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The importance of public policies that encourage companies to decarbonize the environment and invest in clean technologies in Brazil

La importancia de las políticas públicas que incentivan a las empresas a descarbonizar el medio ambiente e invertir en tecnologías limpias en Brasil

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Abstract

In this study, we aim to demonstrate how important public policies that encourage companies to decarbonize the environment are to Brazil. There is an evident need for the creation of a Brazilian Regulatory Agency for the carbon market that acts transparently and according to international agreements. In this study, we analyzed Braskem's greenhouse gas emission reports from 2010 to 2018 regarding the production of green polyethylene or other actions related to depollution of the environment. Furthermore, we sought to investigate Braskem's relationship with the ICO2 index of the São Paulo Stock Exchange, which takes into account the degree of efficiency of greenhouse gas emissions of each member in this indicator. We discussed how the Stock Exchange manipulates ICO2 values through their calculation methods. Companies that participate in the ICO2 market have competitive advantages over stakeholders, even though they have agreed to abide by the Sarbanes-Oxley Act, which requires transparency regarding how the reduction of greenhouse gases emission occurs. We concluded that the lack of transparency and the ICO2 calculation methods also created a new derivative through which companies listed in the ICO2 could profit and reduce the risk of losses.

Keywords: decarbonization, ICO2, GHG, Braskem, green polyethylene, IBrX-50.

Resumen

En este estudio, buscamos demostrar cuán importantes son para Brasil las políticas públicas que incentivan a las empresas a descarbonizar el medio ambiente. Es evidente la necesidad de la creación de una Agencia Brasileña de Regulación del mercado de carbono que actúe de manera transparente y de acuerdo con los acuerdos internacionales. En este estudio, analizamos los informes de emisión de gases de efecto invernadero de Braskem de 2010 a 2018 relacionados con la producción de polietileno verde u otras acciones relacionadas con la descontaminación del medio ambiente. Además, buscamos investigar la relación de Braskem con el índice ICO2 de la Bolsa de Valores de São Paulo, que toma en cuenta el grado de eficiencia de las emisiones de gases de efecto invernadero de cada miembro en este indicador. Discutimos cómo la Bolsa de Valores manipula los valores de ICO2 a través de sus métodos de cálculo. Las empresas que participan en el mercado de ICO2 tienen ventajas competitivas sobre los stakeholders, a pesar de que han acordado cumplir con la Ley Sarbanes-Oxley, que exige transparencia sobre cómo se produce la reducción de la emisión de gases de efecto invernadero. Concluimos que la falta de transparencia y los métodos de cálculo del ICO2 también crearon un nuevo derivado a través del cual las empresas que cotizan en el ICO2 podrían beneficiarse y reducir el riesgo de pérdidas.

Palabras clave: descarbonización, ICO2, GEI, Braskem, polietileno verde, IBRX 50.

1 Introduction

The Brazilian Federal Constitution of 1988 (FC) made the environment an asset that should be protected by the Brazilian State. Nevertheless, the high rates of deforestation in the national territory, the uncontrollable intentional fires, and the neglect of the native vegetation show how Brazil has disregarded the environment in recent years. The FC – which governs the entire Brazilian legal system and guarantees the fundamental rights of Brazilians – is the fundamental and supreme law in Brazil and serves as a parameter of validity for other types of legal norms.

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According to the Institute for Space Research (INPE, 2020), from 2019 to 2020 there was a 34.5% increase in deforestation alerts, equivalent to 9,205 km^2, that is, an area approximately to 1,100,000 football fields. Article 225 of the Constitution states that everyone has the right to an ecologically balanced environment. Thus, economic and political agents should adopt ethical postures and make decisions aimed at minimizing or solving the impacts caused to the environment as a result of activities from their businesses. With the enactment of the FC, the study and development of public policies in Brazil became the core of a major discussion of an intense process of administrative legal system throughout the 1990s. The FC contemplated the creation of Regulatory Agencies, but the creation of legal instruments was only possible after a political will in 1998, under President Fernando Henrique Cardoso[1]. The Regulatory Agencies that discipline the government and the private sector define the obligations and rights of each party in granting goods and authorization for public service delivery. In this regard, the National Financial System (SFN), the body responsible for regulating the Brazilian financial market, has been restructured since the 2000s, and in 2007 agreed to act according to the financial compliance model of the International Financial System through the Sarbanes-Oxley Act (SOx).

