

ENERGY COOPERATION THROUGH AN ENVIRONMENTAL PERSPECTIVE: ANALYSIS OF THE INTERNATIONAL AGREEMENTS SIGNED BETWEEN BRAZIL AND CHINA

Cooperação Energética Através de Uma Perspectiva Ambiental: Análise dos Atos Internacionais Assinados por Brasil e China

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ABSTRACT

The purpose of this essay is to discuss the international cooperation carried out by Brazil and China through the performance of international agreements signed between the years 1990 to 2020 that involve energy, with a special focus on how the perspective of protecting the environment was addressed in these discussions. An original database was built on this cooperation, in which document content analysis techniques were applied to achieve the research results. The findings indicate that both countries signed 18 bilateral agreements over the years, with the administrations of Itamar, Lula and Dilma being the most committed to this cooperation with China. In addition, of these 18 agreements, 10 of them demonstrate the parties' interest in approaching the energy issue from an environmental sustainability perspective.

Keywords: Brazil. China. Energy.

RESUMO

O objetivo desse trabalho é discutir a cooperação internacional realizada pelo Brasil e pela China através da realização de atos internacionais assinados entre os anos de 1990 a 2020 que envolvem energia, com enfoque especial para como a perspectiva da proteção ao meio-ambiente foi abordada nessas discussões. Foi construído um banco de dados original sobre essa cooperação, no qual foi aplicado técnicas de análise de conteúdo de documentos para alcançar os resultados da pesquisa. Os achados indicam que ambos os países assinaram 18 acordos bilaterais ao longo dos anos, com os governos de Itamar, Lula e Dilma sendo os mais empenhados nessa cooperação com a China. Além disso, desses 18 acordos, 10 deles demonstram o interesse das partes em abordar a temática energética a partir de uma perspectiva da sustentabilidade ambiental.

Palavras-chave: Brasil. China. Energia.

INTRODUCTION

There is not exactly a consensus regarding the definition of energy security. In order to prove this reality, Sovacool (2011), in *The Routledge Handbook of Energy Security*, presents forty-five definitions for the term. One of the explanations for this is the fact that “energy” in itself is considered a multifaceted concept: “Energy security may be delineated through multiple dimensions and it takes on different specificities depending on the country (or continent), timeframe or energy source to which it is applied.” (Chester, 2010, p. 893).

Taking this in consideration, this essay will emphasize an environmental perspective in the relationship established between Brazil and China in the energy sector, between the years 1990 and 2020. China was chosen as a partner to be studied due to the fact that it is the country that consume the most energy in the world, as well as having made large investments in the energy sector (Our World in Data, 2022). The key question that drives the research is: In to what extent do the international agreements signed between these countries in terms of energy take into

account the environmental component as a factor to be considered? This will not be the only aspect to be addressed throughout this essay, but it is the one that is most intended to be addressed.

For this essay, in other words, it is important to know mainly to what extent the guarantee of the continuous and adequate flow of energy for the development of a country or its society (energy security) has as a relevant factor in its achievement issues such as preservation of natural resources, ecosystem balance, urban and rural pollution and degradation of conditions for the maintenance of human and plant life on the planet (environment); all of this, specifically, in the relationship that has taken place between Brazil and China in the last three decades.

In order to understand this relationship, a content analysis method was used. The material used was the bilateral international agreements signed between the parties and the energy balances of each country. This essay aims to explore the possibilities of learning about the dynamics of Brazilian foreign policy in the energy sector, focusing on a great world power that is China, having as main reference the agreements signed between the two countries. In this context, this analysis highlights an analytical model on international energy cooperation that has been little explored in the literature, since the agreements have not received due space and relevance. Some published works have already made an analytical effort in this direction, such as Montenegro, Feitosa and Paiva (2020), Feitosa and Silva (2022) and Feitosa (2021). It is a type of approach that considers agreements as a variable that helps to explain and understand how countries guide their intergovernmental interactions, not only bilaterally, but also trilaterally and multilaterally, whether between States or International Organizations.

1. ENERGY SECURITY AND THE ENVIRONMENT

As explained above, it is necessary to better understand the interaction between energy security and the environment. When understood from the environmental perspective, for example, energy security focuses on sustainability, since it takes into account the negative impacts that the use of energy entails, thus being necessary and notable an increase in the importance of sustainable energy. Therefore, it is possible to see how energy security is linked to sustainable energy, since:

Under these circumstances, there is a need to have a long-term vision and to look at 'SES' (Sustainable Energy Security) which aims to provide energy services for meeting the present and future developmental needs of the society without compromising on economic growth and environment. (Narula and Reddy, 2015, p. 149).

The environmental concerns that exist today take into account that the damages caused to the environment are those with the greatest potential to generate disorders on a global scale, threatening the very future of humanity, and it is therefore necessary to develop ways to mitigate them (Pereira, 2015). Currently, the concentration of carbon dioxide in the atmosphere is the highest in millions of years and the temperature of the planet this century has already exceeded by about three to five degrees the temperature of the pre-industrial era. These data have drawn

the attention of the scientific community in the field of International Relations, which has come to address the climate issue as one of the greatest threats to international security⁴, both in terms of state security, as well as human and ecological security (Burke *et al*, 2016).

The impact on the problems that environmental damage can generate for the planet and for the security of States has brought pressure from scientists, civil society and also from countries that are vulnerable to climate change. An example of this is the 2015 Paris Agreement which, due to these pressures, made States agree to seek to keep the planet's temperature at a limit of 1.5 degrees above pre-industrial levels (Burke *et al*, 2016).

With this in mind, it is necessary to emphasize that the use of traditional fossil fuels, those related to non-renewable energies, such as oil, gas, coal and their derivatives, are causing and accentuating the conditions of global warming and climate change, since they emit greenhouse gases into the atmosphere. These types of energy resources are considered non-renewable because they normally take thousands of years to be produced again by nature and, in addition, their demand is growing and continuous, since they are the largest suppliers of energy that is consumed on a global scale (Ioris, 2011; Johnson, 2010; Goldemberg, Lucon, 2007).

