How a joint venture between large fuel companies can strengthen energy transition actions

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ABSTRACT
Extreme weather events, such as rain, dry spells, and heat waves, demonstrate that there is a change in the climate pattern on the planet. This phenomenon known as greenhouse gases (GHG) is a consequence of increased levels of respiratory gases that prevent the passage of sunlight. In this context, energy generation and its environmental impacts emerge as one of the precursor agents of this climate balance. The energy transition is fundamental, not only in generation, but also in transmission, consumption, and reuse. The article presents a case study of a joint venture between ALFA and BETA companies in the initiative to contribute to the theme of energy transition in the strategy of assisting the efficiency of ethanol produced by the company BETA. The partnership placed them at a privileged level in the ethanol market, the biofuel considered a key player in decarbonization in Brazil. The survey results, various ecological and environmental benefits for the two companies, such as reduced dependence on fossil fuels, environmental benefits, economic development, competition with other agricultural activities, and impact on food prices.

Keywords: Energy transition, Ethanol, Joint venture.

1 INTRODUCTION

Currently, you don't have to be an expert to notice that the planet is experiencing climate change. The frequency of extreme events, whether heavy rainfall, as recently observed on the northern coast of São Paulo, or through long periods of drought and heat waves, as has been happening in the northern hemisphere, demonstrates that there is a change in the climate pattern.

The occurrence of extreme events has a direct impact on the population, with a significant increase in the frequency of natural disasters in recent years. This fact is a consequence of atmospheric pollution, where polluting gases allow sunlight to pass towards the planet, as it retains heat, raising the temperature,

which consequently increases pollution and contributes to the worsening of the greenhouse effect (LIMA, 2022).

The authors decided to call the companies ALPHA and BETA, as they were not formally consulted to release the data, despite the fact that the research was carried out with information on their respective websites, reports and news from the websites of news companies.

Greenhouse gases, the so-called GHGs, include: Carbon Dioxide (CO2), Methane (CH4), Nitrous Oxide (N2O), CCF-12 and HCFC-22, with CO2 being the most important, given the impact due to its volume. Thus, due to the large participation of CO2 in the greenhouse effect, these are quantified in CO2 equivalent, $´CO_{eq}´$ or Carbon equivalent (BABARINDE and ADIO, 2020).

With an increase in the frequency of natural catastrophes, linked to the need for the world to present a response to the level of pollution on the planet, especially in relation to the greenhouse effect, the representatives of the countries came together for the first time after the Cold War, to outline global policies to reduce the levels of GHG emissions, in an event dedicated to the discussion of the theme. between June 3 and 14, 1992, in Brazil, known as ECO92.

In this context, an agreement was created to reduce the pollution of the planet, but not all countries made an effort to meet the established goals. The same is observed in subsequent agreements, such as Kyoto (1997) and Copenhagen (2009).

In 2015, a more comprehensive agreement was reached, the so-called Paris agreement, which, according to the website of the Ministry of Science, Technology, Innovation and Communications, governments committed to act to keep the increase in the global average temperature "well below" 2 °C compared to pre-industrial levels and to make efforts to limit the increase to 1.5 °C. To this end, countries have submitted comprehensive national action plans to reduce their emissions through the formulation of their Nationally Determined Contribution (NDC). The Brazilian government committed in its NDC to reduce greenhouse gas emissions by 37% in 2025, with a subsequent indicative contribution of a 43% reduction in 2030, compared to estimated emissions levels for 2005.

This goal of limiting the increase in global temperature to 2 °C by 2050 was eventually revised to 1.5 °C in 2021 at COP26 that was held in Scotland, and it was also agreed to reduce global carbon dioxide emissions by 45% by 2030, compared to 2010, and to achieve CO2 neutrality by 2050 (BBC, 2021).

It is in this scenario that the energy transition emerges, as a phenomenon that is occurring in response to the need to seek energy sources that generate fewer greenhouse gases (GHG) and, consequently, that have less impact on people and the environment (LIMA, 2022).

The energy transition is a paradigm shift that involves not only the generation of energy, but also the consumption and reuse of it.