The SFN has a similar legality and legitimacy to that of a regulatory and supervisory agency and, therefore, must supervise and regulate the transparency required by the financial market, which does not occur. Thus, despite the existence of several laws that regulate the financial market, there is no convergence of laws in the sense of a unification of legislation, i.e., there is no instrumentalization and no broad inspection of what is done and how it is done by the different agencies, which is a broad breach of the SOx Act[2]. The SOx Act also determines that all financial and economic activities of the companies listed on B3 (Assaf, 2012; Apak *et al*., 2015; Davila *et al*., 2006) must be transparent.

At the time that Regulatory Agencies were created in Brazil, carbon credits were not a concern, so there was no need for a specific market for that. Global warming urgency and the international agreements to contain environmental pollution drafted by the United Nations led to the discussion of regulating the carbon market. Now, a transparent Regulatory Agency for the carbon market must be created in accordance with international agreements (SOx Act, Kyoto Protocol Paris Agreement, 2015) for carbon credits to be negotiated through the São Paulo Stock Exchange (B3, 2020). The first emissions trading market in the world was the Emission Trading Scheme in the United Kingdom (UK ETS), which was held in 2002 at an auction and each member state in Europe developed a National Allocation Plan (NAP). It was established that the amount of permission licenses for companies to emit GHG would be distributed by governments.

The creation of a carbon market Regulatory Agency – a regulatory and supervisory body to map the Brazilian biodiversity – would encourage companies and stakeholders to invest in initiatives that generate carbon credits. When companies invest in clean technologies or Clean Development Mechanisms (Hellvig and Flores-Sahagun, 2020b), they reduce greenhouse gas (GHG) emissions and contribute to the decarbonization of the environment. Thus, the profit that can be generated from the sale of carbon credits should be regulated, monitored, and transparent.

In 2011, according to the World Bank (2012), new initiatives for the global carbon market emerged, among them, we can mention the case of Mexico, which is developing bases for a future cap-and-trade scheme. The platform for negotiating carbon credits in Mexico is the first pilot cap-and-trade scheme and is an important step in the development of public policies aimed at reducing GHG. However, countries such as Brazil, which has a sophisticated financial trading system (B3, 2020) for stock exchange and has a great potential for developing clean development mechanisms (CDM's), unfortunately have not been successful in developing public policies and efficient actions for the GHG reduction.

In an attempt to converge existing legislation in UN member countries, during the 2015 United Nations Framework Convention on Climate Change, member countries joined the Paris Agreement (FCCC, 2015). In this Agreement, Article 6 describes the voluntary and cooperative engagement of public and private actors to promote transparent public policies for GHG mitigation, and the development of more sustainable technologies and models.

Although the Kyoto Protocol (MCTI, 2019) and the Paris Agreement are in effect, little has

[1] A Regulatory Agency would be responsible for monitoring public and private entities and regulating punishment procedures.

[2] Law 13.874 Oct/2019 - Economic Freedom Law (Lei de Liberdade Econômica), Bill 4.307/2020, Law 3.681/2013 - Risk Management of Financial Assets (Gerenciamento de Riscos de Ativos Financeiros), Resolution 4.282/13 - Central Bank of Brazil (Banco Central do Brasil - BACEN), Law 9.613/1998 - Means of Payment Law (Lei de Meios de Pagamentos).

been done to mitigate GHG emissions and develop environmental public policies. The Carbon Efficient Index (Índice Carbono Eficiente - ICO2) was launched by BM&FBovespa on December, 2010. The ICO2 is a total return index composed of shares of companies listed in the IBrX-50 index that encourages them to reduce GHG emissions. The shares of companies that meet the criteria to become a member of the IBrX-50 index make up its portfolio, and these companies have theoretically adopted transparent practices regarding GHG emissions.

The IBrX-50 is an indicator of the average performance of the quotations of the 50 assets with the highest negotiability and representativeness of the Brazilian stock market. In July 2020, 28 companies accounted for 100% of the ICO2 portfolio. Although 50 companies could participate, only 28 of them agreed to be a part of the B3 ICO2 program. Other companies could not participate in the B3 program, even if interested in the membership, because the ICO2 is a closed market and these companies were not among the 50 most traded.

