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Barriers to companies' entry monopolized markets: wind energy generators

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ABSTRACT: *Brazil has great potential for the generation of renewable energy, increasing the diversity of the energy matrix, reducing dependence on hydrographic variations and the use of products that harm the environment. Wind energy is one of the fastest growing energy sources in the world and in Brazil, however, in the country, it still has an incipient generation park due to the lack of infrastructure for its flow, and, in part, due to the global financial crisis. Associated with this condition, during the COVID-19 pandemic period there was a decrease in investment in renewable energies, due to the reduction in industrial and commercial activity, which consequently led to a drop in energy consumption. There are some barriers that hinder the entry of new competitors such as technological, environmental, geopolitical, financial, and socioeconomic factors. The objective of this work is to demonstrate the main barriers to the entry of new competitors in wind energy generation. The methodology used was the bibliographic research. The results obtained suggest a significant barrier to the entry of new competitors, enabling exclusivity in concession contracts in a specific area of wind energy exploration, however this energy matrix represents an economic and sustainable expansion where barriers must be overcome to leverage the country's development.*

KEYWORDS–*Brazil, Defense of competition, Energy matrix, Infrastructure, Renewable energy use.*

I. INTRODUCTION

Electric energy is essential for society and indispensable for human life, interfering in its daily life and in various aspects and activities, constituting one of the pillars responsible for the technological and economic development of a nation. The way it is produced can interfere with the quality of life of future generations, especially when it impacts the environment and the sustainability of the planet [1,2].

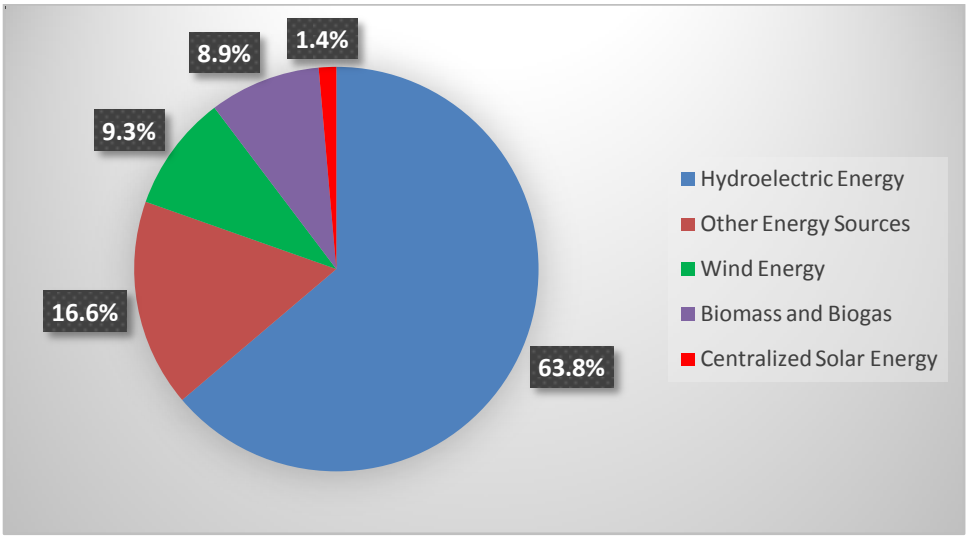
Sustainable development was a concept launched in 1978 that had among its objectives to guide policies aimed at balancing environmental and economic conditions that will configure a gain for society and the planet, which will stimulate the production of clean energy and consequently reducing greenhouse gas emissions [3].

The development model of the Brazilian energy matrix tends to diversify with the use of other means that do not harm nature and are inexhaustible and/or renewable, essential requirements for human sustainability, reduce the emission of gases that generate the greenhouse effect, responsible for the climate changes currently observed in the world, taking into account security of supply, incentive policy, technological development and efficiency [4].

"Renewable energies are those obtained from inexhaustible natural sources, either because of the immense amount of energy they contain, or because they are able to regenerate by natural means". The same author defines non-renewable sources as follows: "they are those that are limited by nature in time. Well, after all, depleted stocks cannot be replaced since there is no economically viable production or extraction system" [5].

