Revista
DESENVOLVIMENTO SOCIOECONÔMICO EM DEBATE
e-ISSN: 2446-5496

Carbon trading: survey of brazilian normative that regulates carbon credit

Comercialização de carbono: Levantamento das normativas brasileiras que regulamentam o crédito de carbono

Kleber Destefani Ferretti
Mestre em Agronegócio, Universidade Federal de Santa Maria. E-mail: kleber.destefani@acad.ufsm.br
0000-0003-4921-0298

Jose Geraldo Wizniewsky
Doutor em Agroecologia Sociologia y Estúdios Campesinos, Universidade Federal de Santa Maria.
E-mail: zecowiz@gmail.com
0000-0002-8718-6308

Abstract

From the analysis of Brazilian legislation, it can be concluded that Brazil needs to move forward when it comes to legislation, both at federal level, because it does not have its own regulation, and also along the 27 states, which do not approach the topic and it does, the acts are confused and flawed, mixing payment for environmental services and carbon credit commercialization.

Keywords: Brazilian states; State legislation; Clean development mechanisms; Trade modalities.

Resumo

A partir da análise das Legislações brasileiras se pode concluir que o Brasil precisa avançar muito no que se refere a legislação, tanto federal por não possuir regramento próprio, como também pelos 27 estados não abordarem a temática e os que regulam são legislações falhas ou confusas, que misturam pagamento por serviços ambientais com comercio de crédito de carbono.

Palavras-chave: Estados brasileiros; Legislações estaduais; Mecanismos de desenvolvimento limpo; Modalidades de comercio.

DOI: 10.18616/rdsd.v10i1.8181

Recebido: 20/08/2023
Aprovado: 29/12/2023

1 Introduction

Over the decades since 1988, when the Intergovernmental Panel on Climate Change (IPCC) has emerged, due to the "United Nations Environment Program (UNEP) and the World Meteorological Organization (WMO)" (OLIVEIRA; MIGUEZ; ANDRADE, 2018, p. 21), which aimed to build ways to scientifically evaluate "climate change, possible socioeconomic and environmental impacts and formulate realistic strategies to deal with causes and consequences of increased greenhouse gases concentration [...]" (OLIVEIRA; MIGUEZ; ANDRADE, 2018, p. 21), in a climate context of global amplitude.

Four years after the construction of the IPCC (1988), the United Nations Framework Convention on Climate Change (UNFCCC) was created in 1992, being adopted by 192 countries. However, although the problem arising from climate change has a strong impact on the environment and, therefore, on the population, there are still "divergences between developed and developing countries in the formulation of measures to reduce the impact of the climate change, making it difficult to integrate mitigation and adaptation with opportunities" (VIEIRA *et al.*, 2021, p. 03).

After the UNFCCC occurrence in 1992, the focus on climate change issues began to grow, in terms of concern for the future. In 1997, the Third Conference of the Parties on Climate Convention, called the Kyoto Protocol was consolidated and sanctioned by Brazil in 2005, envisioning the reduction of carbon emissions into the atmosphere (VIEIRA *et al.*, 2021). With the "aim that developed countries could achieve their reduction targets at the lowest possible cost, three flexibilization mechanisms were implemented: Emissions Trading, Joint Implementation and the Clean Development Mechanism (CDM)" (BASSO; BERTAGNOLLI; SANTOS, 2017, 299).

The Clean Development Mechanism (CDM) points to "achieve and renew sustainable means of production in developing countries from the deployment of cleaner technologies. It is also a mechanism that facilitates the achievement of targets for reducing the emissions of countries' GHGs" (BASSO; BERTAGNOLLI; SANTOS, 2017, p. 300).

Through CDM projects it will be appropriate to enter the carbon market, that is, the market which trades carbon credits certificates, because this market is "designed to offer double advantage: for the buyer/developed country, paying an investment project in a developing country may be more advantageous and cheaper than changing its already consolidated production process" (FERNANDES; LEITE, 2021, p. 352). For the "seller/developing country, they can have environmental benefits with the reduction of emissions, financial profits through selling carbon credits and social welfare owing to the promotion of sustainable development" (FERNANDES; LEITE, 2021, p. 352).

Consequently, "Brazil is part of this context, showing great potential for investment in CDM projects" (FERNANDES; LEITE, 2021, p. 351). This way, since November 2004, when

the first record of a Clean Development Mechanism Project (CDM) occurred, it culminated in September 2019 on the number of 343 CDM projects, which is equivalent to 5% of the world's quantitative (something remarkable when compared to the other countries). Until 2019, there were a total of 7,808 projects registered in UNFCCC (FERNANDES; MILK, 2021).

It is worth quoting some minimalist concepts for a better understanding, such as: 1. "Carbon equivalent: metric measure used to compare the emissions of different GHGs based on their global warming potential. Converts GHGs into carbon dioxide equivalents" (FREITAS; SILVA, 2020, p. 04); 2. Carbon credit: Measure to reduce GHG emissions standardized in tons of carbon equivalent, acronym: tCO2e. Each tonne of CO2e is equivalent to a carbon credit (FREITAS; SILVA, 2020, p. 04); 3. Greenhouse Gases (GHG): natural and anthropic gaseous constituents of the atmosphere that absorb and re-emit infrared radiation. The main greenhouse gases are: "carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), sulfur hexafluoride (SF6), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and nitrogen trifluoride (NF3)" (FREITAS; SILVA, 2020, p. 05).

As Brazil has a great market potential on carbon credit, it is important to conduct a normative survey in each Brazilian state (there is a total of 27 states) to know if they are prepared or structured for this increasing new opportunity for trade, in addition to provide a significant help to readers with involvement in the rural environment (lawyers, rural producers, agronomists, among other professionals), on the main regulations in each state.

To better structure this article, this research was organized as it follows: 1) In the first stage, the approaches contextualizing the emergence of the Clean Development Mechanism is performed; 2) In the second phase, the methodology applied for the construction of this search is addressed, as well as the step-by-step for data collection; 3) In the third part, a discussion is performed using related surveys to assist in understanding carbon trading. In addition, a data collected table is presented, regarding the current laws of each Brazilian state, and 4) At last, the final considerations are presented, and suggestions are incorporated to stimulate future research.

2 Methodological foundations

The structure of this scientific research resulted from a "set of procedures that aims, through the use of scientific methods, to obtain new knowledge in the field of social reality" (GIL, 2021, p. 25). This social research aims at "intellectual reasons, when based on the desire to understand by the simple satisfaction of knowing, and practical ones, when focused on some practical application" (GIL, 2021, p. 25).