In this study, we took the Braskem company as an example to illustrate the lack of transparency of the reports of compensations and reductions of CO_2 emissions. To this end, we used Braskem's S. A. GHG emission inventories from 2010 to 2018 and not only those related to BRKM5 (green assets). In general, when ICO2 indexes are launched by the stock exchanges, explicitly or not, there is a motivation or economic benefit for members, such as the possibility of raising funds at a lower cost, the increase in shares, or the improvement of the company's image to the public. (B3, 2020). The analysis of the ICO2 allows us to reflect further on the promotion of public policies that seek to encourage companies to decarbonize the environment and invest in Clean Technologies. Braskem was chosen for this study because it has a Clean Development Mechanism (CDM), green ethene, produced from dehydration of ethanol obtained from sugar cane, which has an important carbon footprint CO_2. The energy balance of sugarcane is positive, since compared to the production of ethanol any other raw material used for the production of ethanol, it emits less CO_2 into the atmosphere and also removes 3.5 t CO_2 per hectare of sugarcane production from the environment (Pimentel; Patzek *et al*., 2005; Quintero *et al*., 2008; Viaplana *et al*., 2010; Sánches-Sánches *et al*., 2017; Lauzurique-Guerra *et al*., 2017; Gómez *et al*., 2017).

1.1 Environmental Initiatives And Policies

In regard to international actions, Brazil, as a member state of the United Nations, has agreed to participate in the United Nations Development Program (UNDP, 2015). Thus, the country should implement projects that contribute to sustainability to assure the reduction of GHG emissions and carbon capture and storage (CCS) (FEE, 2016; Point Carbon, 2010), the development of Clean Technologies and the promotion of the Circular Economy (Hellvig, 2015). Furthermore, sustainability must be supported by economic, social, and environmental policies. Thus, the 2030 agenda was created in order to encourage countries to participate in the UNDP (2015), which invites municipalities to discuss and develop actions that meet the 17 Sustainable Development Goals (SDG). Another international environmental action plan is the Clean Development Mechanism (CDM) established by the Kyoto Protocol. According to the Ministry of the Environment (2019), the CDM is a flexible mechanism created to help reduce GHG emissions and capture and store carbon (CCS). Under a circular economy system, the CDM can more effectively develop Clean Technologies, seek economic, social and environmental sustainability, and promote equity, transparency and resilience of public power and organized civil society. There are some interesting studies about clean development mechanisms in the literature that, through the implementation of public policies, can contribute to society and the environment (Lucho-Constantino *et al*., 2015; Rodriguez-Mariano, 2015; Godoy *et al*., 2015). Several studies have shown the importance of CO_2 for capture in energy reuse processes (Sanchez-Rangel *et al*., 2014; Maldonado-Magana *et al*., 2013; Buendía-González *et al*., 2010; Doran *et al*., 2009; Golan-Goldhirsh *et al*., 2004; Adesina, 2012; Devendra *et al*., 2013; Stechel *et al*., 2013; Spigarelli *et al*., 2013).

A circular economy system promotes a continuous process of reverse logistics so that limited resources, such as capital, labor and land (Geyer, 2010; Pindyck, 2002) can be reused to achieve Sustainable Development. At national level, public policies must be multidisciplinary since economics, public policy, medicine, engineering, and public administration must converge for effective and efficient governmental actions. The Brazilian Federal Constitution of 1988 (FC) states that not only the articles directly concerning public policies, such as article 225, are considered as environmental actions.

Chart 1. Brazilian Environmental Laws.

LEI	TÍTULO
6.766/1979	URBAN SOIL INSTALLMENT LAW
6.938/1981	NATIONAL ENVIRONMENT POLICY
7.347/1985	PUBLIC CIVIL ACTION LAW
9.433/1997	WATER RESOURCES LAW
9.605/1998	ENVIRONMENTAL CRIME LAW
9.985/2000	NATIONAL SYSTEM OF NATURE CONSERVATION UNITS
11.445/2001	NATIONAL BASICS SANITATION POLICY
11.284/2006	PUBLIC FORESTS MANAGEMENT LAW
12.305/2010	NATIONAL SOLID WASTE POLICY
12.651/2012	NEW BRAZILIAN FOREST CODE

Fonte: Ministries of the environment - Brazil (2020).