Brazil has a technical potential for renewable energy sources such as centralized solar (1.4%), wind (9.3%), biomass and biogas (8.9%) and hydroelectric (63.8%), which represents about of 83% of the total energy matrix, as shown in Figure 1 [6].

Figure 1 – Brazilian energy matrix



Source: Own authorship (2022)

The sources of electricity production have the following emission values of Carbon Dioxide Equivalent (CO_2E) [5].

Table 1 - Equivalent Carbon Dioxide emission values

Type	Source	Emission of CO_2E/kWh
Non-renewable	Natural gas	Between 0.6 and 2.0 pounds
	Coal	Between 1.4and 3.6 lbs
Renewable	Wind Energy	Between 0.02 and 0.04 lbs
	Solar energy	Between just 0.07 to 0.2 lb
	Geothermal energy	Emits only 0.1 to 0.2 lb.
	Hydroelectric Energy	Emits between 0.1 and 0.5 lb

Source: Authorship based on [5]

Table 1 shows that wind energy is the one with the lowest CO2E emissions, impacting the environment 15 times less than the use of natural gas, 35 times less than coal and 2.5 times less than hydroelectric power.

The term wind energy is derived from the Latin aeolicus, which is related to Aeolus, who in Greek mythology represents the god of wind. Wind-derived energy has been used since prehistoric times to move vessels in ancient Egypt and in antiquity it was used by the Persians to pump water and grind grain. During the Industrial Revolution, fossil fuels grew because of the need to increase production to meet the demand for industrial products [7].

The production of wind energy is carried out from the forces of the winds, which is abundant in Brazil and mainly in the Northeast Region and on the coast, it contributes to the socioeconomic development of the country and the places where it is implanted, because, due to the responsibility and environmental awareness it

is not always possible to deploy hydroelectric plants. The energy is generated by means of a wind turbine, which captures the force of the winds through propellers connected to a turbine that drives an electric generator, transforming the force of the winds, which produces kinetic energy, into electricity [3, 6].

Wind energy is an inexhaustible, indigenous energy matrix and considered a "clean" energy source, as it does not emit pollutants or atmospheric contaminants, does not release greenhouse gases, does not generate hazardous waste, and only impacts the local population and environment. of its installation, in addition to being considered a green and sustainable energy resource and these characteristics make it one of the most promising natural sources of electricity [3, 8]. Another advantage of this energy matrix is that they do not need water to function, and this condition will not overload the water supply or compete with other activities in which this resource is essential, in addition to not having the capacity to pollute water resources [3].

Another impact of the installation of the wind energy tower is that it can cause the collision of migratory birds or not that have the production towers in their path and can also serve as a nesting place for birds. The biggest impact is visual, as some tower assembly sites may have scenic, environmental, historical, cultural or touristic values. Noise is impactful for those who have a home close to the tower, as it is intermittent and varies in frequency according to wind speed. In some facilities there is a need to open new accesses for the passage of residents[3, 8].

There is a global growth in the use of energy generated by wind power, which requires financial capital from companies and the allocation of resources for the development and research of new technologies, with a view to the sustainable development of the sector and competitiveness.

The Brazilian Northeast is a region socially characterized by poverty, lacking energy distribution and with great potential for the installation of a wind farm, due to the abundance and strength of the wind in the region, standing out as the place with the highest installed capacity. This region also has potential for the growth of solar energy in the interior and tidal energy on its coast [3].

The capture of wind energy in Brazil shows a high growth due to the auctions carried out by the government in recent years, which increases the capacity of the national energy matrix, mainly from clean sources, which do not harm the environment. The estimated job creation potential by 2020 will be 11,000 permanent jobs, not including the temporary jobs arising from the installation of wind farms [9].

The competitiveness between companies is healthy, as they tend to use different strategies to achieve the same objective as their rivals, in order to deliver greater value to customers at a lower cost, offering specific products for the needs of product users, improving operational efficiency. and increasing its profitability [10, 11].

Entry barriers relate to the obstacles that entrants to a given market need and must overcome to occupy a given segment that is already occupied by a competitor [12].