In this regard, the study followed an intellectual order, derived from the desire to raise the existing regulations in each Brazilian state related to the carbon market. Thus, Gil (2021) described three types of social research, but the "exploratory research" was used in this study, which “provides an overview, in an approximate type, about a given fact. This

type of research is carried out especially when the chosen theme is little explored and it becomes difficult to formulate precise hypotheses [...]" (GIL, 2021, p. 26).

Thus, the design of exploratory research is chosen, alongside the "content analysis research", which has initially been used to "study the matter of mass media, by identifying the presence of certain words, concepts, themes, phrases, characters or sentences in the writings" (GIL, 2021, p. 70), quantitative research. However, over time, it has begun to be used in research with social contexts that are considered more qualitative (GIL, 2021).

2.1 Description of methodological steps

As argued before (topic 2), the steps taken for the construction of results and discussions will be described. The step-by-step were taken as it follows:

First. For a better recognition of the terminologies employed, the display of concepts and arguments used by researchers is recommended. A topic will be raised to comprehend the context of this research so that readers from different areas will have a better understanding of the theme. The basis of consultation for the construction and development of the research was the access to other studies through electronic platforms of journals, such as: CAPES Journals; SciELO Brazil; Google Academic; Elsevier Science Direct, and Scientific journals, which are necessary for survey.

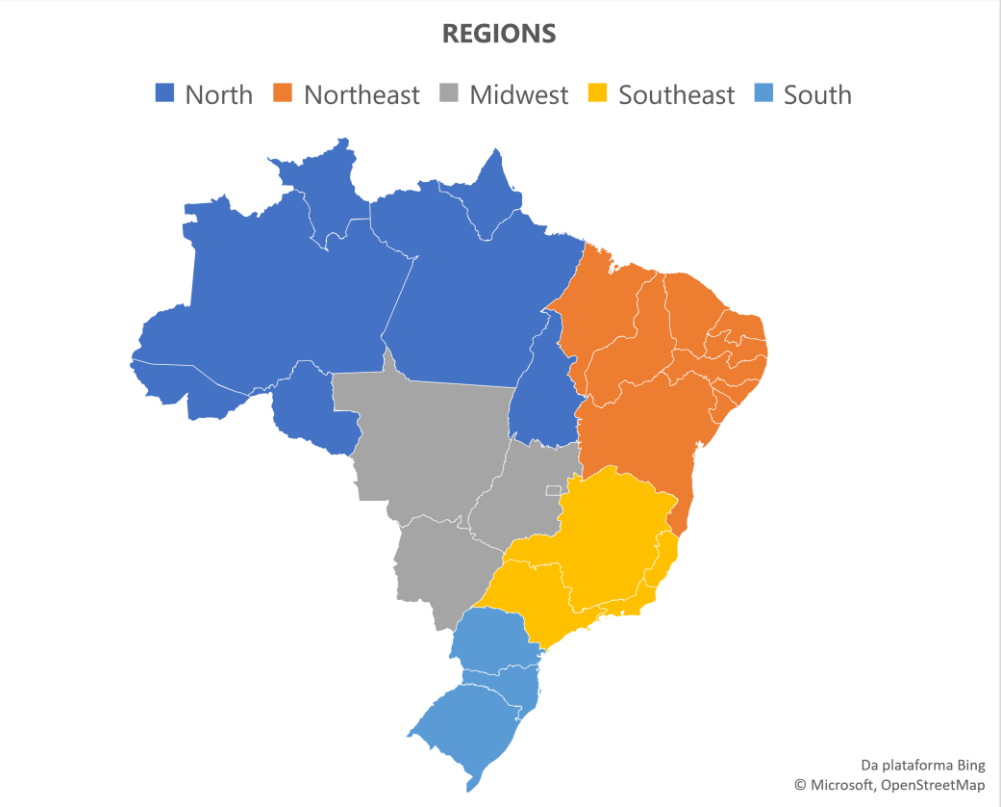
Second. Regarding the collection of legislation, the state laws were consulted on their respective website, where the relevant carbon commercialization laws were searched in the icon of the corresponding state. However, as the search method chosen was the "content analysis" type, the access to the site State Laws was followed by clicking on the icon of each respective state, and then the survey and screening of regulations was started by using the "search toolbar" and typing the "keywords" (one by one) to restrict the examination (automatically delete laws that were not related) and streamline. The results derived from each keyword launched passed through an analytical reading of each regulation, made for verifying the correlation (context treated in the body of norms) with the research theme.

Third. The keywords used were: "carbon market" and "carbon" for referring to the object of commercialization, "clean development" for relating to the CDM mechanism that Brazil adopted to negotiate carbon credit. Moreover, if these terminologies were not addressed in the body of the normative text or lectured "carbon" and was not related to carbon commercialization, they were excluded. In addition, this survey was from the period of 1997 when the Kyoto Protocol was signed until August 2022, when this research was carried out. However, state in force regulations were inserted, excluding those repealed.

Forth. The results obtained at each investigation were collected and inserted in the spreadsheet presented later this work, which was characterized/divided into three columns: 1. Description and Numbering: deals with the type of regulations, whether it is Decree, Law,

Complementary Law or other, as well as the numbering of the regulations that is registered. 2. Menu: the complete description of the regulations, exposing what is regulated as stated in the system. 3. Year: This is when the regulations came into force. But for a better organization of the survey, the spreadsheet was divided into the five existing regions in Brazil (North, Northeast, Midwest, Southeast and South), as shown in Figure 01:

Figure 01 - Brazil map divided into regions and the states of each:



Source: Prepared by the author, 2022.

3 Results and discussion

3.1 UNDERSTANDING THE CARBON MARKETING

Initially, Godoy (2013, p. 310) states that "the United Nations Framework Convention on Climate Change (UNFCCC), which occurred in 1992, is one of the most relevant agreements today in the search for reduction of greenhouse gases (GHGs) in the atmosphere". Since then, there has been growing concern about climate change, however since the Kyoto Protocol held in the late 1990s, the discussions began to concentrate more on the effects of greenhouse gases (FERNANDES; MILK, 2021).

To the detriment of the "Kyoto Protocol negotiations, aimed at creating sustainable development strategies through carbon trading by CDM projects, [...] " (VIEIRA, *et al.*, 2021, p. 03), CDM has started, which "has been a source of studies, intending to evaluate its

performance along with the development of carbon markets" (FERNANDES; LEITE, 2021, p. 352).

Moreover, Fernandes and Leite (2021) interact with the existence of research on CDMs, understanding that these projects cause limitations on sustainable development. On the other hand, other studies expose that CDM projects contribute to sustainable development. "Focused on Brazil, there are articles seeking to relate the impact of CDM on job creation, income generation and poverty reduction at municipal level" (FERNANDES; LEITE, 2021, p. 352).