Within the constitutional principles, the Annual Organic Law (Lei Orgânica Anual - LOA), the Budget Directives Law (Lei de Diretrizes Orçamentárias - LDO), and the Multi-Year Plan (Plano Plurianual - PPA) must be met within the legal deadlines. Each municipality legislates in accordance with its LDO, LOA, and PPA (Sechi, 2013), and today there is a discrepancy between the deadlines and the time it takes to prepare and execute the LDO, PPA, and LOA. The PPA is valid for 4 years, while the LDO and LOA must be renewed annually. In addition, the elaboration of the LOA starts and ends in July, whereas the elaboration of the LDO starts in August and ends in December of the same year. In this regard, the FC favors the electoral process of political agents according to their electoral interests rather than prioritizing public interest. Chart 1 shows the main Brazilian federal environmental laws. It is important to note that the 27 states and the Federal District and the 5,570 Brazilian municipalities have autarchy to legislate. However, to contemplate the complex diversity of the Brazilian Ecosystem, it is necessary to reorganize the federation's political agenda. Despite these initiatives and policies, there is still the matter of information disclosure. Transparency is an essential tool to raise awareness of the public and stakeholders concerning business processes. In a market economy, all kinds of information about business should be released, since "with all the available information in hand, investors decide in which assets to invest, based also on individual preferences" (Batistella *et al*., 2004). This study will help stakeholders, customers and companies to assess the carbon market and the companies listed in the ICO2 and show why it is necessary to create a carbon market Regulatory Agency in Brazil. We sought to answer the question of whether the ICO2 calculation methods are a genuinely useful tool to assess the interest companies have in investing in clean technologies to encourage the development of Clean Development Mechanisms or if this index is only speculative in relation to the market.

2 Materials and methods

In this study, we used the GHG 2010-2018 inventories from Braskem S. A. released by the certifying company KPMG, which is authorized by the Ministry of Science, Technology, and Innovations (MCTI, 2020) to certify inventories. We also analyzed the composition of B3's ICO2 portfolio and B3's ICO2 calculation methods. We requested the company's inventories issued and certified by KPMG, which followed the Brazilian GHG Protocol program method. These inventories are not available for public access but were provided by KPMG at the request of the authors. In relation to the GHG emission inventories, Operational Limits data were categorized as follows: i) Scope 1 included Mobile combustion, Stationary combustion, and Fugitives; ii) Scope 2 included Acquisition of electric power; iii) Scope 3 included Goods and Services purchased, Capital goods, Activities related to fuel and energy not included in other scopes, Transport and distribution (upstream and downstream, Waste generated in operations, Business travels, Employee relocation (home-work), Leased goods (the organization as a lessee), Processing of products sold and End of life treatment of products sold.

The calculation of the ICO2 takes into account the total emissions and gross revenue of each company as shown in Equation 1:

$$\text{Coefficient and Emission/Revenue}_t = \frac{\text{GHG EMISSION}_{(tCO_2E)}}{\text{Revenue}_t(\text{R\$ millions})} \quad (1)$$

Table 1 shows the member companies of B3's ICO2 portfolio in 2020. Most of the companies are banks, but there are petrochemical companies such as Braskem S. A. and Petrobrás, and large retail companies. Equation 2 shows the calculation of the weight of each share in the ICO2 disclosed by B3 for sectors with more than one company and represents the adjustment between the weight of the ICO2 with the weight of the IBr-X of the companies participating in the portfolio.

$$\text{Weight ICO2} = \text{Weight IBRX} \times \left[\frac{\text{Avg Coeff} \times [\text{Emission/Revenue}]\ \text{Sector}_z}{\text{Coeff} \times [\text{Emission/Revenue}]_i} \right]^y \tag{2}$$

$$\Delta Carbon = \frac{\sum_1^n (\text{Weight ICO2}_i \times \text{Coeff} \times [\text{Emission/Revenue}]_i}{\sum_1^n (\text{Weight IBRX}_i \times \text{Coeff} \times [\text{Emission/Revenue}]_i} - 1 \tag{3}$$

$$\text{Weight ICO2} = \text{Weight IBRX}_i + \text{Total Reduction} \frac{\text{Avg Coeff} \times [\text{Emission/Revenue}]\ \text{Total} - \text{Coeff} \times [\text{Emission/Revenue}]}{\sum_{j=1}^n \text{Avg Coeff} \times [\text{Emission/Revenue}]\ \text{Total} - \text{Coeff} \times [\text{Emission/Revenue}]} \tag{4}$$

Equation 3 shows that in order to increase the reduction of the carbon coefficient, either the weight of IBrX must be reduced or the weight of ICO2 must be increased. This can be done by opening a new portfolio, as shown in Equation 4, a process that B3 names rebalancing.