The main entry barriers are the following: economy of scale that is obtained with the growth of a business; product differentiation (loyalty, brand, service); need for capital (need to make large initial investments with uncertain returns); switching costs (situations in which, in order to adopt new products from new competitors, consumers have to incur additional costs to allow the use of these new products); access to distribution channels (situations in which companies already installed already occupy all or a substantial part of the distribution channels, through exclusive contracts with distributors); scale-independent cost disadvantages (technology, access to raw materials, favorable locations, official subsidies, learning curve, etc.); government policy (eventual legal restrictions may prevent or limit, under certain circumstances, the access of new companies to certain segments) [12]

One of the major entry barriers for new competitors is the existing relationships between customers and wind turbine blade manufacturers, as new entrants still do not have enough references about their product in order to impose themselves on the market and nor corporate experience, which induces some companies to acquire wind farms to introduce their equipment and serve as a marketing and reference for their insertion in the market [13].

This work aims to discuss the concept of entry barrier in the wind power generation sector in Brazil, in order to highlight its importance, especially in segments where there is economic concentration. In each

industrial segment, the entry of new competitors is hampered by the existence of certain obstacles that companies face in establishing themselves. Barriers to entry can be higher or lower depending on the industry in question. Therefore, knowledge of these barriers becomes a factor of fundamental importance for the implementation of strategies, as well as one of the main determinants of the competitive performance of companies.

II. METHODOLOGIES

The scientific method concerns a set of procedures and techniques with the objective of achieving the desired knowledge, being used in the present work a bibliographical review aiming to develop and clarify ideas and concepts in order to formulate problems directed to studies later arrive at a certain forecast [14].

The methodology used was an exploratory survey referenced with bibliographic and scientific documents to support its construction, providing greater familiarity with the researched theme, making it explicit. The purpose of the descriptive research was to identify the characteristics of a certain phenomenon.

The information was obtained through academic literature, which is available in books, scientific articles, monographs, dissertations, and theses, which were accessed through the internet, which characterizes as bibliographical research, since all the bibliographical survey in materials already published and available it is called bibliographical research [14, 15].

III. ENTRY BARRIERS

Entry barrier is the degree of difficulty for potential competitors to enter a given market. When a barrier is lifted, a threat is created for the company that is in a dominant and/or monopolistic position, which will influence its strategy, actions, and reactions against the competitor.

For wind power generation companies, the barrier to entry is high, as the market is concentrated in a few companies, some of them monopolists in the exploration region, where they create their entire tower assembly structure, originating in satellite companies and integrated into the surroundings, aiming at the supply of components, preferably using local labor. In the case of turbine companies, the barrier is high because external financing from the banking sector is aimed at those who have a project to manufacture 100 or more turbines per year [16].

In order to avoid concentration and predatory behavior, Brazil holds energy auctions, but creates a certain monopoly in a region to be explored, where the winner has exclusivity in supplying the energy necessary for the country's development, despite attracting many bidders with the possibility of reducing the price offered. The presence of foreign companies in auctions, regardless of whether their capital is public or private, is a relevant factor, as they tend to be more aggressive in their strategies, not worrying about the percentage of return on invested capital, which may be lower than those envisaged by companies with national capital [17].

The analysis of entry barriers in each industrial segment aims to identify and evaluate the determinants of its performance, which was developed by theorists Joe Bain and Paolo Sylos-Labini in the 1950s, serving as a basis reference for the creation of the Structure-Conduct-Performance (ECD) paradigm [18], which is represented in Table 2 below:

Table 2 - Structure-Conduct-Performance Model

ANALYTICAL SCHEME		
STRUCTURE	CONDUCT	PERFORMANCE
Number of producers	Pricing policy	Efficient allocation of resources
Number of buyers	Product strategy	Meeting consumer demands
Product differentiation	Sales strategy	Technical progress
Entry barriers	Spending on research and development	Contribution to enable the full use of resources.
Cost structures	Investments in productive capacity	Contribution to an equitable distribution of income
Vertical integration		Degree of monopolistic restriction of
Degree of diversification.		

Attitudes towards rivals	production Profit margins.