Fernandes and Leite also (2021, p. 353) explain that "some authors identify the importance and potential of the mechanism and seek improvement options through the system's reform". Due to the available guidance mechanisms for carbon market concerning stakeholders and handlers are new, in addition to constant regulatory change, the understanding of the public is often impaired, increased by the use of technical linguistic terminologies and lack of support from those responsible, who do not foster dissemination together with right techniques for accessing information (GODOY; SAES, 2015; NOCOLLETTE; LEFÈVRE, 2016; FERNANDES; LEITE, 2021).

On this matter, quoting Vieira, et al. (2021, p. 02) is convenient:

> The **production and consumption model** applied by society today requires an **accelerated pace in the extraction** of natural resources, in view of the demands of society's service, thus **accelerating the environmental degradation**, such a model is widely criticized, due to the high emissions and environmental degradations, including the burning of fossil fuels. So, the change to energy matrices considered cleaner is the best way for a development with fewer social and economic environmental impacts (VIEIRA, *et al.*, 2021, p. 02, emphasis added).

Godoy's exhibition (2013, p. 312) is also suitable and complementary:

> The discussion about measures to deal with climate change incurs the definition of which is the most efficient solution for the degradation of natural resources, labeled as a negative externality. Negative externalities or agglomeration diseconomies arise when the activities of companies not only generate positive results, but also negative to others, as a result of an inaccurate definition of private property rights. Air is a public good, a resource of common property to the whole society, difficult to measure and transnationalism, and the carbon market emerges as an attempt to define property rights over air pollution, internalizing this negative externality (GODOY, 2013, p. 312).

In this solution context, "carbon trading has essentially the logic advocated by Coase, as far as it allows the use of a tool that points to trading a free asset, based on carbon credit transactions" (GODOY; SAES, 2015, p. 143). Hence, stimulating policies for the commercialization of carbon credit is held in ways of reducing Greenhouse Gases (GHG), about which Godoy and Saes (2015, p. 141) argue that:

> Despite the uncertainties, increased awareness about the effects of increasing GHG encouraged public and/or private policies aimed at reducing gas emissions, such as the creation of carbon markets. In this context, two examples stand out: trade in

> emissions licenses, which follows the Cap-And-Trade principle (European market); and carbon credits resulting from projects developed with a focus on emission reduction (Clean Development Mechanism). These two systems attempt to solve environmental problems using economic tools that oppose fiscal policies (GODOY; SAES, 2015, p. 141, emphasis added).

In detriment of these policies, whether public or private, the generation of capital is favored because of these transactions, fruit from the carbon market, "such as: the drafting of contracts; obtaining new information about the product and competitors; the bargain; conducting the negotiations; and process monitoring" (GODOY; SAES, 2015, p. 143).

However, because commercial rights on carbon are not well defined in the property criteria, it can cause damage to compliance with the Brazilian constitutional principle of well-being, since interpretations are not well understood (GODOY; SAES, 2015; VIEIRA, et al., 2021), which derives from "negative externality, or external cost, that exists when the activity of an agent causes loss of well-being to another agent and when this loss is not compensated" (FERNANDES; LEITE, 2021, p. 353).

"In any case, countries with commitments must meet their objectives primarily through national measures, and flexibilization instruments are complementary alternatives" (GODOY; SAES, 2015, p. 145). Such flexibilization mechanisms was predicted by the Kyoto Protocol, which set targets and outlines, so that "an Annex I country may exceed its emission limit without increasing global net emissions, provided that there is an equivalent reduction in another country" (GODOY; SAES, 2015, p. 145).

Godoy and Saes (2015, p. 145) describe the existence of three flexibilization mechanisms, which are:

> There are three flexibilization mechanisms: Joint Implementation (JI), Emissions Trading (ET), and the Clean Development Mechanism (CDM). Joint Implementation allows industrialized countries to offset their emissions and sinks by participating in projects in other countries from Annex I. Emissions Trading policy outlines operations relating to markets for marketable GHG emissions between Parts of Annex I. Finally, and directly related to developing countries, there is the Clean Development Mechanism (CDM), through which industrialized countries can meet their reduction commitments by investing in projects to reduce greenhouse gas emissions in developing countries (GODOY; SAES, 2015, p. 145).

However, from 2012 on, the Kyoto Protocol was re-agreed and together with the development of the so-called Green Climate Fund, pointing to extending the deadlines for financing by developing countries, incorporating clauses that resulted in climate change projects, stemming from this global agreement update that would be set in 2015 to take effect in 2020. However, it remained aspirational, being expected to be carried out in 2022 to update the mechanisms (GODOY; SAES, 2015; FRENCH; SILVA, 2020; FERNANDES; MILK, 2021).

3.2 UNDERSTANDING THE CARBON MARKETING

Before starting the arguments on this topic, it is important to differentiate "Carbon Market" from "Payment for Environmental Services (PES)", because:

> Payment for Environmental Services is a structure that promotes ecologically correct acts through economic incentives, applied to agriculture, proposes that volunteer farmers of PES programs receive economic incentives, conditioned to the adoption of sustainable production practices, among other actions beneficial to the environment (LIMA; MARTINS, 2022, p. 03, emphasis added).

It is possible to verify in the argument of Lima and Martins (2022) that PES is due to the use of practices or means applied in Brazilian agriculture, so the "Carbon Market" would simplistically be the result of these good practices employed, that is, how much carbon was captured/absorbed in tons to be subsequently marketed by catchment certificates (through professionals' calculations).

Once exposed the context of carbon commercialization, the understanding of the two forms of most observed negotiations in scientific research is relevant to mention, which are: 1st) Emissions trading system or also called the Cap-And-Trade Market (derived from the European Market), and 2nd) Carbon credit market resulting from the projects developed with a focus on reducing emissions, also called Clean Development Mechanism (widely aimed at Brazil) (NOCOLLETTE; LEFÈVRE, 2016; GODOY; SAES, 2015). For this reason, it is appropriate to instrumentalize carbon pricing, with the help of researchers, citizens and especially politicians (SOUSA, 2020).

3.2.1 European Market Emissions Trading System

The first mode of marketing is initiated as a derivation from the European Market (Cap-And-Trade). However, in the process of reaching this modality, the member states of the European community had difficulties related to the emission of Greenhouse Gases (GHG), after the agreement of Kyoto Protocol in 1997. Afterwards, in the period between 2008 and 2012, Britain and Germany struggled to reach the agreed dimensions on reducing emissions (SILVA,2021).

