

Territorial impacts and the installation of wind projects in the traditional fishing community of Enxu Queimado (Pedra Grande/RN): energy transition or a new frontier for capital accumulation?¹

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Abstract

The energy transition represents Brazil's primary policy initiative in the context of adapting to and mitigating climate change, with a particular focus on the installation of wind energy projects. Nevertheless, the energy transition is employed as a strategy to diversify the investment portfolios of transnational corporations, which has the consequence of exerting territorial impacts on communities situated in the vicinity of these energy projects. The objective of this article is to examine the territorial impacts of the energy transition on the traditional fishing community of Enxu Queimado, located in the municipality of Pedra Grande on the coast of the state of Rio Grande do Norte. In order to achieve this objective, a combination of quantitative and qualitative methodologies was employed, including the conduct of fieldwork in the community during the year 2023. The research indicates that the energy transition from the centralized energy generation model has been carried out in a

¹ This article is the result of multiple research efforts, namely: "Socioterritorial resistances in a traditional fishing community: the tides of conflicts and disputes in Enxu Queimado/RN," which formed the basis of a master's dissertation in Urban and Regional Studies under the same title; the post-doctoral research "From global to local: the production of conflicts in the territorialization of wind projects in Northeast Brazil," completed at the Institute of Public Policies and International Relations of São Paulo State University (UNESP) and funded by UNESP's Pro-Rectorate for Research (call 13/2022); the ongoing doctoral research in Geography at the Faculty of Sciences and Technology (FCT) of UNESP titled "Analysis of agri-food relations between Brazil and China using the theoretical-methodological approach of food regimes," funded by the Coordination of Superior Level Staff Improvement CAPES); and the research on political and regional incidence articulated within the Land Matrix platform (Latin America and Caribbean focal point). Additionally, this article reflects debates held within the Brazilian Network of Research on Struggles for Spaces and Territories (Rede DATALUTA), particularly concerning the foreignization of land category.



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manner that violates the territorial rights of traditional communities, thereby configuring the agrarian issue. The question thus arises as to whether the energy transition represents a new frontier for the expansion of capital.

Keywords: Energy transition; renewable energy; territorial impacts; agrarian question.

Impactos territoriais e a instalação de projetos eólicos na comunidade tradicional pesqueira de Enxu Queimado (Pedra Grande/RN): transição energética ou uma nova fronteira para a acumulação do capital?

Resumo

A transição energética é a principal política do Brasil no contexto de adaptação e mitigação das mudanças do clima, sobretudo a partir da instalação de projetos de energia eólica. Todavia, ao mesmo tempo, a transição energética é utilizada como uma estratégia de diversificação dos portfólios de investimentos de corporações transnacionais, resultando em impactos territoriais para as comunidades territorializadas nas proximidades destes projetos energéticos. O objetivo deste artigo é debater sobre como a transição energética resulta em impactos territoriais na comunidade tradicional pesqueira de Enxu Queimado, localizada no município de Pedra Grande, no litoral do estado do Rio Grande do Norte. Para atingir este objetivo foram utilizadas metodologias quantitativas e qualitativas, incluindo a realização de trabalhos de campo na comunidade no ano de 2023. Com a pesquisa é possível concluir que a transição energética a partir do modelo de geração de energia centralizado tem sido efetivada a partir da violação de direitos territoriais de comunidades tradicionais, configurando a questão agrária. A questão posta é: transição energética ou uma nova fronteira para a expansão do capital?

Palavras-chave: Transição energética; energias renováveis; impactos territoriais; questão agrária.

Impactos territoriales e instalación de proyectos eólicos en la tradicional comunidad pesquera de Enxu Queimado (Pedra Grande/RN): ¿transición energética o nueva frontera para la acumulación de capital?

La transición energética es la principal política de Brasil en el contexto de adaptación y mitigación del cambio climático, especialmente mediante la instalación de proyectos de energía eólica. Sin embargo, al mismo tiempo, la transición energética se utiliza como estrategia para diversificar los portafolios de inversión de las corporaciones transnacionales, resultando en impactos territoriales para las comunidades ubicadas en las cercanías de estos proyectos energéticos. El objetivo de este artículo es discutir cómo la transición energética genera impactos territoriales en la tradicional comunidad pesquera de Enxu Queimado, ubicada en el municipio de Pedra Grande, en la costa del estado de Rio Grande do Norte. Para lograr este objetivo se utilizaron metodologías cuantitativas y cualitativas, incluyendo la realización de trabajo de campo en la comunidad en el año 2023. Con la investigación se puede concluir que la transición energética desde el modelo de generación centralizada de energía se ha realizado a partir de la vulneración de derechos territoriales de las comunidades tradicionales, configurando la cuestión agraria. La pregunta es: ¿transición energética o nueva frontera para la expansión del capital?