Source: Adapted from [18]

Therefore, it is necessary to identify the structural factors that condition companies' behavior in setting prices, in order to avoid situations of abuse in raising profit margins, with consequent harm to consumers. In markets where companies have the power to decide the price to be charged [18], this price and the profit margin will be higher:

1. If the conduct of existing firms in the market shows a high degree of coordination, either through tacit agreements, price leadership or cartelization;
2. If the exposure of these companies to potential competition is high, that is, the threat of new competitors entering, attracted by the profit margins practiced in the market [18].

In markets where there are a small number of companies, coordination and collusive behavior is easier. The entry of a new company in a certain segment induces a new productive capacity and the existing companies tend to lose a slice of their market to the competitor, which adjusts to a new level of production and sometimes to a demand [18].

Companies that belong to the segment with a high entry barrier are able to charge higher prices, which led Brain to formulate the limit price theory, which establishes a direct relationship with the level of existing barriers, because the higher they are, the higher the price and, consequently, the higher the profitability [19]. The entry equation of a new competitor can be verified as follows:

$$E = \frac{(LP - PC)}{PC}, \text{ where:} \quad (1)$$

E = matches input condition

LP = limit price (maximum that can be charged by the firm without attracting new competitors);

PC = price that would be charged in a competitive market (with normal profits).

Analogously, we have: LP = PC (1 + E), where it is observed that the limit price tends to be high due to a higher oligopolistic price, where a large portion of the market behaves in a collusive manner, avoiding as soon as other competitors want to enter this type of market. The established company may adopt low price policies, forcing potential entrants to suffer losses if they decide to enter this segment.

Entry barriers have the following properties:

a) are mutable,e.g., patent expired or technology change;
b) strategic decisions can overcome barriers; ex.: having a good market positioning, strengthening relationships, improving logistics, offering more added services;
c) if there are no good strategic decisions, the necessary efforts, risks and costs to enter and remain in the market increase,e.g., giving risky prisoner discounts, investing a disproportionate amount in advertising;
d) resources and competences used in a business unit, in a product or in a functional area (eg commercial department) can be transferred to the operations with the new products or business units, sharing the costs and improving the processes;
e) can be adapted for the analysis of established competitors, working as barriers to the permanence of these competitors [19].

3.1 ECONOMIES OF SCALE

It is related to the size of the market and the minimum scale that makes the operation of a potential entrant economically viable, who expects the product offer to increase substantially, in order to eliminate extraordinary profits, making the operation in the segment attractive.

Its effects on potential competition depend on entrants' expectations about the reactions of established firms in the event of entry, as well as on established firms' expectations about the likely behavior of entrants.

For the established dominant firm, one of the strategies is to dimension the capital stock and the productive capacity in order to influence the decisions of the potential entrants, having a little idle capacity, in a way that this condition constitutes a threat and an aggressive reaction in relation to the incoming company, because its fixed costs tend to increase as a result of the reduction in its sales.

For the entrant, this condition will reduce its accommodation capacity and it will have difficulty occupying its capacity, thus becoming dissuaded from operating in that market.

Economies of scale are classified as real and pecuniary. Savings are pecuniary when there is a reduction in the price paid for the input, due to its purchase in greater quantity. The real economy of scale is explained by the reduction in the number of productive inputs used when there is an increase in production, since the amount of raw material needed for the process does not grow in the same proportion.

Real scale economies are of three types:

1. Techniques: when they result in the use of more efficient equipment;
2. Managerial: when they result in the division of management costs due to increased production.
3. Specialization: are those that occur because the greater the quantity of product to be manufactured, the greater the division of labor and, consequently, the greater the specialization of each worker in his task, which results in greater productive efficiency [18].

3.2 PRODUCT DIFFERENTIATION

This condition is due to the presence of elements that induce the consumer to have a defensive action in relation to new products, afraid of taking a risk on what is new and unknown and does not see any advantage in the consumption of similar products from entrants in relation to products already existing and known. Some consumers maintain loyalty to some brands, and, in this case, it is difficult for the entrant to convince them to switch brands and products.