The increase in the consumption of fossil fuels causes serious environmental and social impacts that tend to lead to the search for new energy alternatives. Among the impacts are urban pollution, acid rain, the greenhouse effect, coastal and marine degradation and global warming, all directly linked to the emission of considerable amounts of harmful gases to living beings. In this case, in addition to the scarcity of these resources, it is essential to talk about the need for alternative energy sources, especially fuels that are developed from organic materials that are renewable (Johnson, 2010).

The current world scenario demonstrates a growing interdependence between States, overcoming the Westphalian notion that they would be like “billiard balls”, that is, independent, autonomous and impenetrable units in relation to each other. In this sense, States need to find ways to cooperate to find solutions to problems that are common in the system in which they live (Pereira, 2015). However, the growing demand for energy, linked to the living standards of the current world, is having responses that mostly are not consistent with sustainable practices, through natural resources that are used indiscriminately, impacting the entire energy chain, that is, its production, transformation, transmission, transport, distribution, storage and its final use. In view of this problem, it has been possible to perceive the search for energy generation systems based on renewable sources that aim to obtain such resources in a less aggressive way to the environment, which are less polluting and renewable (Menkes, 2004; Dupont, *et al*, 2015).

⁴ This perspective that climate problems are issues of international security is based on the idea that environmental degradation can be a cause of conflict. An example of this would be the Resource Wars, that is, wars fought for the possession and control of vital resources that would be in scarcity. This is a state-centric view, which differs from one more focused on human security. In this case, the insecurity caused by environmental problems would be directly related to the lives of human beings (Cudworth and Hobden, 2011).

It is possible to say, therefore, that renewable energies would be the most viable and accurate solution to the problem related to the environmental issue, as a way of protecting the environment, since they emit polluting substances in a much less intensified way when compared to non-renewable resources (Goldemberg, Lucon, 2007).

However, it is important to note that often the economic bias manages to overlap the environmental management, the former being just a background, being directly influenced by globalization:

[One of the most important facets of economic globalization has been the transformation of environmental management from a mere source of raw materials and energy into an open field for new forms of capital circulation (SMITH, 2007). The appropriation and conservation of natural resources and ecosystems, predominantly according to the priority of private accumulation of capital, has repercussions on historically established social inequalities and injustices (Ioris, 2011, p. 364).

That is, development, mainly in the West, often ends up reflecting in Western unsustainability, through which environmental degradation and the exploitation of the natural world in general are intensified. It is in this context that ecological modernization and environmental protection practices gain strength, given the recognition of these risks arising from economic activities, “in other words, ecological modernization would serve as a stabilizer (or regulator, in economic language) of negative impacts of capitalist economic expansion” (Ioris, 2011, p. 364).

It is possible to infer then that the use of so-called clean renewable energies is based on a sustainable system that understands the importance of providing the necessary services in a way that does not deplete natural resources, which is important both if perceived from an environmental and economic point of view. In this context, the use of more efficient technologies and a more effective use of natural resources, the core of the sustainable system, have a direct impact on the environmental issue, since it mainly slows down the depletion of these natural resources, in addition to reducing pollution, which reduces the chances of environmental disturbances, related to climate and environmental changes (Menkes, 2004).

In this scenario, the focal point that will guide this analysis based on agreements will be to highlight the movement of the different Brazilian governments in the field of energy cooperation with China, between 1990 and 2020, seeking not only to understand the trajectory of the commitments established over the years, but also the content of the adjustments regarding a certain purpose, specifically: how the protection and preservation of the environment is a component that guides the commitments assumed between the two countries in the field of energy.

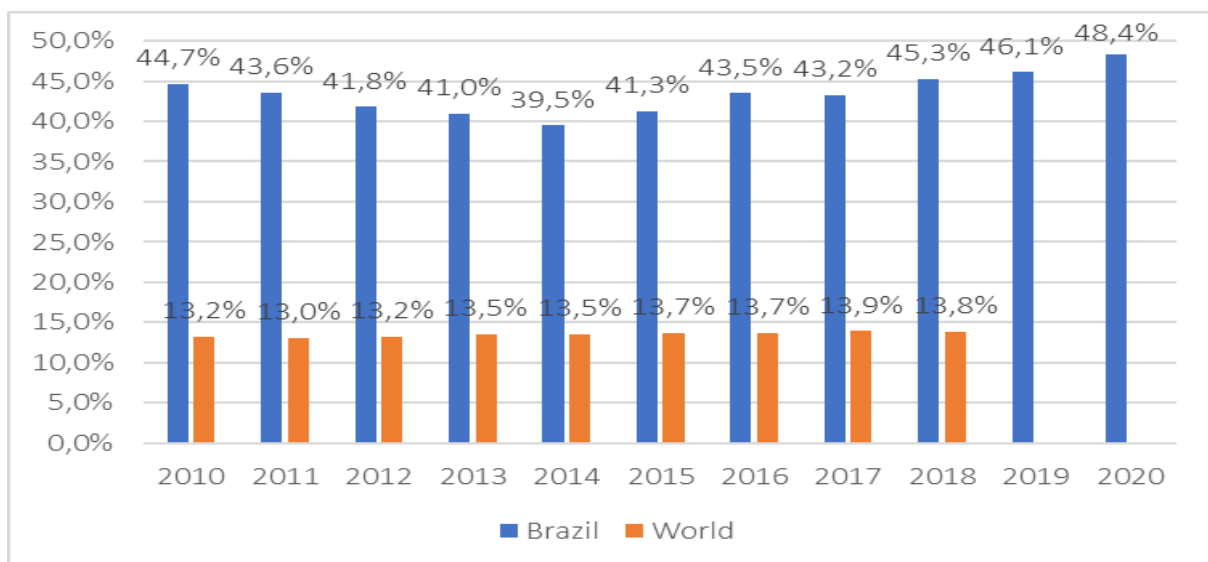
2. ENERGY CONSUMPTION IN BRAZIL AND CHINA

Before we talk about the analysis of the agreements, it is important to understand how both countries deal with their energy systems. The 2021 National Energy Balance, a study

published by the Energy Research Company, an entity linked to the Ministry of Mines and Energy, shows that in 2020 Brazil consumed about 254,6mtoe (millions of tons of oil equivalent) in energy, about of 5,3mtoe (2%) less than in 2019. About 33.1% of this amount was supplied through oil and its derivatives, the flagship of the Brazilian energy matrix. Meanwhile, China in 2020 had a total energy consumption equivalent to 4.980mtec⁵ (million tons of coal equivalent), 105,1mtec (2%) more than the previous year. Most of this consumption was made up of coal, which represents 56.8% of the energy consumed in the country (EPE, 2021; China, 2021). One of the reasons for this large consumption of energy by China is the Chinese economy itself, which in the last 30 years had an GDP growth rate of 9% per year, while the global growth rate is just under 3% in the same period of time (World Bank, 2022).