The B3 (2020) has some requirements for member companies that participate in the ICO2, namely: i) members must be part of the IBrX-50 portfolio; ii) members must have formally joined the ICO2 initiative; iii) members must report their annual GHG inventory data according to the scope level and deadline defined by B3; and iv) BDRs (assets traded internationally) and assets under judicial or extrajudicial recovery are not included in this calculation.

3 Results and discussion

For Equation 1, by increasing revenue and/or decreasing GHG emissions, the emission coefficient (ICO2) decreases. The increase in revenue, whether from increased production or from speculation of assets on the financial market, leads to a reduction in the emission coefficient. In the analyzed period, Braskem had an increase of 268% in their Income Statement (*Demonstração do Resultado do Exercício* - DRE[3]), (Hellvig and Flores-Sahagun, 2020a and 2020b). Thus, even though the production of green polymers represented only 1.23% of total polyethylene production (green and fossil), the company's emission coefficient decreased yearly.

According to Table 1, banks have the largest share of the portfolio (46.573%), followed by retail (41.270%) and the petrochemical sector (12.155%). Table 1 also shows the total value of the GHG emission[4] reducer (448,475,688.06084862 units) that is not released either by B3, or by the sector or member companies, which would be important in the representativeness of the GHG reduction calculations.

In Equation 2, a simple arithmetic mean of the emission coefficients is calculated instead of a weighted mean per sector. The division by sector provides competitive advantages to large companies, since they have market dominance (PETRO3, PETRO4, UGPA3 and BRKM5). Thus, the banking sector is the largest beneficiary, since it presents higher revenues and lower Emission/Revenue coefficients, without necessarily decreasing GHG emissions. It may be argued that this represents a derivative (financial instruments to earn profits for banks and reduce risks) in the financial market through which banks profit, but the benefits of decarbonization of the environment do not return to society. Equation 4 shows that B3 must rebalance when a new company wishes to open a new ICO2 portfolio. However, the B3 rule is that the company cannot reduce the weight of ICO2 for rebalancing, i.e., the percentile share in the portfolio. Once again, this strategy benefits the companies because they can increase their participation with a new asset without effectively decarbonizing the environment. To illustrate this, we will discuss Braskem's GHG emissions inventories from 2010 to 2018.

Table 2 shows that in 2010 and 2011, there were no investments in Scope 3. In 2010, the production of green polyethylene began and was computed in the 2011 inventory (Table 3). In 2011, a Carbon Footprint (Braskem, 2020) was developed for 12 polymers or Braskem products.

[3]The Income Statement shows whether the company is profiting or losing during a given period (Assaf Neto, 2012).

[4]Reduction of GHG emissions are good environmental practices adopted in the production chain to reduce the emission of Greenhouse Gases into the environment (Firjan, 2017).

Table 1. ICO2 member companies in 2020.

TICKER	COMPANY	PART (%)
B3SA3	B3	13,603
BBAS3	BRASIL	5,575
BBDC3	BRADESCO	3,311
BBDC4	BRADESCO	9,856
BRFS3	BRF S.A	2,171
BRKM5	BRASKEM	0,32
BRML3	BR MALLS PAR	1,161
BTOW3	B2W DIGITAL	3,682
CCRO3	CCR S. A	2,267
CIEL3	CIELO	0,489
CMIG4	CEMIG	1,706
ELET3	ELETROBRAS	0,705
GOLL4	GOL	0,118
ITSA4	ITAUSA	1,14
ITUB4	ITAUUNIBANCO	12,54
JBSS3	JBS	2,947
LAME4	LOJAS AMERIC	3,962
LREN3	LOJAS RENNER	2,453
MRVE3	MRV	1,446
MULT3	MULTIPLAN	0,548
NTCO3	GRUPO NATURA	4,171
PCAR3	P. ACUÇAR-CBD	1,73
PETR3	PETROBRAS	3,633
PETR4	PETROBRAS	5,443
RAIL3	RUMO S.A	2,386
RENT3	LOCALIZA	3,972
UGPA3	ULTRAPAR	2,759
WEGE3	WEG	5,906
TOTAL		100
REDUCED EMISSIONS	448.475.688,06	

Source: B3 (2020).