New entrants tend to spend a lot on advertising to make their product known and accepted by consumers and the market. It also has a high expense over a long period of time to convince the consumer of the durability and quality of your product.

Another strategy used by entrants is to choose to sell their product at a price lower than that charged by established companies, which will impact their profitability and this condition is not sustainable for a long time.

In some cases, product differentiation can be a factor that favors an entrant, as its product can be innovative, which can attract new consumers by offering products with different characteristics from those existing in the market. Product differentiation is seen as the strongest barrier compared to the others, as there is the possibility of creating advantages for the established company, because it already knows the tastes and preferences of its consumers, directing its product to satisfy them.

3.3 CAPITAL REQUIREMENT

The installation of a company in the market requires a high initial investment, which constitutes an entry barrier in a given segment. Admission involves the creation of a new capacity and this condition involves the application of investments, the value of which is linked to the variables resulting from the technology to be used and the capital/product ratio, which can make it difficult to raise funds, since holders of capital may be reluctant to make the money available or may want to charge higher interest due to the risk inherent in the activity. There can also be resistance from capitalists when the firm does not have an established reputation.

Established companies have a lower cost of raising capital because they are more able to use their own resources to finance their projects.

3.4 COSTS OF CHANGE

In some cases, the incoming company can enjoy advantages over the already established ones, as it will be able to plan and build a unit with the latest technology, with state-of-the-art technical solutions and producing at a lower cost, which can be a differential in in relation to established companies, which may have a higher cost to adapt to legislation and new technologies, as sometimes their park is obsolete compared to more modern ones

and sometimes manufacturing products with higher costs. This condition can be a positive factor for entrants, which can reduce other cost advantages of established firms.

3.5 ACCESS TO DISTRIBUTION CHANNELS

Distribution channels are other obstacles for entrants, since companies established in some segments sign exclusivity contracts, making it difficult for entrants to use this channel. The presence of distribution practices and channels tends to limit the use of certain forms of consumer access by entrants.

3.6 COST DISADVANTAGE INDEPENDENT OF SCALE

The technology is already available to established companies, as there are legal mechanisms to protect intellectual property such as patents, and some products are not easy to copy due to lack of technological knowledge on the part of potential entrants and the complexity and presence of elements tacit.

New entrants tend to pay more for their inputs or may resort to imperfect substitutes, because in some cases, the established company has already verticalized its process to lower costs and reduce dependence on suppliers, not becoming a hostage and not paying a higher amount. high in the acquisition of these inputs, which will directly impact costs. This condition will oblige incoming companies to obtain more resources to meet their demand.

Another positive factor for established companies is that, due to exclusivity contracts or purchases in large volumes, the cost of raw materials is cheaper than the price offered to entrants. Established companies have qualified and trained human capital, and newcomers will find it difficult to obtain this type of qualified capital, which will create difficulties in recruiting adequate personnel to run their business efficiently, since they will be obliged to pay salaries superiors to attract this workforce.

3.7 GOVERNMENT POLICY

Governments adopt policies to support renewable energies, in addition to fiscal, economic, and regulatory incentives, due to economic and technical barriers. This incentive leads to an increase in the participation of this type of energy in the energy matrix and aims to increase the competitiveness of the economy and improve energy efficiency, the integration of environmental objectives and security of supply.

In 2001, the government created the Emergency Wind Energy Program (PROEÓLICA) with the aim of encouraging the hiring of wind power generation projects, however, this program was unsuccessful and was replaced by the Program to Incentive Alternative Sources of Electric Energy. (PROINFA), which encouraged the development of renewable sources of energy matrix, in addition to stimulating the establishment of the components and wind turbines industry. The incentive program for alternative sources of electricity was instituted by Law 10,438 of April 26, 2002, and Decree No. 5,025 of March 30, 2004.

PROINFA allowed the component and wind turbine industries to settle in Brazil, with the requirement of a nationalization level of 60% (value and weight), which in turn encouraged the emergence of a productive supply chain for wind turbines , which was later replaced by the requirement of 60% of the project, enabling the emergence of a network of component suppliers such as foundries and tower factories, resulting in the generation of direct and indirect jobs.