Even though the main energy resource consumed in Brazil in 2021 was oil, it is possible to say that Brazil is a country that has a cleaner energy matrix, since in 2021 48.4% of the Brazilian energy matrix was derived from sources renewable energies, while in the world, in 2018⁶, the share of renewable energies in relation to the world total consumed was only 13.8% (EPE, 2021). Graph 1 shows the variation over the years in the share of renewable energy in Brazil and in the world since 2010 (there was no access to data on the share of renewable energy in the world energy matrix in the years 2019 and 2020). Between 2010 and 2014, it is possible to observe a downward trend in the share of renewables in the Brazilian matrix, followed by a resumption of growth, reaching its peak exactly in 2020.

Graph 1 – Share of Renewable Energies in Brazil and in the World (2010-2020)



Source: Authors' elaboration Based on National Energy Balances.

As can be seen in Graph 1, the share of renewable energies in the world energy matrix averaged 13.5%, with a maximum of 13.9%. Meanwhile, in this last decade the only year in which

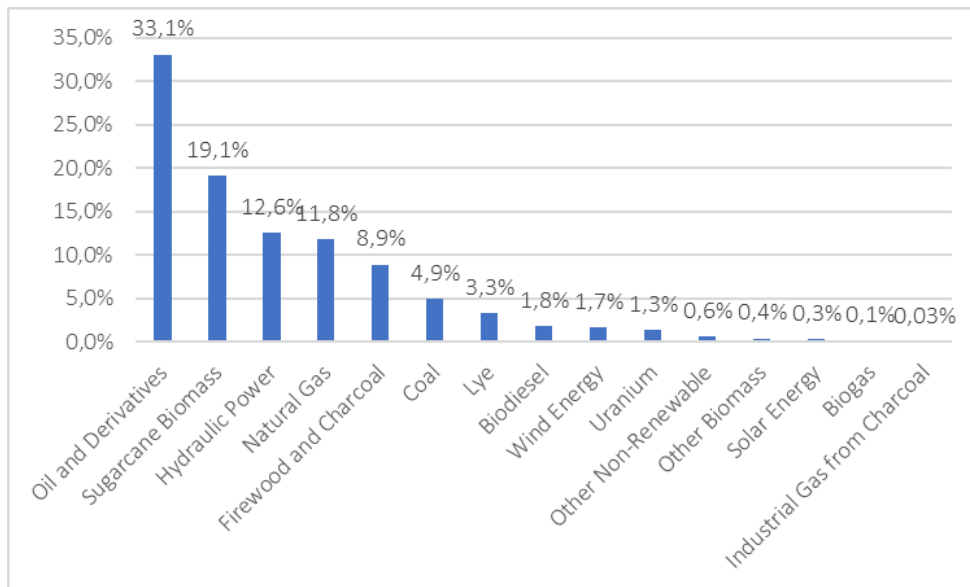
⁵ This value is equivalent to 3.486mtoe. China, therefore, consumed approximately 3.231,4mtoe more than Brazil in 2020, a consumption around 13 times higher.

⁶ The year 2018 is used as a reference because it is the most recent made available by the National Energy Balance.

renewables did not have a share above 40% in Brazil was in 2014, which according to EPE (2015) this was because there was a lower supply of hydraulic energy that year.

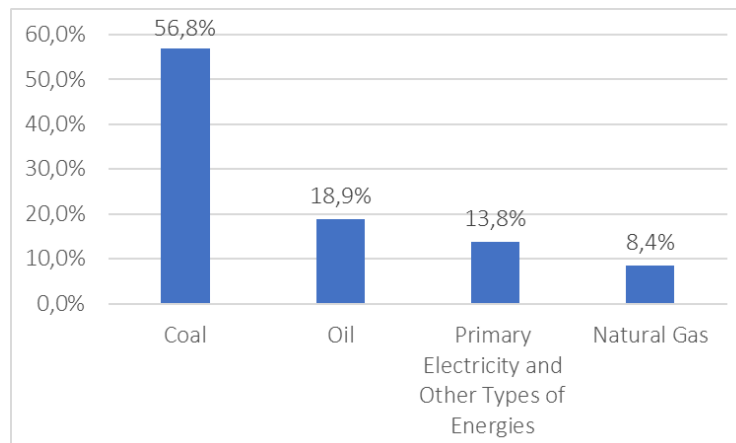
Moving forward in the analysis, when we break down the share of each energy resource in relation to the total consumed in each of the countries, we find the following data: in Brazil, the leader of the list is oil and its derivatives, as previously mentioned, with 33.1% share, followed by sugarcane biomass (19.1%), hydraulic energy (12.6%), natural gas (11.8%), firewood and charcoal (8.9%), coal (4, 9%), lye (3.3%), biodiesel (1.8%), wind energy (1.7%), uranium (1.3%), other non-renewable (0.6%), other biomass (0.4%), solar energy (0.3%), biogas (0.1%) and industrial gas from charcoal (0.03%) (EPE, 2021). In China, coal is the leader with a wide advantage with 56.8% of total consumption, followed by oil (18.9%), natural gas (8.4%), and finally by primary electricity and other types of energies (13.8%).

Graph 2 - Distribution of the Domestic Energy Supply in Brazil (2020)



Source: Authors' elaboration Based on EPE (2021).

Graph 3 - Distribution of the Domestic Energy Supply in China (2020)



Source: Authors Elaboration Based on CHINA (2021).