In 2012 (Table 3), although item 5.4 of the emissions inventory states that there is no regulatory or voluntary obligation linked to GHG, this information is required by the SOx Act. Therefore, Braskem, as a publicly held company, should release this information. (Hellvig and Flores-Sahagun 2020b). In item 5.8 of this same inventory, the carbon stock is not reported either. In 2015 (Table 4), as in previous years, no offsets and reductions were reported, but methods and tools were adopted (item 4 of the inventory) for mass balances, that is, compensations. In 2018 (Table 5), Braskem's environmental station maintained the same CO2e quantity in tonnes. In 2018, 2,064,961.00 MWh of renewable energy were purchased.

When carbon credits are generated by the production of green polymers (Altinbalik *et al*., 2018; Mohanty, 2012; Heinzen *et al*., 2011), the removal of CO_2 is accounted for in the total emissions balance. However, Braskem produces 16,000,000 t/year of fossil polyethylene and only 200,000 t/year of green polyethylene. In 2018, the company allegedly received around US$7,600,000 in carbon credits despite being ranked with a stake of only 0.32% of the ICO2 portfolio. This suggests that Braskem may profit much more by polluting than by depolluting (Hellvig and Flores-Sahagun, 2019 and 2020b) and that all companies listed in Table 1 of ICO2 may not be properly decarbonizing the environment while still gaining competitive advantages (Porter, 1998; Borsatto, 2020) and profits. In this regard, a carbon market Regulatory Agency in Brazil would ensure more transparency regarding the calculation of carbon credits and their origin.

Table 6 shows the ICO2 of Braskem S. A. from 2010 to 2018. In 2011 and 2016, there were divergences regarding the values in the Braskem website and the inventory issued for that year. Shows that although 50 of the most traded companies in the IBrX-50 can participate in the B3 ICO2 ranking, this number was not reached in the years 2010, 2011, 2016, and 2019. Although the 2012-2015 and 2017-2018 rankings are not available, the number of participating companies has been decreasing.

Table 2. 2010 and 2011 GHG emission inventories of Braskem S. A.

YEAR	OPERATIONAL LIMITS	tCO2 emission	BIOGENIC CO2 EMISSIONS(t)	BIOGENIC CO2 REMOVAL*(t)
2010	SCOPE 1	9,233,668.00	0	0
	SCOPE 2	337,294.00	0	0
	SCOPE 3	0	0	0
YEAR	**OPERATIONAL LIMITS**	**tCO2 emission**	**BIOGENIC CO2 EMISSIONS(t)**	**BIOGENIC CO2 REMOVAL*(t)**
2011	SCOPE 1	8,911,770.84	27,073.741	0
	SCOPE 2	216,240.361	0	0
	SCOPE 3	9,976,357.48	12,834.36	0

Source: BRASKEM (2011).

Table 3. 2012 GHG emission inventories of Braskem S. A.

YEAR	OPERATIONAL LIMITS	tCO2 emission	BIOGENIC CO2 EMISSIONS(t)	BIOGENIC CO2 REMOVAL*(t)
2012	SCOPE 1	3,158,782.35	61.0	0
	SCOPE 2	16,235.96 0	0	
	SCOPE 3	658,051.85	645.0	0

Source: BRASKEM (2012).

Table 4. 2015 GHG emission inventories of Braskem S. A.

YEAR	OPERATIONAL LIMITS	tCO2 emission	BIOGENIC CO2 EMISSIONS(t)	BIOGENIC CO2 REMOVAL*(t)
2015	SCOPE 1	8,958,273.63	117.724	0
	SCOPE 2	494,195.82	0	0
	SCOPE 3	12,412.75	0	0

Source: BRASKEM (2015).

Table 5. 2018 GHG emission inventories of Braskem S. A.

YEAR	OPERATIONAL LIMITS	tCO2 emission	BIOGENIC CO2 EMISSIONS(t)	BIOGENIC CO2 REMOVAL*(t)
2018	SCOPE 1	8,936,750.02	476,814	0
	SCOPE 2: LOCATION	344,701.92	0	0
	SCOPE 2: PURCHASE CHOICE	251,421.79	0	0
	SCOPE 3	19,872,836.34	562,055.82	0

Source: BRASKEM (2018).

Thus, the B3 methodology for 2021 predicts that the IBrX-100 would replace the IBrX-50 to facilitate the admission of new companies that cannot be inserted in the indicator under the current methods. (B3, 2020).