Environmental licensing is obtained based on the results of preliminary studies such as: Previous Environmental Impact Studies (EPIA), Environmental Impact Study (EIA) and Environmental Impact Report (RIA). To receive the license, companies prepare environmental studies and send them to the Brazilian Institute of the Environment (IBAMA) for evaluation and license granting.

To obtain the license, the enterprise goes through three stages:

1. Prior Licensing (LP) – which must be requested from IBAMA in the implementation, alteration or expansion phase. This document approves the environmental viability of the project, authorizes its location, technological design and establishes the conditions to be considered in the development of the executive project.

2. Installation Licensing (LI) – which authorizes the start of work or installation of the project. If there is a need for deforestation, the enterprise must request the Vegetation Suppression Authorization.
3. Operation Licensing – which must be requested before the enterprise enters into operation. Its concession is subject to an inspection in order to verify that all the requirements and technical details described in the approved project were developed and met throughout its installation and that they are in accordance with the provisions of the LP and LI

IV. THE CASE OF WIND ENERGY GENERATION COMPANIES

The insertion of wind energy in the power generation system arose from the need to generate energy from a clean, renewable matrix that does not harm the environment, however, because it is a more expensive matrix than that generated by the hydro system, will have an impact on the tariff price paid by users. It is considered the cleanest energy because it does not emit polluting gases that cause the so-called greenhouse effect, one of those responsible for global warming.

In other countries, this matrix is not very expensive, it is competitive, while in Brazil it is expensive due to several factors such as: higher logistical costs of implementing projects that are related to structural issues, such as the precariousness of roads, the restricted number of offers national wind turbines associated with restrictions on the import of such equipment, among others.

Wind energy began in Brazil in 1992, with the commercial operation of the first aerogenerator, located in the Fernando de Noronha archipelago, whose project was carried out by the Wind Energy Group of the Federal University of Pernambuco (UFPE), with funding from Folkecenter, a Danish research institute, in partnership with Companhia Energética de Pernambuco (CELPE). The turbine has a 75-kW asynchronous generator, a 17 m diameter rotor and a 23 m high tower. At the time of its installation, the generation of electricity from this turbine corresponded to about 10% of the energy generated on the island, resulting in savings of approximately 70,000 liters of diesel oil per year. The second turbine was installed in May 2000 and went into operation in 2001. The project was carried out by the Companhia Brasileira de Energia Elétrica (CBEE), in collaboration with the RISØ National Laboratory of Denmark, and financed by the National Electric Energy Agency (ANEEL). Together, the two turbines generate up to 25% of the electricity consumed on the island. These projects made Fernando de Noronha the largest wind-diesel hybrid system in Brazil [20].

The wind turbine industry is organized in the form of an oligopoly, with the four largest manufacturers Vestas (Denmark), GE Wind (USA), Gamesa (Spain) and Enercon (Germany), having a market share of 70%, demonstrating great market power, but this condition is not contested because there are entry barriers related to the scale of production and high technological innovation that result in cost advantages and product differentiation [21].

In Brazil, companies that manufacture wind turbines have competitive advantages over other companies not installed in the country, due to import restrictions and a 14% tax. Financing from the National Bank for Economic and Social Development (BNDES) is intended only for companies established in the country, which constitutes yet another entry barrier.

4.1 THE MAIN BARRIERS TO ENTRY

The wind power generation industry has a high barrier to entry. Financing, national inputs and equipment, regulatory aspects and innovation in Brazilian industry constitute entry barriers. This sector requires high investments in equipment and components such as blades, hub, axle, box, generator, nacelle and tower. Companies must have specific know-how, as the components are expensive, their installation is expensive and companies in the sector usually set up a wind farm with several towers capable of generating enough energy to meet the demand sold in auctions held by the federal government.

Most of the investment is concentrated in the initial phase of the project and equipment costs correspond to up to 75% of the total investment. Access to capital is difficult, with a high cost and unattractive

interest rates, in addition to the existence of a small number of financial institutions, which constitutes an economic-financial barrier.