For Silva (2021, p. 12) "the European carbon market, known as the European Union Emissions Trading Scheme, is the world's pioneer and largest carbon market." This marketing type is intended to encourage the European community to remain below the requirements, i.e., not to increase GHG emissions within the deadline. Thus, if it does not reach the established percentage, it provides the commercialization of the surplus (credits) between countries or companies that have exceeded the established quotas (EUROPEAN COMMISSION, 2015; SILVA, 2021).

However, the "main reason for using carbon pricing is its environmental efficiency at a relatively low cost, which in turn contributes to increasing the social and political acceptability of the climate strategy" (SOUSA, 2020, p. 16).

Silva (2021, p. 12) considers that the Cap-And-Trade system was based on European Community regulations, with:

> Its establishment was carried out by Directive 2003/87/EC and was not conditional on any international agreement, even if it was in line with the Kyoto Protocol and its flexible mechanisms for achieving reduction targets. Its performance was phased in four periods, starting its operation in January 2005 with 25 Member States (SILVA, 2021, p. 12).

Silva (2021) also highlights the existence of 4 phases to reach the structure of regulations for its implementation, a resultant argument from the book "EU ETS Handbooks" (EUROPEAN COMISSION, 2015). The starting [first] phase was in the period between 2005 and 2007 and involved the structuring of public policies focused on infrastructure. The goals focused on the construction of the National Allocation Plan (NAP), submitted to the European Committee to be examined and verified whether it was convergent with Decision No. 358 of 2002, sanctioned by the European Union (EUROPEAN COMMISSION, 2015; SILVA, 2021).

After that period, where the survey of emissions' quantity was performed, the second phase, held between 2008 and 2012, was marked by the structuring and alteration of the mechanisms to more economically viable forms, according to European Commission Directive (Normative) No. 101, 2004 (SILVA, 2021).

The third phase, between 2013 and 2020, was more focused on a review and improvement of the regulatory guidelines, aiming to resolve any controversies faced in previous years using the European Union Emissions Trading System (EU ETS), which derived from Directive No. 29 of 2009 of the European Commission. "In the same period, the auction procedure was inserted in the mechanism to establish a uniform price for all bidders and easy access to EU ETS participants" (SILVA, 2021, p. 14).

Ultimately, the fourth phase that currently predominates since 2021 and will end in 2030 is characterized by the implementation of what has been constructed and will undergo its regulations' revision in 2026. In addition to the European Commission giving indications, there will be greater limitations as regards GHG emission allowances (EUROPEAN COMMISSION, 2015).

However, the emission price of one ton of Carbon Dioxide Equivalent (tCO2e) "is set by the competent body and then the market defines the amount of GHG emitted. It is up to another regulatory body to define the quantity to be issued (or "ceiling" of emissions), so that the market sets the price of the ton" (NOCOLLETTE; LEFÈVRE, 2016, p. 147).

3.2.2 Clean Development Mechanism Projects - CDM

In the context of the CDM, as has been argued previously, a brief discussion about the reason why this modality is used in Latin America, alongside its characteristics and some numerical information, will be accomplished.

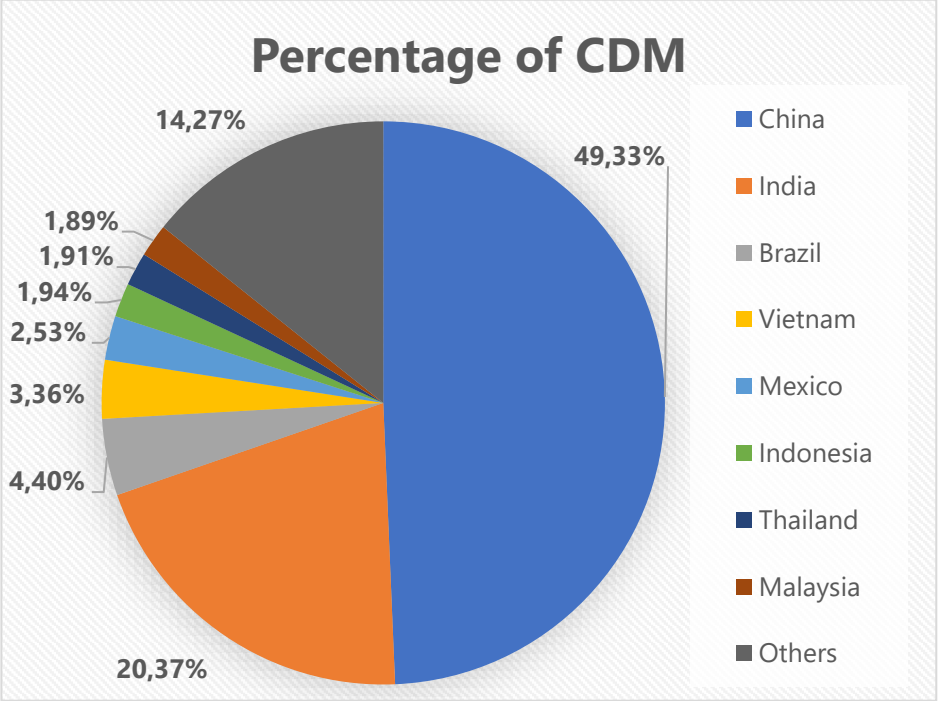
Brazil is in the 6th position, among the countries that emit the most Greenhouse Gases (CLIMATEWATCH, 2022). Silva (2021, p. 15) had already mentioned in another study that Brazil was among the top 10 that emit GHG the most, which means it has remained among the 10, because:

> Although unlike industrialized countries, most of their emissions do not come from the use of energy (because they have a differentiated range of natural resources to obtain energy), but rather, by land use, land and forest changes, which characterizes Brazil as the largest emitter of this sector in the world (SILVA, 2021, p. 15).

The CDM "wishes to achieve and renew sustainable means of production in developing countries, from the deployment of cleaner technologies" (BASSO; BERTAGNOLLI; SANTOS, 2017, p. 300) and points to be a way to assist in the engagement of targets, which allow the reduction of GHG by the countries seen as developed (BASSO; BERTAGNOLLI; SANTOS, 2017). Approaches were pre-established in Article 12 of the Kyoto Protocol, which favors the expansion of production means through Sustainable Development and low greenhouse gas emissions (KYOTO PROTOCOL, 2012; BASSO; BERTAGNOLLI; SANTOS, 2017; FERNANDES; MILK, 2021). Also, §5º (paragraph five) lists certain requirements for obtaining emission reduction certificates from CDM projects (KYOTO PROTOCOL, 2012).