According to the Energy Balance of Brazil, in 2022, our energy matrix is divided into: hydroelectric 60.9%, wind (11.4%), biomass (8.8%), solar (2.6%), fossil (16%) and nuclear (1.1%), this distribution is well balanced compared to other countries. This Brazilian condition, although favorable, we understand that there is a need to intensify the insertion of renewable sources. One of the options would be ethanol, which is an old acquaintance of Brazilians, since since the 70's research has been carried out seeking the economic and technical feasibility of this clean and renewable energy source. Ethanol meets the full conditions to place the country as a protagonist in the high-level dialogue of the energy transition.

In recent years, it has been observed that society has been seeking the use of energies defined as clean, such as: hydrothermal, solar, wind and hydraulic, replacing the energies produced by sources that emit more carbon.

According to Lima and Hamzagic (2022), ethanol emerges IN BRAZIL AS AN ALTERNATIVE TO GASOLINE, GIVEN THE GLOBAL OIL CRISIS OF THE 1970S. FOR THEM, THERE WAS A FOCUS ON HIGHLIGHTING BRAZIL'S NATIONALISM AND PROTAGONISM, AS THIS FUEL IS IMPORTANT FOR THE DECARBONIZATION PROCESS, SINCE THE PHENOMENON OF PHOTOSYNTHESIS CAPTURES ATMOSPHERIC CARBON THROUGH PLANTS DURING THEIR DEVELOPMENT, PROVIDING A BALANCE IN THE CARBON CYCLE, BECAUSE DURING THE BURNING OF THIS FUEL, CARBON WILL BE RELEASED INTO THE ATMOSPHERE. ETHANOL CAN BE USED IN TWO WAYS FOR COMBUSTION ENGINES: ANHYDROUS ETHANOL, WHICH SERVES AS AN ADDITIVE TO GASOLINE; AND, HYDROUS ETHANOL, WHICH IS USED DIRECTLY IN THE FUEL TANK COMPLETELY AUTONOMOUSLY.

In this context, the present work aims to address the aspects of the expansion of ethanol commercialization, as an alternative for decarbonization in the energy transition scenario, carrying out the case study of the company ALFA in the Oil & Gas sector based in Rio de Janeiro, with several terminals spread throughout the country.

2 METHODOLOGY

The methodology chosen for this work is the case study, because, as Yin (2010) explains, it is a method that enables the delimited specification of the research object, so that the researcher is able to deepen and act on a given reality. In this case, a study will be carried out on the strategy to expand the commercialization of ethanol by ALFA.

In order to obtain the answers and results about the study, it was also necessary to review the literature that made it possible to explain the universe of scientific contributions of authors on specific themes.

The analysis was an applied research, which focuses on the problems present in the activities of institutions, organizations, groups or social actors.

The study is also qualitative, with emphasis on observation and documentary study. The data were consulted on the websites of the Brazilian government and the state of São Paulo, among others.

3 DEVELOPMENT

The study aims to take advantage of a strategic advantage and dominance in the production of Ethanol in Brazil to boost ALFA's energy transition with a solution already known and fully technically and economically viable. It already had around 17% ethanol *market share* in 2021 according to data from CADE (2021) and in August 2021, ALFA closed an agreement with BETA to form a *joint venture*, which resulted in the company XYKM.

XYKM has become the largest ethanol trader in Brazil and operates in a collaborative and integrated manner, generating shared value by overcoming the challenge of offering clean and renewable energy on a large scale, to the entire country and the world.

According to the companies, XYKM will operate with the open platform model, enabling access to all interested agents. Its purpose is to "enable solutions, integrate, bring scale and efficiency to the market, shortening the distances between ethanol producers and consumers throughout the country, as ethanol should be one of the major protagonists of the global energy transition process, which opens up "a range of possibilities" for XYKM.

With an annual movement of 6.5 billion liters of ethanol in the distribution activity, the 4.5 billion liters produced by the 33 plants linked to BETA are now added. This volume categorized it as the largest ethanol origination and trading platform in Brazil and one of the largest in the world.

The *joint venture* gained scale, bringing greater competitiveness and opportunities for synergies in operations, as well as better operational controls, greater inventory loading capacity and constant monitoring.

This partnership brought the producer closer, allowing a broad view of all the chain's processes. Under the agreement, ECE (Ethanol Trading Company) is free to buy ethanol in the market and not only from BETA, as well as can sell ethanol to customers other than ALFA, including other distributors, in order to increase its capillarity and coverage in the ethanol market. In addition, the *joint venture* became responsible for ALFA's ethanol import and export operations.

