed. Namely, the renewable natural gas, from renewable sources.

Each cubic meter of biogas produced and distributed by any physical means tends to replace or move the same unit of natural gas from fossil sources or other fossil fuels. The GAS-REC Certification tracks the biogas generated and distributed in Brazil, reaching the point of consumption. Tracking is done through a "book and claim" system, meaning, entrances and exits, without necessarily following the physical flow, since in a gas pipeline, for example, fossil natural gas and renewable natural gas are mixed. The GAS-REC Certification and the tracking system ensure that there is no double counting (nor double beneficiary) from the biomethane production point to the final consumer.

GAS-REC is a biogas tracking scheme that allows gas users to make claims regarding the use of renewable natural gas. The GAS-REC certificates issued can be sold separately from physical gas. The initial owners of the GAS-REC certificate, which are the biogas production plants, can sell the physical commodity gas and simultaneously seek buyers for the renewable biogas attribute generated, obtaining an extra revenue due to the sustainability characteristic of the injected or transported biogas.

The unit of measurement of the GAS-REC is expressed in energy units (BTU or MWh), since the production and commercialization of renewable natural

gas is not always standardized, for instace in the case of clean biogas, which is transformed into biomethane (which is standardized within the ANP rules).

The purchase of GAS-RECs does not directly represent a reduction in Scope 1 emissions (stationary or mobile combustion), but rather factual evidence that low-emission biogas was purchased by the organization. Companies that do not consume gas cannot purchase GAS-RECs, just as one should not purchase GAS-RECs beyond their consumption, as GAS-REC is not useful for reducing Scopes 2 or 3 emissions. Furthermore, good practice indicates that the purchase of GAS-RECs by gas consuming companies should be made within the same transportation system (which delivers a mix of fossil and renewable gas) or within the same market. The aforementioned makes it difficult, in practice, for GAS-RECs to be internationally traded (except in the case of international gas pipelines).

What is CBIO?

CBIO is a decarbonization credit created by the institution of the RenovaBio Program in Brazil. RenovaBio is the National Biofuel Policy, established by Law 13576/2017 with the objectives of providing an important contribution to the fulfilment of the goals determined by Brazil under the Paris Agreement. It promotes the adequate expansion of biofuels in the energy matrix, emphasizing the regularity of fuel supply, to ensure predictability for the fuel market. That induces gains in energy efficiency and the reduction of greenhouse gas emissions in the production, commercialization and use of biofuels.

RenovaBio's main instrument is the establishment of annual national decarbonization targets for the fuel sector, to encourage an increase of the production and participation of biofuels in the country's energy matrix. Through the certification of biofuel production, different grades are assigned to each biofuel producer and importer, the grade is inversely proportional to the carbon intensity of the biofuel produced. The grade will accurately reflect the individual contribution of each producing agent to mitigate a specific amount of greenhouse gases compared to its fossil substitute (in terms of tons of CO^2 equivalent).

Fuel distributors must prove compliance with compulsory individual targets by purchasing Decarbonization Credits (CBIO), a financial asset negotiable on the stock exchange, derived from the certification of the biofuel production process based on the respective efficiency levels achieved compared to their emissions.

Biofuel producers and importers who voluntarily join the program will be able to commercialize these credits, based on

this certified production. Fuel distributors will meet the mandatory individual annual target when proving ownership of CBIOs in their portfolio.

The methodology used to obtain the CBIO is based on the analysis of GHG emissions from the life cycle of each biofuel and its comparison with the emissions from fossil fuels that represent normal market practice ("business as usual"). It is an acceptable type of methodology for issuing a type of carbon credit. There is a regulated component to the CBIO market, namely, the fuel distributors that must acquire them in sufficient quantity to support the national policies for decarbonization of the fuel matrix. However, in essence, because they are carbon credits, they can be used by any organization to offset or reduce direct and indirect emissions associated with operations, reported by the GHG Protocol platform. The "negative" emissions resulting from each CBIO can be purchased by organizations to reduce their emissions within Scopes 1, 2 or 3, in addition to any internal actions by the organization to reduce its emissions.

In the case of biogas plants, for example, the portion that is processed to reach the national biomethane standard may be the considered to obtain CBIOS. The CBIOS transaction unit, regardless of fuel type, is standardized in terms of tons of carbon dioxide equivalent avoided or reduced.

The purchase of CBIOS, outside the scope of fuel distributors, represents a voluntary action to reduce GHG emissions and can be applied to any Scope defined in the GHG Protocol. There is no need for the CBIOS purchasing company to consume any fuel targeted by the RenovaBio certification or to have a commercial relationship with the distributor or plant responsible for RenovaBio certification. That includes the possibility of purchase in different countries (as long as the destination country recognizes CBIO as a carbon credit instrument).