When looking at the composition of the Brazilian energy matrix, it is also possible to see that even though it has most of its composition from non-renewable resources (54.7% in 2018), in proportional terms the share of these resources in Brazil is lower than in China (84.1% in 2020). An important value that reflects this panorama is the per capita CO₂ emission in Brazil, which in 2020 was 1.9 t CO₂-eq/inhabitant, while in China this value in 2019 was 7.1 t CO₂-eq/inhab, that is, about 3.7 times more than Brazil. Another important value to be highlighted is the carbon intensity in the economy. While to generate a unit of product Brazil emitted in 2020, both in production and consumption, a total of 0.14 kgCO₂/US\$_{ppp}, China emitted in 2019 an amount of 0.40 kgCO₂/US\$_{ppp}. It means that the Brazilian economy emitted 75% less than the Chinese economy (EPE, 2021; China, 2021; AIE, 2022)⁷.

As we can see, these numbers are still not ideal if they want to deal with the energy resources in a sustainable way. To change this scenario over the years, both countries have made efforts regarding energy consumption. Brazil has been a strong advocate in the international system of the use of biofuels and other types of alternative energy, with emphasis on the ethanol diplomacy carried out during the Lula administration. In turn, China sets goals its Five Year Plans to promote the energy transition, use a cleaner electric model and establish an energy revolution (Kroetz, Sanchez-Badin e Sato, 2022).

It remains evident that Brazil and China have convergent and divergent points regarding the dilemmas to be confronted in their energy matrices. In this sense, the agreements can reveal whether such issues are on the table, so that internal demands would end up having repercussions on the conformation of Brazilian foreign policy in the context of energy cooperation with the Chinese, to the point of adjusting bilateral commitments for this purpose.

3. BRAZIL-CHINA RELATIONS

Relations between Brazil and China date back to the 1950s, with the founding of the People's Republic of China in 1949, and over the decades it has gone through phases of approximation and estrangement. Seeking to pursue national liberation policies, China began to extend its foreign policy to countries in Asia, Africa and Latin America. Brazil was one of those countries that approached China, aiming to increase the list of trading partners and the country's prestige in the International System. The highest point of this relationship at that time was the trip of Vice-President João Goulart to China, in 1961, the first to make an official visit to this country. However, with the establishment of the military regime in Brazil, these relations were restrained due to the automatic alignment with the United States, being later resumed at 1974, motivated by a greater pragmatism that began to operate in the foreign policies of both countries (Becard, 2011).

From 1974, therefore, both countries reestablished their relations with the aim of carrying out joint actions that would allow them to achieve certain specific goals that were common to

⁷ 2019 is used as a reference for China because it is the most recent year available at the International Energy Agency website.

both countries, such as reforms of multilateral institutions and opposition to the developed countries' trade protectionism, as well as the possibility of overcoming the development challenges of each country (Leite and Vanderlei, 2017; Oliveira, 2010). However, what can be said is that the reestablishment of cooperation between Brazil and China this year took place slowly, given that internal changes in China did not allow that country to have many resources to dedicate itself to South-South relations, while Brazil was paying more attention to its regional policy. Even so, in 1978 a Trade Agreement was signed between the two countries, gradually increasing Sino-Brazilian trade and relations (Becard, 2011).

In the 1980s China changed its international projection strategy, linking its development policy to its foreign policy, trying not to compete directly with the great powers. Thus, in this decade, China opens up more space for South-South cooperation, increasing visits to Latin American countries. From then on, relations with Brazil began to intensify, resulting in the signing of more than 20 bilateral agreements during that decade (Becard, 2011).

During the 1990s, with the governments of Fernando Collor and Fernando Henrique Cardoso, China was considered an important trading partner, but not necessarily a country that Brazil should be closely linked to. However, with the election of Lula da Silva, the then government identified the possibility of making gains in maintaining greater proximity to China. During this period, the foundations of the relationship between the two countries were mainly marked by the increase in the commercial partnership between the two, with Brazil being the major importer of Chinese manufactured products, and China the destination of Brazilian exports. In the 2000s, for example, it was possible to observe that trade relations between Brazil and China had a higher growth than trade between Brazil and the rest of the world (IPEA, 2011; Leite, 2013). On the Chinese side, we can say that it started to give greater support to Brazil's international ambitions, such as the intention to be a global player with more voice and more participation (Leite, 2013).

One of the moments that marked the relations between Brazil and China during the 2000s was the formulation of the Joint Action Plan, signed in April of 2010 between the two countries, which gave an institutional character to the relationship between them and sought to establish parameters for the joint action of both in the international scenario, among which was the coordination of their actions on issues that were of interest to both Brazil and China at the local, regional and global levels (Leite, 2012; Oliveira 2010).

However, in recent years the relations between Brazil and China have gone through a new phase during Bolsonaro's administration. The Brazilian foreign policy came to be influenced by "bolsonarism", which has strong ideological elements, among which anti-China sentiment is present, the result of a "cultural war" carried out by this movement (Campello, 2021).

Even so, to conclude this section, a relevant factor that should be highlighted in the relations between Brazil and China in recent years and that is relevant to the topic discussed here concerns the strong increase in Chinese investments in the Brazilian energy sector that occurred

during the second half of the 2000s, mainly in northeastern Brazil (Leite and Vanderlei, 2017). These investments were part of the Chinese foreign policy strategy of establishing South-South partnerships to guarantee the raw material needed for its own development. In this case, therefore, Brazil became a recipient country of Chinese investments in exchange for natural resources that would be fundamental for China's economic development (Leite and Lira, 2011). Investments also continued to occur between 2010 and 2020. During this period, China invested around 57.1 billion dollars in Brazil, of which 42.29 billion were in the energy sector, that is, around 74% of China's investments in Brazil in the last decade were in the energy sector (AEI, 2022).

However, what the agreements on Brazilian foreign policy say about this scenario is still something quite open in the literature and its analysis may reveal whether the panorama during the different Brazilian presidential terms towards the Chinese government would be one of approximation or distancing in energy sector. Likewise, it would be possible to verify whether the negotiations established in terms of Brazilian foreign policy over time, through agreements, for example, favor an energy cooperation agenda based on renewable or non-renewable sources, as well as to what extent they are dedicated to take care of environmental issues relating to national and international energy issues.