The Brazilian wind industry is still underdeveloped, with technological restrictions, constituting one of the biggest entry barriers for competitors. The second biggest restriction was related to access to technologies, as there is resistance from manufacturers to transfer technology to Brazilian companies, which makes the sector dependent on component manufacturers for assembling the towers [22].

The Brazilian regulations for technological incentives are contained in Normative Resolution No. 482, of the National Electric Energy Agency – ANAEEL – of April 17, 2012, which establishes the general conditions for access of distributed microgeneration and minigeneration to electricity distribution systems. This is an energy compensation, where the entrepreneur receives a premium for renewable generation.

For the assembly of the towers and maintenance of the park there is a need for qualified labor. The tower assembly process is done by hand, but the manufacture of components requires cutting-edge technology and specialized personnel, therefore, training the workforce is another obstacle to the undertaking. Companies have difficulty recruiting workers due to the lack of qualification of people within the park's installation radius and the jobs generated on site are those that do not require specialization such as servants, auxiliaries, and helpers, which generates little opportunity for qualification of the labor force. local work, in addition to being hired on a temporary basis until the end of installation of the park. Some workers hired by the companies are trained by the company itself and this workforce is transported to the various projects under construction.

Infrastructure and logistics are considered the biggest bottleneck, because they are related to the transport of the wind turbine by sea and land and the transmission of the energy generated. The main aspects related to transport are:

In the first place, there is the condition of trafficability on the highways, as it is the only means of transport for wind turbines to the place of installation, traveling on precarious roads. As the wind turbines are large, there is a need to use large trucks, which, due to their size, can only travel during the day and with an escort, and in periods of large flow of vehicles, transport cannot be done, the which may impact the logistics of setting up the wind farm.

The second factor is the length of the trucks, which are not readily available to transport 40-meter-long blades and the problem increases when there is a need to transport 50-meter-long blades.

The third factor is the cabotage system, as there is a lack of infrastructure in port warehouses. This transport system is cheaper than the terrestrial one, with the result that costs are reduced.

Another barrier verified is the difficulty of environmental licensing, as the grouped equipment presents a high level of noise, visual and sound pollution, electromagnetic interference (it can interfere with air communication in space), alteration of bird migration routes (due to the height of the tower) and shock of the birds on the blades. Some equipment can affect animals and people, which is why IBAMA takes a long time to release the license, because it carries out a very thorough study of the impacts, which can lead to delays in the development of the enterprise.

Other impacts verified in the installation of a wind farm are the modification of the natural landscape and environmental alterations in permanent preservation ecosystems, burying of dunes and interdune lakes. The burying of the dunes may be due to the opening of access roads and implementation of construction sites, with the mobilization of a large volume of sand that is placed in a place where there was native vegetation, getting it buried and consequently killing this vegetation.

Deforestation is done to open the access roads and install the construction site. This action suppresses the environment with the region's native fauna and flora, fragmenting the region's ecosystem.

Some developments are installed in areas protected by environmental legislation or in areas with an active economy such as agricultural production, tourism, etc. lacking mediation rules for existing conflicts in these areas.

V. CONCLUSIONS

Wind energy has grown in the world and in Brazil. The Brazilian government's policies have stimulated the growth of this market with tax incentives and credit facilitation for companies based in the country, making the sector more attractive and competitive.

The installation of a wind farm is very expensive, due to the price of its components, which are not cheap, and the entrant must have specific know-how to reduce its costs and become competitive.

The costs of the technologies used have been decreasing due to investments in research and development (R&D), gains in the learning curve and the development of the global equipment industry.

The lack of transmission lines is a major obstacle to the growth of the wind energy sector in Brazil, requiring public investments for the expansion of transmission lines.

The main barriers to entry into Brazil are the underdevelopment of the wind industry and access to technologies, since companies holding patents are reluctant to transfer technology to Brazilian companies, making them dependent on manufacturers of components for assembling the towers.

Among the positive impacts for wind energy, we can mention the generation of jobs, its contribution to the sustainable development of the Brazilian energy matrix and its diversification, the low environmental impact compared to other energy sources, its contribution to the process of universalization of energy services, consumption of goods and services in regions close to the wind farm and opening of artesian wells for the local community.

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