Carbon Credits, CBIOs, RECs and GAS-RECs are the same?

. The environmental assets aforementioned have different definitions and objectives and are most definitely not the same.

All instruments can help organizations lower their GHG emissions and their respective carbon footprints, but they should be seen as instruments aimed at different objectives, and are not fully interchangeable.

In a way, carbon credits and CBIOS can be considered similar assets, as they represent negative emission assets (that is, emission reduction) and are not necessarily linked to the factual evidence of the generating physical asset (which is a project). These instruments can be acquired by organizations of any type, even if they have no relation to the primary physical asset that generates the environmental asset. As they can be used by any organization, they are assets measured in a "standard currency", that is, tons of CO2 equivalent avoided. Both assets represent emission reductions that can be used to reduce (offset) actual emissions in Scopes 1, 2 or 3 within the rules of the GHG Protocol.

RECs and GAS-RECs can be considered similar assets, but significantly different from Carbon Credits and CBIOS. Both instruments are virtual tracking tools for the consumption of physical goods, whose factual traceability is impossible or impractical. RECs and GAS-RECs do not allow organizations to reduce emissions, but rather to declare consumption of tracked physical goods that have intrinsically lower GHG emissions than other physical goods used

for the same purpose. The purchase of these instruments allows organizations to secure the renewable part of the mixed physical goods, leaving the unallocated part for the others. In itself, there is no reduction in emissions as a whole, but a simple equation for allocating existing emissions. Unlike carbon credits or CBIOs, which can be purchased by any organization, the RECs and GAS-REC instruments can only be purchased by organizations that use the physical assets connected to these assets, in this case, respectively, grid electricity and gas. In terms of emissions reporting, the REC and GAS-REC assets can only be used for the reporting of emissions in Scopes 2 and 1 of the GHG Protocol, respectively.

Is there the risk of double counting or double profiting?

This is a controversial issue worldwide. RECs and GAS-RECs are tools for the promotion and tracking of renewable energy. That is because they are more linked to the transacted physical context (respectively electricity and biogas) at present and are a factual basis for the allegation of consumption of renewable goods, without future inferences or other hypotheses. Carbon credits and CBIOs, on the other hand, represent an action that prevents the emission (or causes the sequestration of) a ton of CO2 equivalent. While REC and GAS-REC can be measured factually, carbon credit and CBIO cannot, as they are the result of a hypothetical comparison with some baseline, in addition to the subjective question of additionality.

Therefore, an electric power plant could submit a carbon credit project and, if approved, request the issuance of this environmental asset to sell to any organization in the world, such as avoided or negative tons of CO2 linked to each MWh generated. At the same time, it could certify its unit for issuing RECs and sell these renewable MWh attributes to another organization, in the currency of the RECs, which is MWh. Furthermore, the physical electrical energy itself could be sold to a third consumer, who could not claim renewable energy consumption. This is the current practice in several markets around the world. However, there are some markets or regulations related to RECs in which an electric power generation plant is not allowed to issue Carbon Credits to the MWh that were used to issue RECs unless these Carbon Credits are issued to the same buyer as the RECs. Therefore in those markets or according to those regulations, the issuance of RECs would prevent the issuance of Carbon Credits, considering the same MWh and different buyers.

For example, consider an electric power plant that is eligible for issuing RECs and has a formally registered carbon credit project. This plant generates, for example, 10,000 MWh of renewable energy in a given month. If the plant decides to use the 10,000 MWh for issuing RECs and Carbon Credits, it should choose to issue either RECs or

Carbon Credit for each MWh (considering different customers for each environmental asset). If one were to decide to issue an "X" amount of RECs, the amount equivalent to (10,000 - X) would be left over for other buyers to issue carbon credits. This is the case of the I-REC (International REC Standard), which started to adopt this limitation in the issue of I-RECs from 2020.

In line with the above concept, in markets, where the emission of RECs and Carbon Credits for the same MWh is free, some organizations purchasing RECs request that no carbon credits be issued for the same MWh that were sold as RECs, because of the purchasing organization's internal policies. These organizations seek to ensure that any emission reductions generated from MWh sold as RECs are not sold to other organizations, appreciating their RECs. As this may be an internal policy for each buyer, local REC issuers worldwide indicate, in the absence of emission limiting rules, for each certificate issued, whether the seller (plant) wishes or not to maintain the rights to an eventual reduction in emissions. That limitation depends on whether the buyer makes this specific requirement or not.