4. THE INTERNATIONAL AGREEMENTS SIGNED BETWEEN BRAZIL AND CHINA ABOUT ENERGY

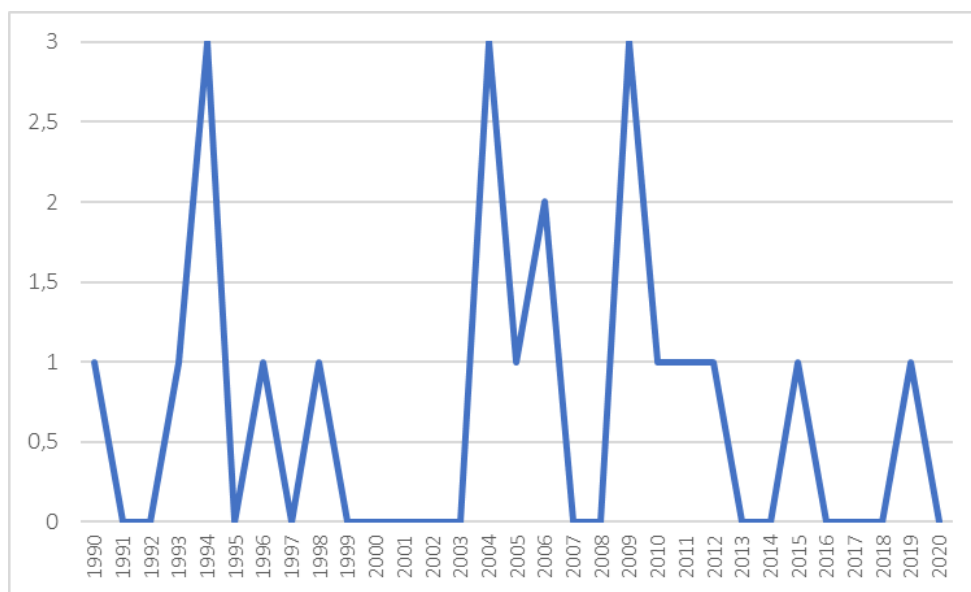
In order to understand how bilateral energy relations between Brazil and China took place from a historical perspective, a database was built with international agreements that deal with the energy theme carried out by these two countries. These documents were collected through the Concórdia platform, under the care of the Division of International Acts (DAI) of the Ministry of Foreign Affairs (MRE) and cover the period between 1990 and 2020. To better understand how this cooperation happened, this work will divide the analysis from each administration that took place during this period, that is, the administrations of Fernando Collor (1990-1992), Itamar Franco (1992-1994), Fernando Henrique Cardoso (1995-2002), Luiz Inácio Lula da Silva (2003-2010), Dilma Rousseff (2011-2016), Michel Temer (2016-2018) and Jair Bolsonaro (2019-2020).

To carry out the data analysis, four variables were established to be observed: (i) the date the agreements were signed, (ii) the centrality that energy receives in these agreements, (iii) the energy resources mentioned in the documents, (iv) and the mention of environmental protection. It is important to explain that for the variable "ii" two categories were established: "accessory" thematic agreements, which would be the agreements that mention other themes besides energy and the "unique" thematic agreements, which are those that deal exclusively with energy. As for the variable "iii", it is necessary to explain that at times the documents mentioned, for example, the term "electricity", which is not necessarily an energy resource, but which was still accounted for in the analysis. In addition, the documents sometimes also mentioned, for example, "renewable energies", "biofuels" and "ethanol" in the same document. It was decided to keep these mentions separately instead of placing them in a single category, so that it would be possible to go into more detail about the nature of cooperation.

The first information that can be listed from the data collection is that during the analyzed period, 87 agreements signed between Brazil and China were found on the Concórdia platform, in which 21 of them (approximately 24%) discuss at some point about energy. Of these 21 agreements, one was carried out during the Fernando Collor administration, four in Itamar Franco administration, two in Fernando Henrique Cardoso administration, 10 in Lula administration, three in Dilma administrations, none during the period in which Michel Temer was in the presidency and one in Bolsonaro administration. This shows that more than 45% of the agreements were carried out while Lula was president of Brazil. One of the reasons for this to have occurred is in the very foundations of the Lula government's foreign policy, which had as principles the diversification of partnerships, universalism, priority for South-South relations and the intention of being a haughty and active foreign policy.

If we look at Graph 4, it is possible to see that the years in which the most agreements were signed were 1994, together with 2004 and 2009 with three agreements signed each, a period in which Itamar Franco and Lula were in the presidency. From the graph it is also possible to observe that no agreement was signed in 17 of the 31 years analyzed, with emphasis on the period between 1999 and 2003, which was the longest period of time without the agreements on energy between the two countries, in which four of those five years encompassed the second term of Fernando Henrique Cardoso.

Graph 4 – Number of International Agreements Signed Per Year



Source: Authors Elaboration.

Regarding the centrality in which energy receives in the agreements, variable (ii) of the research, Table 1 shows the number of agreements found according to each category and the percentage of the total that each one represents. As can be seen, 14 agreements were found that treat energy in an accessory way, which gives approximately 66,6% of the agreements, and seven that treat energy from unique way, representing about 33,3% of all of them.

Table 1 - Centrality of the Energy Theme in the International Agreements Signed Between Brazil and China (1990-2020)

Thematic Classification	Accessory	Unique
Total	14	7
Percentage	66,6%%	33,3%

Source: Authors Elaboration.

From these data on the centrality that energy receives in the agreements, it is possible to extract some information. One of them, for example, occurs if we exclude accessory thematic agreements from the analysis. If we do that, only the governments of Itamar Franco and Lula da Silva would have international agreements signed with the Chinese government. This suggests that energy received more vigorous attention in the administration of these two presidents, especially Itamar. The title of the agreements, the date of celebration and the centrality of the energy theme can be seen in Table 2.