Palabras-clave: Transición energética; energías renovables; impactos territoriales; cuestión agraria.

Introduction

*"They are stealing our wind, they are stealing our sun. This is no joke."
(Nêgo Bispo, 2023, p. 99 - The Earth Gives, the Earth Wants)*

In the context of the ongoing debate surrounding climate change, new solutions are emerging with increasing frequency. These solutions aim to reduce the amount of carbon dioxide (CO₂) emitted into the atmosphere, thereby aiding in the reduction of global warming. The energy transition, which entails a shift from a model of energy production and consumption based on non-renewable sources (such as those derived from fossil fuels) to a renewable matrix like photovoltaic and wind energy, is presented as the sole viable and necessary alternative to curb climate change. This has resulted in the formulation of an environmental agenda that is firmly rooted in diplomatic commitments (e.g., various international agreements), technological innovations, and increasingly financialized market solutions (Marques, 2023), with green bonds serving as a classic example of this trend.²

The necessity for an energy transition has been identified as a key issue (Cataia and Duarte, 2022). This is due to the manner in which climate change policy has been constructed by the various agents involved (Franco and Borrás Jr., 2019). This has resulted in a number of contradictions. The first point to be made is that climate change is not solely a consequence of a non-renewable energy matrix or CO₂ emissions. A number of other activities, including deforestation, the use of pesticides, mineral exploitation, and the improper disposal of solid waste, also contribute to the increase and acceleration of global warming. As Chomsky and Pollin (2020) demonstrate, on a global scale, greenhouse gas emissions represent the primary driver of climate change. However, in Brazil, the majority of CO₂ emissions do not originate from the energy sector, but rather from what is referred to as Land Use, Land-Use Change, and Forestry (LULUCF).

The 2023 report by the Climate Observatory, entitled the Greenhouse Gas Emissions Estimation System (Sistema de Estimativa de Emissões de Gases de Efeito Estufa - SEEG), indicates that Brazil continues to increase its net greenhouse gas emissions. In 2021, emissions reached 1.76 GtCO₂e, representing a 19% increase from the 2020 level of 1.49 GtCO₂e (Climate Observatory, 2023). In Brazil, the emissions for 2021 were concentrated in land-use change and agriculture, accounting for 49% and 25% of emissions, respectively. In that year, the energy sector was responsible for 18% of global emissions. In other words, the agricultural sector (carried out by agribusiness) and land-use change (resulting from deforestation and forest fires) were responsible for 74% of CO₂

² So-called green bonds are fixed-income financial instruments whose purpose is to finance green projects, i.e. projects with environmental and/or climate benefits.

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emissions in Brazil in 2021. In light of the aforementioned circumstances, the notion that energy transition is the sole viable approach to reducing greenhouse gas emissions is untenable. It is pertinent to highlight that 47.4% of Brazil's energy matrix is comprised of renewable sources. While renewable sources account for only 15.0% of the global energy matrix (EPE, 2021), there is considerable potential for growth in this area. In the context of the electric matrix, Brazil's energy sources are particularly noteworthy for their high degree of renewability, with 82.9% of energy sources derived from renewable sources. The current model of energy transition developed in Brazil is focused on the addition of energy generation sources, including wind, photovoltaic, and the expansion of agrofuels, such as ethanol derived from sugarcane and corn.

It is also noteworthy that in Brazil, the expansion of biofuel production, particularly from sugarcane, has historically received state support. This can be traced back to the establishment of the National Alcohol Program (PROÁLCOOL) during the oil crises of the 1970s, which facilitated the construction of distilleries integrated with sugar production mills through a series of incentives granted to the sector, thereby boosting the production and utilization of hydrated alcohol as fuel, ethanol (Bray, Ferreira and Ruas, 2000). Nevertheless, the reduction in oil prices during the 1990s, the option for sugar mills to produce sugar at more profitable prices in the external market, and other factors contributed to the discrediting of ethanol-powered vehicles by both consumers and automakers, ultimately leading to the extinction of the program. In the early 2000s, the advent of the flex-fuel vehicle once again spurred the growth of ethanol production, this time with a focus on sustainability. Ethanol was positioned as a renewable and clean energy source, offering an alternative to the use of fossil fuels.