Let us analyse the case of an ethanol plant that sells fuel to distributor A. This plant is RenovaBio certified and authorized to issue CBIOs. As already explained, CBIOs can be used both in the

regulated market for fuel distributors and the voluntary market as a tool for offsetting GHG emissions (emission reductions). Let's assume that the plant sold 100% of its CBIOs to a distributor B, but continues to trade physical ethanol with distributor A, which places the product on the market. The product is available for sale at the gas station. An industry that has its own vehicle fleet buys ethanol and uses it in its flex fleet. At the end of the year, this industry will report its GHG emissions, according to the guidelines of the GHG Protocol. Thus, in Scope 1, the company will report the purchase of a certain amount of liters of ethanol and report its emissions according to the ethanol emission factor. For this consumer, he is reporting a fact that he consumed a certain amount of ethanol in a given time, without the fact that the plant has RenovaBio certification or not changing the reporting decision. As the industry has a physical invoice of ethanol, it can report its consumption in a credible way and the consequent GHG emission of ethanol. It is not up to the industry to report emission reductions for having consumed ethanol instead of gasoline in its “flex” fleet, but only the fact that it consumed ethanol in the period. Although the fuel has been subject to RenovaBio certification with the issuance of CBIOs, there is no need to claim any risk of double counting in this procedure.

Despite this, specifically for the gas market, some organizations that purchase GAS-RECs may request that CBIOs not be issued for the same volumes of biomethane marketed as GAS-REC, due to the organization's internal policies. These organizations seek to ensure that any emission reductions generated from cubic meters or BTU of biomethane sold as GAS-REC are not sold to other organizations, valuing the GAS-RECs acquired by the organization. As this is an internal policy for each buyer, local GAS-REC issuers in Brazil indicate, for each certificate issued, whether or not the buyer wishes to maintain the rights on any CBIO emissions, and whether or not the buyer should make this specific requirement

To close this article, we will now investigate the case of a biomethane plant selling this fuel to a gas distributor, injecting ANP standard biomethane directly into the pipeline. This plant has RenovaBio certification and authorization to issue CBIOs. As already explained, CBIOs can be used both in the regulated market for fuel distributors and the voluntary market as a tool for offsetting GHG emissions (emission

reductions). Let's assume that the plant sold 100% of its CBIOs to a distributor B, but continues to sell physical biomethane with distributor A, which places the product on the market through a gas pipeline, most of which is fossil natural gas. The product “fossil natural gas plus biomethane” is available at the tip of the gas pipelines for industrial use. An industry that has a boiler buys the gas and uses it in its industrial process. At the end of the year, this industry decides to report its GHG emissions, following the guidelines of the GHG Protocol and CDP. Thus, in Scope 1, the company will report the purchase of a certain quantity of cubic meters or BTU (MWh) of gas. In the absence of any traceability, the company must use the emission factor of the acquired mixture (if it has access to this information via a distributor) or, for conservatism, it should report as if the consumption were 100% fossil natural gas. If the company has GAS-REC in its possession in an amount compatible with its total consumption, it could claim the consumption of up to 100% of biomethane and report lower emissions

than those of natural gas. This allocation does not generate a reduction in emissions as a whole, but only a reallocation of emissions for all users of that distributor (gas pipeline). Even though biomethane has been the target of generation of CBIOs, the industry at the end is not appropriating emission reductions, but only declaring the present fact that it is consuming a product tracked from a mix of the gas pipeline of impossible physical traceability. There is no risk of double counting, because while distributor B has appropriated the emission reductions resulting from biomethane, the industry has physically appropriated the biomethane injected into the network and can report emissions from that biomethane, and not from the gas mixed in the pipeline.

Still under the case of the aforementioned biogas plant, there would indeed be double counting if the plant obtained RenovaBio certification and certification for the emission of Carbon Credits, since both assets represent reductions in GHG emissions over the same operating base. Simply obtaining double certification would not be a reason for double counting, but the issue of CBIOs and Carbon Credits for the same volume produced would represent double counting. The plant in this case is required to choose to issue either CBIO or Carbon Credit for each biogas unit produced.