Table 2 - Date, Title and Centrality of the Energy Theme in the International Agreements Signed Between Brazil and China (1990-2020)

Date	Title	Centrality of Energy in the Agreements
May 18, 1990	Economic and Technological Cooperation Agreement Between the Government of Brazil and the Government of China	Accessory
March 05, 1993	Complementary Adjustment to the Economic and Technological Cooperation Agreement between the Government of Brazil and the Government of China	Unique
September 05, 1994	Memorandum of Understanding between the Ministry of Mines and Energy of the Federative Republic of Brazil and the Ministry of Water Resources of the People's Republic of China on Economic, Scientific and Technological Cooperation	Unique
September 05, 1994	Memorandum of Understanding between the Ministry of Mines and Energy of the Federative Republic of Brazil and the Ministry of Electricity of the People's Republic of China on Technological Cooperation in Fluidized Bed Coal Combustion	Unique
September 06, 1994	Memorandum of Understanding for Cooperation between the Ministry of Mines and Energy of the Federative Republic of Brazil and the Ministry of Chemical Industry of the People's Republic of China	Accessory
November 08, 1996	Joint Declaration by the Government of the Federative Republic of Brazil and the Government of the People's Republic of China on the Common Agenda for Sustainable Development	Accessory

December 01, 1998	Complementary Adjustment to the Economic and Technological Cooperation Agreement between the Government of Brazil and the Government of China	Accessory
May 24, 2004	Memorandum of Understanding on Cooperation between the Ministry of Planning, Budget and Management of the Federative Republic of Brazil and the Ministry of Commerce of the People's Republic of China	Accessory
November 12, 2004	Memorandum of Understanding between the Ministry of Development, Industry and Commerce of the Federative Republic of Brazil and the National Development and Reform Commission of the People's Republic of China on Industrial Cooperation.	Accessory
November 12, 2004	Memorandum of Understanding between the Federative Republic of Brazil and the People's Republic of China on Cooperation in Trade and Investment	Accessory
August 17, 2005	Memorandum of Understanding on Cooperation in the Area of Environmental Protection between the Ministry of Environment of the Federative Republic of Brazil and the State Administration of Environmental Protection of the People's Republic of China	Accessory
June 05, 2006	Memorandum of Understanding on the Establishment of the Subcommittee on Energy and Mineral Resources of the Sino-Brazilian Commission of High Level of Concertation and Cooperation between the Ministry of Mines and Energy of the Federative Republic of Brazil and the Commission for Development and State Reform of the People's Republic of China.	Unique
June 05, 2006	Agreement on Strengthening Cooperation in the Area of Construction Infrastructure Implementation between the Government of the Federative Republic of Brazil and the Government of the People's Republic of China	Unique
February 19, 2009	Protocol between the Government of the Federative Republic of Brazil and the Government of the People's Republic of China on Cooperation in Energy and Mining	Unique
May 19, 2009	Memorandum of Understanding between the Government of the Federative Republic of Brazil and the Government of the Republic of China on Petroleum, Equipment and Financing	Unique
May 19, 2009	Joint Communiqué between the Republic of Brazil and the People's Republic of China on the Continuous Strengthening of the Strategic Partnership	Accessory
April 15, 2010	Joint Action Plan between the Government of the Federative Republic of Brazil and the Government of the People's Republic of China, 2010-2014	Accessory
April 12, 2011	Joint Communiqué between the Federative Republic of Brazil and the People's Republic of China	Accessory

June 21, 2012	Ten-Year Cooperation Plan between the Government of the Federative Republic of Brazil and the Government of the People's Republic of China	Accessory
May 19, 2015	Joint Action Plan between the Government of the Federative Republic of Brazil and the Government of the People's Republic of China 2015-2021	Accessory
May 23, 2019	Minutes of the Fifth Plenary Meeting of the Sino-Brazilian Commission of High Level of Concertation and Cooperation – COSBAN	Accessory

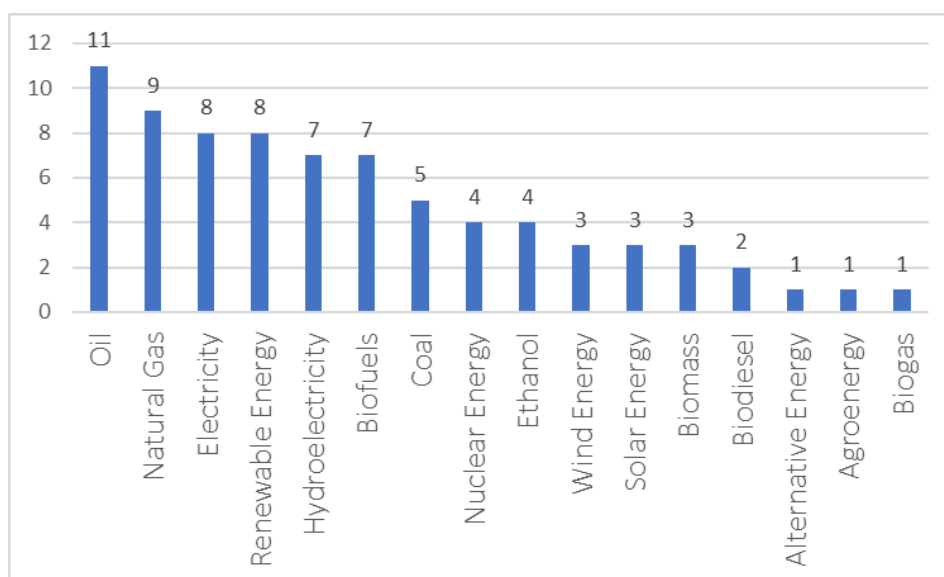
Source: Authors Elaboration.

Therefore, a fact that is notorious through the data presented here is the strength of Sino-Brazilian relations in the energy sector during the Workers' Party government, jointly with the administration of Hu Jintao in China. Of the 21 signed agreements, 13 (62%) were during the PT governments, with 10 of them (48%) while Lula was in power and three (14%) with Dilma. Of these 13 agreements, 12 were in partnership with the government led by Hu Jintao, who was in power between 2003 and 2013, showing a strong alignment of the two countries in that period.