As discussed before, Brazil has great potential in the implementation of CDM, which was proven when it reached the 3rd position among countries that most implemented this type of project until 2014 (FREITAS; SILVA, 2020), as shown in Figure 2:

Figure 2 - Clean Development Mechanism, percentage of participation by country:



Source: Prepared by the author (2022), extracted from Freitas, Silva (2020, p. 08).

Oliveira, Miguez and Andrade (2018) emphasize that Brazil has already been at the forefront of implementing this mechanism, derived from the Kyoto Protocol in 1997, because:

> Brazil was **a pioneer** in using this mechanism, through its first CDM project registered at the UN already **in 2004**, called "**NovaGerar" for utilization of landfill biogas**. Hence, even before the Kyoto Protocol coming into force, as its ratification by the Russian Federation. Likewise, one of the first project methodologies approved by the CDM Executive Council was Brazilian: landfills in Salvador - BA (OLIVEIRA; MIGUEZ; ANDRADE, 2018, p. 31, emphasis added).

After these considerations about the development of CDM projects, it should be explained the necessary steps to be overcome in order to achieve such structuring. For educational purpose, they are summarized in Table 1:

Table 1 - Steps for development of CDM Projects:

1	Feasibility study of the project
2	Drafting of the Project Design Document (PDD)
3	Validation by a Designated Operational Entity (DOE)
4	Approval by the Designated National Authority (DNA)
5	Submission to the Executive Board of the (CDM) for project registration
6	GHG Reduction Emission Monitoring
7	Verification of the monitoring report(s) by a DOE
8	Issuance of Certified Emission Reductions – CER by the CDM Executive Board

Source: Basso, Bertagnolli and Santos (2017, p. 300), extracting data from Cruz and Paulino (2013).

According to Basso, Bertagnolli and Santos (2017, p. 301) explanation (Table 1), it is noted that "since the activities' beginning of a CDM project, the company can make the registration on the project bank, which evidences the possibility of project financing operations". A study conducted by the Brazilian Corporate Council for Sustainable Development – CEBDS pointed out that CDM projects do not only focus on the context of support, but also on sustainable development to prevent harmful climate change to countries (BASSO; BERTAGNOLLI; SANTOS, 2017). "Besides providing benefits to the environment, a CDM project should also provide improvements in terms of life quality of society, for instance jobs generation" (BASSO; BERTAGNOLLI; SANTOS, 2017, p. 301).

Therefore, private entities such as companies can develop such projects and interconnect them "to afforestation and reforestation; use of alternative energies, as the implementation of controlled or sanitary landfills; use of biofuels, generation of energy from biomass; treatment of effluents, among others" (BASSO; BERTAGNOLLI; SANTOS, 2017, p. 301).

In this respect, it is worth mentioning a study directed by Ferretti (2021) about a survey of federal regulations on the carbon market, which will be shown in Table 2:

Table 2 - Characterization of carbon draft bills that were presented in the Federal House of Representatives after ratification of Kyoto Protocol:

DRAFT BILLS	MENUS
DB 3552/2004	Provides for the organization and regulation of Carbon market on the Rio de Janeiro Stock Exchange through the generation of Certified Emission Reduction - CERs in Clean Development Mechanism projects - CDM.
DB 494/2007	Provides for tax incentives to be granted to individuals and legal entities that invest in Clean Development Mechanism projects - CDM which produce Certified Emission Reductions - CERs, authorizes the constitution of Investment Funds in CDM projects and provides other measures.
DB 493/2007	Provides for the organization and regulation of Carbon market on the Rio de Janeiro Stock Exchange through generation of Certified Emission Reduction – CER in Clean Development Mechanism projects – CDM.
DB 2027/2007	Provides for carbon credits and emission reduction certificates and their exclusive ownership in projects for generating electricity from alternative sources.
DB 542/2011	Results on a supporting policy of projects for the generation of carbon credits and provides other measures.

Source: Ferretti (2021, p. 560). Table translated by the authors (2023).

The aforementioned draft bills (Table 2) "were not received, that is, they were filed because the political views of federal representatives were not aligned, according to the unfavorable opinions in each project" (FERRETTI, 2021, p. 561). However, Draft Bill No. 528 of 2021 is being processed in the National Congress of Brazil slowly and has no prospect of being sanctioned by the federal government (FERRETTI, 2021), harming Brazil in the construction of regulations on carbon credit trading.

4 Inventory of brazilian states regulations

After the approaches and searches for understanding carbon credit and means of commercializing this carbon (certificates) in the business world, whether in Brazil or abroad (because the basic regulations allow the interaction of this type of trade between countries), in this topic, a survey of regulations related to and legitimating this context of carbon trade will be carried out, including information about each Brazilian state's laws if they exist.

However, it is worth noting that Brazilian regulations followed the tendency of Clean Development Mechanisms Projects (CDM), because the "EU ETS system establishes an emissions regime that has many complexities, because implementing a regime and structuring on a regional scale makes the structure difficult to replicate" (SILVA, 2021, p. 18). In 2004, Brazil followed the path of the CDM system instead of the EU ETS, however the process of CDM system did not have a legal form (rules), which turned its participation for

commercialization of carbon credits on voluntary mode (BASSO; BERTAGNOLLI; SANTOS, 2017; SILVA, 2021; FERNANDES; MILK, 2021).

After the extensive legislative analysis by the 27 Brazilian states (Table 3), it was found that Brazil, despite the regulation of the theme Clean Development Mechanisms projects, is long overdue. Table 3 shows that about 8 states do not have their own regulation to promote knowledge on the matter in the rural environment and to legal authorities (judiciary and lawyers).

However, it is worth mentioning that the other states which have more than one regulation related to CDM, in most cases only mention the carbon market, conceptualizing what would be clean or sustainable development. Besides, sometimes there is a confusion in the text body, possibly caused by representatives of the legislative powers at the federal and state level, because they are responsible for Brazilian state and federal laws.

This confusion is due to the subject's mixture, as what happens on the normative approaching "payment of environmental services" and "carbon market". They are distinct themes and should follow differentiated procedures to be implemented. In addition, most documents do not allow a greater discernment in the way proceeded to develop these projects, which reinforces the argument exposed in the previous paragraph, that is, the normative only conceptualize what is CDM and carbon market, which disfavors and discourages Brazilian companies in accessing this trade area.