3.1 SUSTAINABLE DEVELOPMENT GOALS

When it comes to an article on energy transition, it is important to highlight the concept of Sustainable Development Goals or SDGs. According to the website of IDIS - Institute for the Development of Social Investment, in 2015, the United Nations General Assembly (UNGA), composed of 193 UN member states, defined 17 interconnected global goals and 169 targets, to be achieved by 2030 – as the

"2030 Agenda" became known. Based on four main dimensions: social, environmental, economic and institutional, the SDGs argue that it is necessary to take the world to a sustainable path with transformative measures.

The Agenda includes actions in the areas of poverty eradication, food security, agriculture, health, education, gender equality, reduction of inequalities, and many other topics. There are issues that depend on the action of governments and large global companies, but there are also more specific recommendations, with a focus on the communities and specificities of each part of the world.

To answer how the SDGs came about, we first need to contextualize the 2030 Agenda. It emerged from a global participatory process of more than two years, initiated in 2013 and coordinated by the UN, in which governments, civil society, the private sector and research institutions contributed through the "*My World*" Platform.

Its implementation began in January 2016, continuing the Millennium Development Agenda (2000-2015). To achieve such bold goals, the action plan was designed in four main steps:

1st: Construction of a declaration, where the vision, principles and commitments of the 2030 Agenda were documented.

2nd: Creation of the Sustainable Development Goals.

3rd: Focus on the monitoring and evaluation of the 2030 Agenda, "fundamental for its implementation and should be done systematically at the global, regional and national levels," according to the document.

4th: Implementation of these objectives and, to this end, defined goals that deal with the necessary means for the execution of the Agenda. Coincidentally, they are the same as those envisaged in Goal 17 of the SDGs.

Therefore, the adoption of biofuels such as ethanol corroborates the following SDGs, proposed by the UN:

Table 1 – Sustainable Development Goals with the adoption of Ethanol

ODS	Description
3	Ensuring healthy lives and promoting well-being for all at all ages.
7	Ensure reliable, sustainable, modern and affordable access to energy for all.
8	Decent Work and Economic Growth - Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all.
9	Infrastructure innovation – Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation.
11	Make cities and human settlements inclusive, safe, resilient and sustainable.
12	Responsible consumption and production - Ensure sustainable production and consumption patterns.
13	Take urgent action to combat climate change and its impacts.
14	Life below water - Conservation and sustainable use of the oceans, seas, and marine resources for sustainable development.
15	Life on land - Protect, restore and promote the sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation and halt biodiversity loss.

17	Partnerships and Means of Implementation - Strengthen the means of implementation and revitalize the global partnership for sustainable development.

Fonte: IDIS (2023)

3.2 CONTEXT OF ETHANOL IN BRAZIL

Ethanol is a widely used biofuel in Brazil, produced from sugarcane. Its history dates back to the 1970s, when the country began developing a program to replace fossil fuels with renewable energy sources.

Ethanol already represents more than 25% of the entire energy matrix used for transportation, according to the Valor Econômico newspaper (2022) of the Globo publishing group. There are more than 30 billion liters produced annually, which guarantees enormous economic, social and, above all, environmental gains to the country. And thanks to the technological advances currently underway, ethanol could gain an even bigger role in this race against climate change.

Its use as a fuel has been consolidated in Brazil as a strategy for energy security and reduction of greenhouse gas emissions. The country is one of the largest producers and consumers of ethanol in the world, with a fleet of *flex-fuel* vehicles that can use both gasoline and ethanol as fuel.

In the energy transition, ethanol continues to play an important role as an alternative to fossil fuels. However, there is a growing demand for cleaner and renewable energy sources, such as electricity generated by renewable sources and green hydrogen.

To accompany this transition, the Brazilian ethanol industry is investing in more efficient and sustainable production technologies, such as the production of second-generation ethanol from agricultural and forestry residues.

According to the Agribusiness Portal website, the challenge now is to produce in a sustainable and economically viable way a second-generation biofuel, popularly known as ethanol 2.0, originated from agro-industrial waste, such as sugarcane bagasse and straw, capable of increasing production by up to 50% while reducing greenhouse gas emissions emitted throughout the production process by about 30%.