And finally, failure to submit the emission reports is a valid reason to immediately remove a company from the ICO2, we observed that B3, the responsible supervisory body, has allegedly omitted and manipulated the compliance with the defined criteria, the process of monitoring these criteria, and the calculation method of the emission-to-revenue ratio. Current Brazilian legislation and the SOx Act require full transparency of assets traded in B3. However, the company does not publish the emission inventories of companies listed in the ICO2 on the grounds that these data should only be available to shareholders.

Regarding the limitations of the study, the lack of transparency about the company's CO_2 footprint compromises the development of efficient public policies that deal with economic, social, and environmental sustainability. UNDP and the SDG also reinforce the need for the applicability of the seven pillars of the economy, as well as for meeting the proposed objectives. Non-transparency may lead to foreign exchange fraud, increased risks of investments in the country, and as a consequence, the alienation of stakeholders.

In the absence of transparency, our analysis consisted of a case study on Braskem S. A. and an analysis of its financial reports and GHG emission inventories from 2010 to 2018. We were able to identify an incongruity between the ICO2 and the emission reports since there is no transparency regarding how much CO_2 was removed from the environment and how the carbon footprint calculation was carried out. When this Braskem reaches the ICO2/t product target, their image within the speculative scenario draws attention from new investors who believe that the company is developing new MDLs and clean technologies, when in truth, profit is preferable to effective actions for the decarbonization of the environment.

We found that B3 is capable of manipulating ICO2 values through the calculation methods adopted for the ICO2 weights, the IBrXt, the percentage of participation of companies in the ICO2 portfolio, and the possibility of expanding the number of companies that participate in IBrX-50 to IBrX-100 in 2021.

Table 6. ICO2 of Braskem S. A. (website and emission inventories) and ICO2 Ranking.

YEAR	ICO2/t product: Braskem website	ICO2/t product: GHG emission inventories – KPMG (BRKM S. A.)	ICO2 Ranking Number of companies – B3
2010	0.640	----	42 companies
2011	0.615	0.646	37 companies
2012	0.628	0.628	*
2013	0.630	0.630	*
2014	0.630	0.630	*
2015	0.604	0.604	*
2016	0.641	0.589	34 companies
2017	0.573	0.5733	*
2018	0.609	0.609	*
2019	*	*	28 companies

Source: B3 (2020)

The lack of transparency showcased by B3 when calculating the ICO2 compromises the reliability of an indicator that should represent a net gain for the environment. This contradicts B3's stated goal of a "low carbon" economy, which encourages companies with the most traded shares to measure, disclose, and monitor their GHG emissions.

Although B3 aims to provide the market with an indicator based on a portfolio that incorporates issues related to climate change, in practice, this does not occur. Companies can pollute without limitation and the little that is done in terms of decarbonizing the environment is not shown transparently. The lack of transparency also leads to the creation of a new derivative; since the carbon reducer of each company is not disclosed by B3, companies listed in ICO2 profit by diluting their risk of losses.

Conclusions

Considering that Brazil's Amazon Forest is considered the lungs of the earth and that flora and fauna must be preserved, his study shows that the bureaucracy of the different political, economic and social structures and the great and complex diversity of the Brazilian Ecosystem are not being contemplated with the current public policies. Although the Kyoto protocol has been signed by many countries, the global carbon market is not yet defined as an environmental commodity. It is necessary to structure and implement public policies for the single carbon market between countries in order to develop the Kyoto compliance and thus create an instrument for the regulation and oversight of the "pollute" license, making it possible to monitor and accompany the decarbonization of the environment worldwide. Through this study, we observed that the international governance practices agreed under the SOx Act are not being applied because B3 does not release data on the annual GHG inventories of the companies that are included in the ICO2 portfolio. We also reported the need for the creation of a Brazilian carbon market Regulatory Agency to transparently map Brazilian companies that invest in the environment, contribute to decarbonization, and profit from carbon credits.

The ICO2 method is flawed and non-transparent. Furthermore, a company that participates in B3's ICO2 has a competitive advantage in the financial market under a closed-market model. The method has proved to be a kind of speculative asset, since companies that participate in the IBrX-50 portfolio and voluntarily agree to compose ICO2 are perceived as "environmentally conscious" when they reach the target proposed by their emission report for the coverage period.

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