Table 3 – Carbon regulations of each Brazilian state from 1997 to 2022:

NORTHERN REGION		
AMAZONAS		
Description/ Numbering	**Menu**	**Year**
Decree n. 44.968	Regulates the State Policy on Environmental Services, the Bolsa Floresta Program, and provides other measures.	2021
Law n. 5.496	Regulates the mandatory five-year safety inspection of the gas installations of residential and commercial units supplied by combustible gases, in the State of Amazonas.	2021
Decree n. 44.716	FORMALIZES Amazonas state's support for the "Race to Zero" and "Under2 Coalition" campaigns, under the United Nations Framework Convention on Climate Change (UNFCCC) and provides other measures.	2021
Complementary Law 53	REGULATES item V of Article 230 and § 1 of Article 231 of the State Constitution, establishes the STATE SYSTEM OF CONSERVATION UNITS - SSCU, providing for infractions and penalties and establishing other measures.	2007
ACRE		
Law n. 2.308	"Creates the State System of Incentives for Environmental Services – SIES, the Incentive program for Environmental Services – IES Carbon and other Programs of Environmental Services and Ecosystem Products of the State of Acre and provides other measures."	2010

Law n. 2.728	"Authorizes the Executive Power to transfer carbon credits to the Environmental Services Development Agency Company of the State of Acre S/A."	2013
Law n. 2,850	"Amends Law No. 2,308 of October 22, 2010, which creates the State System of Incentives for Environmental Services – SIES, the Incentive program for Environmental Services – ISA Carbon and other Environmental Services programs and Ecosystem Products of the State and provides other measures."	2014
Law n. 3,749	Amends Law No. 2,308 of October 22, 2010, and creates the Acre SIES Certificate and Acre SIES Seal.	2021
Law n. 3,880	Amends Law No. 2,308 of October 22, 2010, which creates the State System of Incentives for Environmental Services – SIES, the Incentives program for Environmental Services - ISA Carbon and other Programs of Environmental Services and Ecosystem Products of the State of Acre and provides other measures.	2021
AMAPÁ		
Law n. 702	Regulates the state policy of forests and other forms of vegetation on the state of Amapá and provides other measures.	2002
Decree n. 2.842	Establishes standards for the installation and operation of the Amapaense Forum on Climate Change and Environmental Services - AFCCES and provides related measures.	2021
Decree n. 4.014	FORMALIZES the state of Amapá's support for the "Race to Zero" campaign, under the United Nations Framework Convention on Climate Change (UNFCCC) and provides other measures.	2021
PARÁ		
Decree n. 491	Establishes the Amazonas State Plan for Now (ASPN), creates the Scientific Committee of the Plan, the Permanent Center for Monitoring the Plan and provides other measures.	2020
Law n. 9.312	Establishes the fund for the small rural producer and the industry for bioeconomy (FSRPIB).	2021
Decree n. 2.247	Regulates titles III and IV of state law Nº. 9,234, of March 24, 2021, which provides for fire safety and emergencies in the state and establishes rules for the activities of monitoring measures of fire and disasters prevention and combat in establishments, buildings and risk areas, in accordance with arts.3th, 4th and 5th of federal law nº. 13,425, 2017.	2022
RONDONIA		
Decree n. 25.968	Regulates Climate Governance and Environmental Services Fund - CGESF and provides other measures.	2021
RORAIMA		
No legislation attending the patterns of this research has been found until August 2022		
TOCANTINS		
No legislation attending the patterns of this research has been found until August 2022		
MIDWEST REGION		
MATO GROSSO		
Description/ Numbering	**Menu**	**Year**
Decree n. 1.313	Regulates the Forest Management of the State of Mato Grosso and provides other measures.	2022

Decree n. 1.160	Creates the "CARBON NEUTRAL MT" Program; provides for the state of Mato Grosso's support for the "Race to Zero" campaign under the United Nations Framework Convention on Climate Change; sets voluntary targets to reduce illegal deforestation in the State; establishes the Action Plan for Prevention and Control of Deforestation and Forest Fires in the State of Mato Grosso - APPCDFF/MT 4th phase (2021 - 2024) and provides other measures.	2021
Complementary Law no. 582	Establishes the State Climate Change Policy.	2017
Law n. 9.878	Creates the State System for Reducing Emissions from Deforestation and Forest Degradation, Conservation, Sustainable Forest Management and Increased Forest Carbon Stocks - REDD+ in the State of Mato Grosso and provides other measures.	2013
Law n. 9.111	Establishes the Mato Grosso Forum on Climate Change and provides other measures.	2009
Law n. 8,580	Regulates the state policy of supporting projects for the generation of carbon credits and provides other measures.	2006
MATO GROSSO DO SUL		
Decree n. 15.798	Regulates the Voluntary Public Register of Annual Greenhouse Gas Emissions and the State Communication, in line with the State Climate Change Policy, present in State Law No. 4,555, of July 15, 2014, and provides other measures.	2021
Decree n. 15.741	Formalizes the support of the State of Mato Grosso do Sul to the campaigns "Race to Zero" and "Under2 Coalition", under the United Nations Framework Convention on Climate Change (UNFCCC) and provides other measures.	2021
Law n. 5.235	Regulates the State Policy for the Preservation of Environmental Services, creates the State Program for Payment for Environmental Services (SPPES), and establishes a Management System of this Program.	2018
Law n. 4.555	Establishes the State Climate Change Policy (SCCP), within the territory of the State of Mato Grosso do Sul and provides other measures.	2014
Law n. 3.951	Regulates the establishment of the Green Seal to enterprises that may be environmentally licensed for the protection and neutralization of carbon in the environment, within the state of Mato Grosso do Sul.	2010
Law n. 3.020	Establishes policy and rules for carbon sequestration in the state of Mato Grosso do Sul and provides other measures.	2005
GOIÁS		
Decree n. 9.821	Regulates the methodology for defining the degree of environmental impact for compliance of environmental compensation defined in Article 9 of State Law No. 20,773 from May 8, 2020, which establishes the Extraordinary Environmental Licensing Regime - ELR.	2021
Law n. 19,763	Regulates the Green Treasury Program and provides other measures.	2017
Law n. 9.130	Regulates the State Program of Payment for Environmental Services - SPPES - and provides other measures.	2017
Law n. 18.104	Regulates the protection of native vegetation, institutes the new Forest Policy of the State of Goiás and provides other measures.	2013
FEDERAL DISTRICT		