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Table outlining differences between Carbon Credits, CBIOs, RECs and GAS-RECs

Aspect	Carbon Credit	CBIO	REC	GAS-REC
Regulation	Voluntary	Regulated by ANP	Voluntary	Voluntary
Origin	Project that avoids or reduces GHG emissions.	Project that produces biofuel.	Generation of renewable electric energy.	Generation of biogas or biomethane.
Aim	It represents a reduction in GHG emissions in any type of eligible activity.	It represents a reduction in GHG emissions in the production of biofuels.	Factual evidence that renewable electricity was generated and consumed.	Factual evidence that biogas or biomethane was generated and consumed.
Unit of measure	Tons of CO2 equivalent.	Tons of CO2 equivalent.	MWh.	BTU, MWh or m3.
Relation with the GHG Protocol	It allows the reduction of emissions in the form of compensation in Scopes 1, 2 or 3. It does not change the emissions of the organization itself.	It allows the reduction of emissions in the form of compensation in Scopes 1, 2 or 3. It does not change the emissions of the organization itself.	Allows the claim of use of a renewable source of electric energy only in Scope 2. It cannot be used to reduce or offset emissions.	Allows the claim of use of renewable natural only in Scope 1. It cannot be used to reduce or offset emissions.
Relationship with Organizational Environmental Declarations	Organizations can claim to reduce emissions outside the company's environment.	Organizations can claim to reduce emissions outside the company's environment.	Organizations can claim use of renewable sources of electricity in their operations.	Organizations can claim use of renewable natural gas in their operations.
Additionality Tests	Required to prove that emission reductions are beyond common practice. They generally require validation and verification activities performed by an independent third party.	Not required, it suffices to follow the rules of RenovaBio. The regulation requires a certification procedure involving an external inspection firm.	Not required. The registration of the plant, as well as the issuance of the REC, is simple and done by a Local Issuer.	Not required. The registration of the plant, as well as the issuance of the GAS-REC is simple and done by a Local Issuer.

Aspect	Carbon Credit	CBIO	REC	GAS-REC
Imports and Exports of Environmental Assets	Allowed, given that the reduction of the greenhouse effect has worldwide reach.	It depends on the regulation.	Only allowed for connected systems or for the same regulated market.	It can be restricted to the same gas pipeline or to the same country.
Continuity	Usually, projects that generate Carbon Credits allow the asset to be issued for a limited time (between 7 and 21 years).	As long as there is regulation.	An electric power plant can issue RECs while it is operating.	A biogas plant can generate GAS-REC while it is operating.
Relationship to the Asset Origin	There is not one.	Only in the regulated aspect for distributors. For the voluntary market, there is not.	RECs can only be acquired by organizations that consume electricity within the same grid or regulated market. The year of consumption is generally expected to be paired with the year of the generation of the REC's target energy	Only organizations that consume gas within the same gas pipeline or country can acquire GAS-REC. Generally, the year of consumption of biomethane is expected to be paired with the year of production targeted by the GAS-REC
Double counting risk	Only in relation to CBIO.	Only in relation to Carbon Credit.	There is none, provided transparent emission standards are used regarding the right to issue carbon credits by the seller. However, there are more and more limitations for the issuance of RECs and Carbon Credits for the same MWh (considering different buyers).	There is none, provided transparent emission standards are used regarding the right to issue carbon credits or CBIOS by the seller, and whether or not to accept the status is up to the buyer.

Aspect	Carbon Credit	CBIO	REC	GAS-REC
Transparency regarding possible competing environmental assets	Not foreseen	Not foreseen	The instrument provides the citation of retention or not of the rights to issue carbon credits. In some markets, there is a requirement that no carbon credits be issued for the same MWh issued as RECs to another buyer other than the REC.	The instrument provides the citation of the retention or not of rights to issue carbon credits or CBIOs.
Time limitations for asset use	A certified emission reduction, in general, can be used at any time to claim emissions offsetting.	CBIO must be used in the period of demonstration of legal compliance in the regulated market. For voluntary use, there does not seem to be a limitation of period of use.	There is generally a need to pair the REC's generation (energy production) year with the year of consumption claim.	There is usually a need to match the year of generation (biogas production) of GAS-REC with the year of consumption
Potential Users	Any organization in the world interested in offsetting GHG emissions and reporting them for the GHG Protocol, CDP, ISE (B3) and sustainability reports, regardless of the source of the carbon credit.	Within the regulated scope, fuel distributors in Brazil that need to meet the ANP goals. In the voluntary scope, ditto the Carbon Credit column.	Any organization, interested in reporting renewable energy consumption, especially those reporting environmental performance in RE 100, Leed Certification, CDP, GHG Protocol, ISE (B3), as long as it is connected to the same electrical grid (or the same market) where the REC was produced.	Any organization that consumes gas in its process and is interested in reporting consumption of renewable natural gas, especially those that report environmental performance in CDP, GHG Protocol, ISE (B3), as long as it is in the same country or connected to the gas transport system.