5. ENVIRONMENTAL ASPECTS IN THE AGREEMENTS SIGNED BETWEEN BRAZIL AND CHINA

Regarding the energy resources mentioned in the 18 agreements observed, oil and natural gas lead the list with ten and nine agreements mentioning them respectively. The terms “electricity” and “renewable energy” appear soon after, both appearing in eight agreements. The terms “hydroelectricity” and “biofuels” are mentioned in seven agreements, followed by “coal” in five, “nuclear energy” in four, “wind energy”, “solar energy”, “biomass” and “ethanol” in three, “biodiesel” in two, and finally the terms “alternative energy” and “agroenergy”, together with “biogas”, appearing only in one agreement. All this information can be seen in Graph 5.

Graph 5 - Number of International Agreements in which Energy Resources Appear



Source: Authors Elaboration.

From these data, one of the first impressions that we can perceive is that energy resources of fossil origin are the main resources that historically are at the top of the list of Brazil-China energy cooperation. However, attention is drawn to the fact that renewable energies have also started to play a prominent role in the execution of agreements between these two countries, which began in 2005 with the signing of the Memorandum of Understanding on Environmental Protection Cooperation Between the Ministry of the Environment of Brazil and the State Environmental Protection Administration of China. After the signing of this Memorandum of Understanding, renewable energies were also mentioned again in the agreements signed in the years 2006, 2009 (twice), 2010, 2011, 2012 and 2015. Another point that calls attention is the inclusion of wind and solar energy, which appeared for the first time in the last year of the Lula administration (2010) and continued to appear during the Dilma administration (2011-2015). This indicates that, over time, the cooperation between China and Brazil has included new themes in its dynamics.

One of the most interesting data, and one that dialogues well with the Lula government's foreign policy, concerns biofuels. Biofuels were mentioned for the first time in an agreement signed in 2006 and since then they have appeared in all agreements. This data draws attention because it dialogues with the interest of the Lula government in promoting biofuels in the international system as a substitute for fossil resources. The flagship of this strategy was ethanol, which, as mentioned in the second section, was part of what became known as ethanol diplomacy, a soft power tool for Brazilian foreign policy to project itself internationally as a leader in the energy sector and, consequently, achieve political and economic benefits (Afionis *et al*, 2016; Dalgaard, 2017).

It is also worth bringing to the discussion what were the main resources contemplated in the governments of each president. In the only agreement signed during the Collor administration, no specific energy resource was mentioned. However, with Itamar Franco, Electric Energy and Hydroelectricity appear in the spotlight, but there are also mentions of resources such as Oil and Coal. Oil also appears in one of the agreements that was signed in Fernando Henrique Cardoso administration, but it is also in the government of this president that a mention is made of the "development of alternative energy sources" (MRE, 1996). In the Lula administration, new energy resources are included in the agreements made between China and Brazil, such as natural gas, which is the leader of this period appearing in six agreements together with oil, but we also have renewable energies as a highlight, which appear in second place being mentioned in five agreements. In Dilma's administration, the highlight goes to nuclear energy, which is at the top of the list along with renewable energies, oil, natural gas and biofuels, appearing in all the agreements that were made in her government.

Table 3 - International Agreements Dealing With Energy (Brazil and China) in Each Administration (1990-2020)

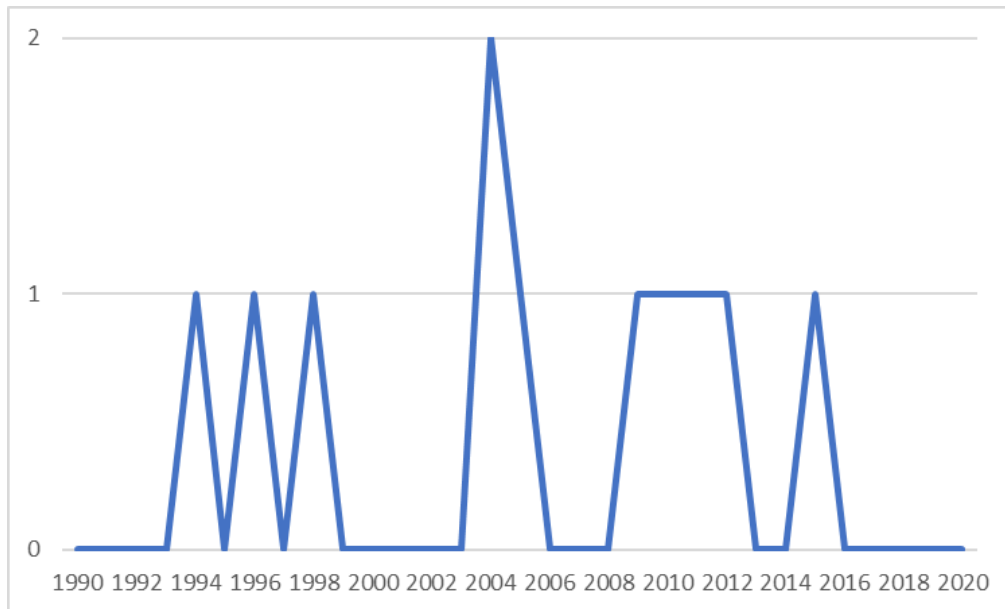
Administration	Agreements	Energy Terms
Collor	1	X
Itamar	4	Electricity and Hydroelectricity (2); Coal, Oil (1)
FHC	2	Oil and Alternative Energy (1)
Lula	7	Gas and Oil (6); Renewable Energy (5); Biofuels and Electric Energy (4); Hydroelectricity, Coal and Ethanol (3); Agroenergy, Solar Energy, Wind Energy, Biodiesel, Biomass and Nuclear Energy (1)
Dilma	3	Nuclear Energy, Renewable Energy, Oil, Gas, Biofuels (3); Electricity; Wind Energy, Solar Energy; Hydroelectricity and Biomass (2); Biodiesel, Ethanol, Biogas and Coal (1)
Temer	0	X
Bolsonaro	1	X

Source: Authors Elaboration

To enter into the question regarding the protection of the environment, at this moment the data found on the number of agreements that mention the protection of the environment and sustainability as an objective to be established in cooperation will be presented. First of all, of the 21 agreements that talk about energy, 11 of them mention in some way that the protection of the environment is an objective to be pursued between Brazil and China. The first time this goal appeared was in the Itamar Franco administration through the signature of the Protocol of Intent for Cooperation between the Ministry of Mines and Energy of Brazil and the Ministry of Chemical Industry of China, in 1994, which, when talking about fostering cooperation in the chemical and petrochemical industry sectors, establishes that one of the modalities to be fulfilled would be environmental protection (MRE, 1994). As can be seen in Graph 6, the chronology of the agreements shows that the administrations that most established environmental protection as one of the objectives to be achieved with energy cooperation were the governments of Lula and Dilma, mentioning this objective in five and three agreements respectively. Between 2009 and

2012, for example, every year at least one agreement was made that mentioned environmental protection in its text.