Decree n. 43.413	Establishes the Neutral Carbon Plan of the Federal District, the district-determined contribution - DDC and provides other measures.	2022
SOUTHEAST REGION		
MINAS GERAIS		
Description/ Numbering	**Menu**	**Year**
Law n. 18,365	Amends Law Nº. 14,309 of June 19, 2002, which provides for forest and biodiversity protection policies in the state, and Article 7 of Delegated Law Nº. 125 of January 25, 2007, which provides for the basic organic structure of the Secretary of State for The Environment and Sustainable Development - SSESD and provides other measures.	2009
Decree n. 44,042	Establishes the *Mineiro* forum on climate change.	2005
ESPÍRITO SANTO		
Decree Nº. 4,503	Regulates the *Capixaba* Forum on Climate Change and provides other measures.	2019
Law n. 9,864	Regulates the reformulation of the Payment Program for Environmental Services – PES in the State, established by Law Nº. 8,995, of 9/22.2008, and provides other measures.	2012
Law n. 9,531	Establishes the State Climate Change Policy – SCCP, including its objectives, principles and instruments of application.	2010
Law n. 8,995	Establishes the Payment Program for Environmental Services – PES and provides other measures.	2008
Decree No. 1,651-R	Establishes the Capixaba Forum on Global Climate Change and Rational Water Use (CFCC).	2006
RIO DE JANEIRO		
Law n. 5,690	Regulates state policy on global climate change, sustainable development and provides other measures.	2010
SAO PAULO		
Decree n. 66.550	Reorganizes the "Forest Remaining Program", which deals with Article 23 of Law No. 13,798, of November 9, 2009, and Articles 51 to 67 of Decree Nº. 55,947 of June 24, 2010, now called the "Reforest-SP Program", and reorganizes the "Incentive Program for the Recovery of *Ciliares* Forests and the Recompositing of Vegetation in the Formation Basin of Water Sources – Fountains", Decree nº. 62,914 of November 8, 2017, is now called the "Fountain Program", and provides related arrangements.	2022
Decree n. 55.947	Regulates law nº. 13,798 of November 9, 2009, which provides for the state's climate change policy	2010
Law n. 13,798	Regulates state climate change policy – SCCP.	2009
Decree n. 49.369	Establishes the São Paulo forum on global climate change and biodiversity and provides related measures.	2005
SOUTHERN REGION		
PARANÁ		
Description/ Numbering	**Menu**	**Year**
Law n. 20,741	Amends provisions of Law Nº. 16,019 of December 19, 2008, which establishes the *Paranaense* Forum on Global Climate Change.	2021

Decree n. 1.591	Regulates the rules of State Law Nº. 17,134, of April 25, 2012, which established payment for environmental services and biocredit within the State of Paraná.	2015
Law n. 17.134	Establishes the Payment for Environmental Services, especially those provided by Biodiversity Conservation, part of the Bioclimate Paraná Program, and also regulates Biocredit.	2012
Law n. 16.019	Establishes the Paraná forum on global climate change, alongside the objectives that it specifies and adopts other measures.	2008
Decree Nº. 4.888	Establishes the Paraná forum on global climate change and provides related measures.	2005
SANTA CATARINA		
Law n. 15.133	Establishes the state policy of environmental services and regulates the state program of payment for environmental services in the state of Santa Catarina, established by law nº. 14,675, of 2009, and provides other measures.	2010
Law n. 14,829	Establishes the state policy on climate change and sustainable development of Santa Catarina and provides other measures.	2009
RIO GRANDE DO SUL		
Law n. 13,594	Establishes the *Gaucho* Climate Change Policy (GCCP), setting its objectives, principles, guidelines and instruments and provides other measures.	2010
NORTHEAST REGION		
MARANHÃO		
Description/ Numbering	**Menu**	**Year**
Law n. 11,734	It establishes the Ecological-Economic Zoning of the *Cerrado* Biome and Coastal System of the State of Maranhão and provides other measures.	2022
Law n. 11,578	Establishes the Policy for Reducing Greenhouse Gas Emissions from Deforestation and Forest Degradation, Conservation of Forest Carbon Stocks, Sustainable Forest Management and Forest Carbon Stocks (REDD+), Environmental Asset Management and Payment for Environmental Services (PES) in the State of Maranhão, called REDD+ and PES Judicial System, and amends State Law No. 11,000, of April 2, 2019, to expand the scope of operation of *Maranhão* Partnerships - MAPA.	2021
Law n. 10.161	Establishes the *Maranhão* climate change forum – MCCF and provides other measures.	2014
PIAUÍ		
No legislation attending the patterns of this research has been found until August 2022		
CEARÁ		
No legislation attending the patterns of this research has been found until August 2022		
RIO GRANDE DO NORTE		
No legislation attending the patterns of this research has been found until August 2022		
PARAIBA		
No legislation attending the patterns of this research has been found until August 2022		
PERNAMBUCO		
Decree n. 36.495	Approves the Regulation of the Secretariat of Environment and Sustainability and provides other measures.	2011
Law n. 14,090	Regulates the State Policy to Combat Climate Change in Pernambuco and provides other measures.	2010

Decree n. 33.015	Establishes the Pernambuco Climate Change Forum and provides other measures.	2009
ALAGOAS		
No legislation attending the patterns of this research has been found until August 2022		
SERGIPE		
No legislation attending the patterns of this research has been found until August 2022		
BAHIA		
Decree n. 19.916	Amends Decree Nº.9,519 of August 18, 2005, which established the *Baiano* Forum on Global Climate Change and Biodiversity.	2020
Decree n. 9.519	Establishes the *Baiano* Forum on Global Climate Change and Biodiversity and provides other measures.	2005

Source: Prepared by the author (2022), using data extracted from the State Laws website (2022).

5 Final considerations

Over the decades, since the agreement of the Kyoto Protocol in the 1990s, the climate issue has been heavily addressed and engaging with public policy constructions or legislation to enable protection for the good of the whole population. Besides, the countries have been targeting means and commercial alternatives that enable economic growth without harming the environment, that is, favoring sustainable development.

It created a requirement to regulate the modalities for the commercialization of carbon credit, such as the two mentioned in this research: the European Union Emissions Trading System (EU ETS) and the one targeted by Latin America, in our case employed by Brazil, called Clean Development Mechanism Projects (CDM). However, it was found that, in the context of state and federal legislation, there were no approaches on this CDM method adopted by Brazil.

However, as can be seen in Figure 3, together with Tables 2 and 3, Brazil is backward in terms of regulation, and this work demonstrate it does not have a structure or procedure for commercialization of carbon credits, that is to say, how or where the sale will be made because a document describing such procedure is nowhere to be found. Debating about how commercialization will take place in practice is an encouragement for future studies.

Conclusively, on the legislative survey in the 27 Brazilian states, an inattention on the part of the representatives of the state legislative powers was observed concerning the creation of a normative framework to support the entities or companies in how the commercialization will happen. Furthermore, a confusion and mixture of topics were noted in the normative texts of the states that regulate the research field, such as payment for environmental services and commercialization of carbon credit, which certainly implies difficulties in the feasibility of accessing the carbon market.