Ethanol 2.0 is produced from residual sugars present in sugarcane after processing for the production of conventional ethanol, which are more difficult to extract. In this case, advanced sugars are obtained through the use of microorganisms and enzymes – after the biomass is treated, the material goes through a fermentation process, is distilled and transformed into second-generation ethanol. This will require a high initial investment to adapt the processing plants, where currently only two of the approximately 350 ethanol processing plants installed in the country are able to produce the second-generation biofuel.

In addition, in order to be truly sustainable, the sugarcane production process must not cancel out the benefits generated by the reduction in CO2 emissions and, therefore, must not compete with other foods, must not promote new deforestation, and must not cause disturbances to the environment where it is produced.

In the state of São Paulo, for example, old pastures are being replaced by sugarcane plantations, where there is also a great deal of concern about pesticide use in farming and the damage they can cause to the environment and to the farmer. Labor, when replaced by mechanized labor, also requires adaptation and training, in order to minimize the issue of unemployment.

The impacts of a new monoculture on the environment must be evaluated and the management of the entire process must be controlled, so that a reduction in greenhouse gases is truly guaranteed, maintaining the economic and environmental viability of the process .

According to the website of the Secretariat of Environment, Infrastructure and Logistics of the Government of São Paulo, which talks about the Greener Ethanol Protocol, the main environmental impacts resulting from sugarcane activity are:

- Use of the practice of harvesting through the burning of sugarcane straw and fire-related accidents in undesirable areas;
- Soil loss due to water erosion;
- Accidents related to the contamination of water resources through the improper management of pesticides;
- Excessive water consumption in industrial processes;
- Generation of air pollutants;
- Generation of vinasse and possible contamination of watercourses with inadequate management of this by-product;
- Implementation of large monoculture areas resulting in the formation of extensive continuous spaces for sugarcane planting;
- Suppression of riparian vegetation of water bodies and springs and cutting down of isolated individuals, and the consequent reduction of biodiversity, both flora and fauna.

Brazil is the pioneer in the use of ethanol, ethyl alcohol, and the second largest producer in the world, behind only the United States. Despite being a renewable fuel, its production is not considered completely ecological.

According to the website "Pensamento Verde", if on the one hand ethanol emits up to 25% less pollutants than gasoline, on the other hand, there is the issue of the need for large areas for vegetable planting. In Brazil, sugarcane is the raw material used in the production of ethanol, while North Americans obtain it from corn.

The main benefit of ethanol is that it is a clean and renewable alternative to gasoline, which is derived from petroleum, a finite mineral resource that releases carbon dioxide and contributes to pollution. With a simple technology, any country can produce it, as long as there are minimum conditions, such as land for planting, sun and rainfall. It can be used pure or mixed with fossil fuels, this biofuel can also be obtained

from soybeans, corn, castor beans, canola and babassu. Another advantage of ethanol is the lower price when compared to other fossil fuels, in the price charged to the final consumer in the national gas station networks, as published in the "Synthesis of the Behavior of Fuel Prices" by the ANP (National Oil and Gas Agency) on a weekly basis.

Also according to the Pensamento Verde website, there is an indication as a disadvantage of the use of ethanol, the need for large tracts of land for planting, which can contribute to the increase of hunger in the world, since these areas could be destined to the production of food for people. The search for new plantation land to meet growing global demand may also increase deforestation of forests. Another negative point is the environmental degradation caused by the use of fertilizers and pesticides in the sugarcane crop and by the management of waste generated in production, such as wine. The energy yield of ethanol in a car is also lower when compared to gasoline, and its use is advantageous when the value of the liter of alcohol is less than 70% of the price of gasoline.

Given ALFA's geographic reach and expertise in logistics, storage and fuel distribution, strengthening the energy transition to greater ethanol distribution is a strong point for it.

Despite being a protagonist in the distribution of fuels, the company is inserted in a sector that is undergoing major transformations, both regulatory and structural, within the scope of the energy transition. The challenges, in this sense, include facing society's growing concern regarding aspects of Sustainable Development and centralizing action on the consumer.

Another aspect that may signal a weakness is the changes in market dynamics and preferences, which are fundamental elements for defining the company's operating strategies. The trend towards a cleaner energy matrix is an undeniable reality. This trend can be especially detrimental to companies whose *core business* is the distribution of fossil fuels, so several fronts are being conducted to expand their product portfolio, with the ultimate goal of improving their strategic positioning, mitigating threats and seizing opportunities.