Graph 6 - International Agreements per Year that Mentions the Protection of the Environment



Source: Authors Elaboration.

However, in order to observe in detail the nature of this cooperation and how it would take place in a sustainable way, it is necessary to establish some parameters. In this sense, the objectives that were established in these agreements will also be analyzed based on von Hauff and Kleine's (2006) Integrative Sustainability Triangle method, which determines that sustainable development is based on three dimensions: economy, ecology and society. According to them, "the sustainability triangle can be used to define areas of action with specific goals related to effectiveness and efficiency." (Von Hauff and Kleine, 2006, p. 374). In this case, effectiveness would be measured from the establishment of a single objective based on one of the pillars of the triangle, while efficiency would be related to a relationship that integrates two of the pillars.

In the agreements signed between Brazil and China, there are some examples that reflect this discussion. One of these cases would be the Joint Communiqué between the Federative Republic of Brazil and the People's Republic of China, signed in 2011, which in its text talks about:

deepen cooperation in the area of oil trade and finance, oil and gas prospection and exploration, electric power, energy equipment, peaceful use of nuclear energy, and renewable energy, including biofuels, in order to deepen cooperation in the environment area and in projects in the area of green economy (MRE, 2011).

Another good example about sustainability can be found in the Ten-Year Cooperation Plan Between the Government of Brazil and the Government of China, carried out in 2012, which at the outset makes a clear mention of the sustainability triangle, reporting that the two countries "attach special importance to sustainable development in its three pillars: economic, social and

environmental.” (MRE, 2012). When applied to the energy field, this agreement says that energy plays an important role for the economic and social development of both countries, but also takes into account that it is necessary to develop energies that are focused on climate change issues.

Therefore, what is interesting to note with these examples is that energy enters the agreements not only as a way to obtain economic return, or to guarantee the population's access to energy, but it is also possible to perceive that energy is seen in an ecological way to ensure environmental protection, while at the same time obtaining economic and social returns, as in the case of the search for the development of a green economy.

FINAL CONSIDERATIONS

These final considerations are marked by articulated conclusions that aim to offer a synthesis of the analysis carried out throughout the entire essay, aiming to understand the dynamics of the relationship between Brazil and China in the field of energy and also offering an analytical trail of the agreement-based energy foreign policy centered on environmental issues. To this end, they are divided into five groups as set out below.

Firstly, this is a methodological step in which it was necessary to trace the connection points between energy security and environmental demands, in order to parameterize the discussion in the field of international energy cooperation. The latter starts to be discussed as a foreign policy initiative, which starts to be analyzed in the light of one of the most famous instruments of diplomacy: the agreements signed between countries.

Secondly, the next step refers to the analysis of foreign policy regarding the approximation of the reality experienced by the two countries, specifically regarding energy matrices of each one. And about that it can be said that: 1) the energy matrices of Brazil and China have very specific similarities and differences; 2) the similarities are due to the preponderance of non-renewable sources in their energy matrices, with emphasis on oil and its derivatives in Brazil and coal in China; 3) in general, the Brazilian matrix is much less dependent on non-renewable resources than the Chinese one, but the latter has strongly sought to change this circumstance by increasing the share of renewables.

The third step is aimed at verifying how relations between the two countries develop considering the different Brazilian presidential terms, in this case, without considering the condition of the other party in the explanation, that is, the condition of each period of the Chinese government under the management of a specific agent. Diplomatic relations between these two countries went through several stages. With a relatively recent history, the high point of Sino-Brazilian cooperation actually took place during the Lula governments on the part of Brazil and Hu Jintao on the part of China. These relationships reflect a kind of complex interdependence, in which Brazil is heavily dependent on China in the economic sphere, while the Chinese have come to support Brazil's pretensions in the international system.

Fourthly, comes the specific stage of analyzing the trajectory of the agreements on energy between Brazil and China. And on this it can be said that: 1) there is a significant amount and diversity of agreements signed between the two countries in the energy area, between the years 1990 and 2020; 2) throughout this period, it appears that several Brazilian governments have established some type of agreement on energy; 3) the highlights are the Lula, Itamar and Dilma administrations, and the only government that did not establish agreements in this field with China was the Temer administration.

Fifth, it is the final stage regarding the environmental aspects of energy security in agreements between Brazil and China, it can be said that: 1) the agreements signed between 1990 and 2020 involve both renewable and non-renewable energy sources, with a wide variety of mentioned resources; 2) in specific terms, it was found that the mention of non-renewable resources prevailed with oil and gas, but in general terms renewable resources prevailed; 3) it was found that most of the signed agreements make reference to the environment as an interest or objective to be achieved in the cooperation between Brazil and China in terms of energy, demonstrating the relevance of this issue in this bilateral relationship.

This essay must be conceived within the limits of its purpose of offering possibilities for learning about the dynamics of foreign policy in terms of international energy cooperation, having as a reference the agreements signed between two or more countries. Therefore, in the case at hand involving Brazil and China, an analytical model was proposed based on a variable that has been little explored in the literature, which, as we sought to demonstrate in this text, can help in the understanding of how a country guides its actions abroad in terms of energy. This text is, therefore, a starting point and not an end point in the analysis of foreign policy in terms of international energy cooperation.

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