Referências bibliográficas:

BASSO, Renata Lúcia; BERTAGNOLLI, Daniele Dias de Oliveira; SANTOS, Lucas Almeida dos. Análise econômico-financeira mediante geração e comercialização de créditos de carbono**. Revista Ambiente Contábil**. Natal-RN. v. 9, n. 2, jul./dez, 2017, p. 296-314.

FREITAS, Cláudia Virgínia M. de; SILVA, Maria Lúcia Pereira da. Mudanças do Clima: Análise das Conferências que trataram do Mercado de Carbono e seus principais resultados. **Revista Brazilian Journal of Development** - ISSN 2525-8761, Curitiba, v. 6, n.10, oct. 2020, p. 75332-75342.

CLIMATEWATCH. **Historical GHG emissions**. Disponível em: <https://www.climatewatchdata.org/ghg-emissions?chartType=percentage&end_year=2019&start_year=1990> Acesso em: 15 Dez. 2022.

EUROPEAN COMISSION. **EU ETS Handbook -2015**. Disponível em:<https://ec.europa.eu/clima/system/files/2017-03/ets_handbook_en.pdf>. Acesso em: 20 Dez. 2022.

FERNANDES, Elaine Aparecida; LEITE, Gustavo Barros. Atuação dos projetos de mecanismo de desenvolvimento limpo para o desenvolvimento sustentável no Brasil**. Revista de Economia Política**, vol. 41, n. 2, abr./ jun. 2021, p. 351-371.

FERRETTI, Kleber Destefani. REGULAMENTAÇÃO DO CRÉDITO DECARBONO NO BRASIL: Situação legislativa dessa política pública. ***In.*:** Irene Carniatto, *et al.* (Orgs.). **ANAIS DO III WORKSHOP DA REDE INTERNACIONAL DE PESQUISA RESILIÊNCIA CLIMÁTICA – RIPERC: "Crise climática e pandemia: transformações globais e impactos locais**". Cascavel – PR: CEPED/UNIOESTE, 2021, 773 p.

GIL, Antonio Carlos. **Métodos e técnicas de pesquisa social.**–7ª ed. [2ª Reimpr]. São Paulo: Atlas, 2021, 230 p.

GODOY, Sara Gurfinkel Marques de. Projetos de redução de emissões de gases de efeito estufa: desempenho e custos de transação**. Revista de Administração**, São Paulo, v.48, n.2, abr./maio/jun. 2013, p.310-326.

GODOY, Sara Gurfinkel Marques de; SAES, Maria Sylvia Macchione.CAP-AND-TRADE e projetos de redução de emissões: comparativo entre mercados de carbono, evolução e desenvolvimento**. Revista Ambiente & Sociedade**. São Paulo, vol. XVIII, n. 1, jan./mar. 2015, p. 141-160.

LEIS ESTADUAIS. **Consulta de leis estaduais do Brasil.** Disponível em: <https://leisestaduais.com.br/> Acesso em: 01 Dez. 2022.

LIMA, Leonardo Andrade; MARTINS, Karina. O marco legal do pagamento por serviços ambientais para o avanço de iniciativas agrosustentáveis**. Revista Brazilian Journal of Development,** Curitiba-PR, v.8, n.6, jun.2022, p. 45720-45738. Disponível em: <https://brazilianjournals.com/ojs/index.php/BRJD/article/view/49267> Acesso em: 27 Dez. 2022.

NICOLLETTI, Mariana; LEFÉVRE, Guilherme Borba Precificação de carbono no Brasil: perspectivas e aprendizados a partir de uma simulação de mercado *cap-and-trade*. **Revista Cadernos Adenauer XVII**, n. 2, 2016, p. 145-169. Disponível em: <http://hdl.handle.net/10438/18725> Acesso em: 17 Dez. 2022.

OLIVEIRA, Adriano Santhiago de; MIGUEZ, José Domingos Gonzalez; ANDRADE, Tulio César Mouthé de Alvim. **A convenção sobre mudança do clima e o seu protocolo de Quioto como indutores de ação. *In.*:** FRANGETTO, Flavia Witkowski, VEIGA, Ana Paula Beber, LUEDEMANN, Gustavo (Orgs.). *Legado do MDL: impactos e lições aprendidas a partir da implementação do Mecanismo de Desenvolvimento Limpo no Brasil*. Brasília: IPEA, 2018, 426 p.

UNIÃO EUROPEIA. **DIRECTIVA n. 87/2003-CE DO PARLAMENTO EUROPEU E DO CONSELHO de 13 de Outubro de 2003**. Disponível em: <https://eur-lex.europa.eu/legal-content/PT/TXT/PDF/?uri=CELEX:32003L0087&from=PL> Acesso em: 23 Dez. 2022.

SILVA, Bruna Emanuela de Oliveira Paiva da. **O SISTEMA DE COMÉRCIO DE CARBONO EUROPEU: uma análise sobre o modelo e o possível mecanismo regulado no Brasil**. Artigo de Monografia (Graduação em Relações Internacionais) – UNIFESP, 2021. Disponível em: <https://repositorio.unifesp.br/xmlui/handle/11600/62940> Acesso em: 16 Dez. 2022.

SOUSA, Elizabeth Farias de Melo de. **A DINÂMICA DOS INSTRUMENTOS DE PRECIFICAÇÃO DE CARBONO: Uma análise para o mercado *Cap-And-Trade***. Monografia (Graduação em Ciências Econômicas) – João Pessoa-PB, 2020, 60 f. Disponível em: <https://repositorio.ufpb.br/jspui/bitstream/123456789/19587/1/EFMS26022021.pdf> Acesso em: 17 Dez. 2022.

UNFCCC, Convenção- Quadro das Nações Unidas sobre Mudança do Clima. **Protocolo de Kyoto.** Disponível em: <https://unfccc.int/process/the-kyoto-protocol/history-of-the-kyoto-protocol/text-of-the-kyoto-protocol> Acessado em: 05 Dez. 2022.

VIEIRA, Michael Raphael Soares; LIMA FILHO, Arlindo Almeida de; LOPES, Aixa Braga; SILVESTRIM, Eneida Guerra; SILVESTRIM, Fernanda Guerra. O futuro das energias renováveis e os acordos ambientais como mitigação da mudança climática e a possibilidade de compensação por emissões evitadas**. Revista Research, Society and Development**, v. 10, n.14, 2021. Disponível em: <DOI: http://dx.doi.org/10.33448/rsd-v10i14.21558> Acesso em: 22 Dez. 2022.

WWF, **Glossário da COP**. Disponível em: <https://www.wwf.org.br/?10540/Glossrio-da-COP#:~:text=Anexo%20I%20%2D%20S%C3%A3o%20os%20pa%C3%ADses,de%20gases%20de%20efeito%20estufa.> Acesso em: 12 Dez. 2022.