Another weakness to which ALFA is subject is that the sales volume is influenced by taxation and production relative to the states, which directly influences strategic decision-making at the national level The company is subject to regulations from various regulatory agencies, environmental, health and safety authorities and industry standards, which are increasingly stringent.

In addition, as an economic risk, the potential loss of revenue and the increase in logistics expenses due to climate change, in regions affected by periods of heavy rainfall. The occurrence of extreme weather events, such as floods, cyclones and large fires, are always present warning points at the company's facilities, especially at storage bases, where a large amount of flammable and polluting products are stored.

According to ALFA's 2020 Sustainability Report, the company presented a performance indicator that is directly related to the energy transition: the reduction of greenhouse gas emissions. The company

reported a 13.5% reduction in emissions compared to the previous year, reaching a total of 25,708 tonnes of$_{CO2eq}$ in 2020. Therefore, ALFA presents performance indicators that demonstrate its commitment to the energy transition and the reduction of greenhouse gas emissions.

Metrics used by the organization to assess risks and opportunities related to climate change according to its strategy and risk management process.

- Absolute GHG emission (tCO2eq)
- GHG emission intensity (tCO2eq/BOE – barrels of oil equivalent)
- Power Consumption (GJ)
- Energy Consumption Intensity (GJ/GJ)

3.3 ANALYSIS OF ENVIRONMENTAL, ECONOMIC AND MARKET IMPACTS

The Strategic Agenda for Sustainable Development prepared in the first quarter of 2022, built with the participation of ALFA's leaders and key employees and discussed with the board, established the goals of neutralizing carbon emissions from scopes I and II (direct emissions from the activity and indirect emissions from the company's energy use) by 2025, and scope III (indirect emissions from the activity) by 2050.

With this new direction, according to ALFA, the goal is to deliver the most appropriate and sustainable energy to customers and, at the same time, the most efficient and affordable, in the place where they need it, in addition to helping B_{2B} (*business to business*) customers to also meet their emission reduction goals and objectives.

To talk about revenue growth, it is important to mention the acronym EBITDA, which comes from English: *earnings before interest, taxes, depreciation and amortization.* In Portuguese, it is also known as EBITDA, or earnings before interest, taxes, depreciation, and amortization. ALFA expects revenue growth of around 30% and EBITDA growth of 50% in the coming years, with between 20% and 30% of the result coming from new business.

However, with the substantial increase in ethanol sales, there may be a drop in gasoline sales, directly impacting the volume of purchases of this fossil fuel directly with Petrobras or with the importing market, causing a price increase, which can be passed on to consumers, or changing profit margins.

As previously reported, the partnership with BETA brings gains to both companies, as it strengthens the chain from production to supply, distribution and marketing.

4 CONCLUSIONS

The partnership between ALFA and BETA, which resulted in the creation of XYKM in July 2022, aimed to produce and sell ethanol in a more efficient and sustainable way, through the integration of the production chains of the two companies. During the research for this work, we have not yet obtained quantitative results, but the objective was certainly to strengthen the position of the two companies in the ethanol market, which is of great importance to the Brazilian economy.

The paper described how the expansion of the production, distribution and use of ethanol as a vector of the energy transition can bring several consequences to Brazil and the world. Possible conclusions include:

- Reducing dependence on fossil fuels: Ethanol is a renewable energy source and can replace, in part, gasoline and diesel. With its expansion, there is the possibility of reducing countries' dependence on fossil fuels, decreasing price volatility and increasing energy security.
- Environmental benefits: Ethanol is considered a cleaner and less polluting biofuel than fossil fuels. Its production can contribute to the reduction of greenhouse gas emissions, reducing the negative environmental impacts of the transport sector.
- Economic development: Ethanol production can generate jobs and income for producing countries, in addition to contributing to the development of technologies and innovations in the area of biofuels.
- Competition with other agricultural activities: Ethanol production competes with other agricultural activities, such as food production. It is necessary to have public policies to ensure the sustainability of production and avoid conflicts with other activities.
- Impact on food prices: The expansion of ethanol production can influence food prices, especially those that use the same raw materials. There needs to be a balance between biofuel production and food production to avoid negative impacts on food security.

Given all that has been explained, the creation of *the XYKM joint venture* in July 2022 was the best choice for ALFA's growth as one of the participants, both for the positive environmental example, environmental marketing, contribution to reducing the use of gasoline, and the strengthening of the activities in which it already dominates: logistics and fuel distribution.

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