During his initial term (2003 - 2006), President Luiz Inácio Lula da Silva emphasized Brazil's potential for biofuel production in his official addresses, encouraging the competitiveness of sugarcane ethanol vis-à-vis corn ethanol produced in the United States. During this period, new projects for sugar and ethanol production plants were initiated or resumed with the participation of both traditional and non-traditional national and foreign groups in this sector. These projects were financed through credit provided by public and private banks, including the National Bank for Economic and Social Development (Banco Nacional de Desenvolvimento Econômico e Social - BNDES). The 2007/2008 financial crisis had a direct impact on the sugar-alcohol sector, which was subsequently referred to as the sugar-energy sector. This designation reflects the sector's production of sugar, ethanol, and bioelectricity (consuming the residual biomass generated in its processes). Consequently, a number of mergers and acquisitions were undertaken among traditional or non-traditional

economic groups within the sector, as well as the formation of joint ventures and bankruptcy filings. Currently, an Ethanol Parliamentary Front has been established in the National Congress, comprising over one hundred parliamentarians. The Front's objective is to expand the advantages of ethanol as a clean energy source, thereby maintaining the sector's historical advantages and benefits from the Brazilian state.

In addition to the aforementioned initiatives, projects for the construction of plants processing corn to produce ethanol were also implemented. These were initially established in the state of Mato Grosso. The installed models are capable of operating in two distinct modes: as corn-only plants and as flex plants. The former is designed to process corn exclusively, whereas the latter is a sugarcane ethanol production plant that has been adapted to produce corn ethanol during the off-season. Flex-fuel projects represent a further category of plants, which are sugarcane ethanol production facilities that have been configured to process corn alongside their existing sugarcane ethanol production units. Brazil has 19 corn ethanol plants, 12 of which are located in the state of Mato Grosso, with the remaining plants situated in the states of Goiás, São Paulo, and Paraná. Additionally, one unit is currently under construction in Mato Grosso do Sul.

The second issue is that, in reality, there is no planned replacement of fossil fuel sources with renewable sources. Rather, there is an energy transition based on the addition of renewable sources. As Cataia and Duarte (2022, p. 766) observe, the history of energy is one of successive additions of new primary energy sources, rather than transitions. Despite the energy transition being presented as a mitigation policy, fossil fuel subsidies worldwide reached a total of USD 697.2 billion in 2021. This represents an increase of 92.4% compared to the previous year (INESC, 2022). The third point is that although wind and photovoltaic sources are inexhaustible, the transformation of these sources into electricity requires the use of finite resources, which are unequally distributed around the globe (Milanez, 2021). The energy transition has led to an increase in the demand for mineral materials, particularly those classified as critical minerals. This has resulted in a number of adverse effects, including territorial conflicts and an increase in greenhouse gas emissions.³ Furthermore, it has reinforced historical patterns of exploitation (Soto Hernandez and Newell, 2022).

The fourth and final contradictory issue concerns the territorial impacts resulting from the installation of wind projects. Although wind and photovoltaic energies are considered clean, renewable, and with lower impact (considering they do not involve the displacement of populations and flooding of areas for dam construction, like hydropower

³ Wanderley and Rocha-Leão (2023) report that global carbon dioxide emissions from mineral extraction increased by 50% between 2005 and 2018. When aluminum production is considered separately, CO2 emissions on a global scale nearly doubled between 2005 and 2018 and now represent 2% of total emissions worldwide.

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generation), these energy models are not free from externalities. From the perspective of geography and a multidimensional and multi-scalar view of territory (Fernandes, 2009), the impact of territorial projects is understood to be the result of negative changes occurring in the environmental, economic, social, and cultural dimensions. These changes alter the territoriality and lives of the populations living near these projects. These impacts occur on a local scale and are often not revealed during the dissemination of these projects.

In light of the aforementioned context, the objective of this article is to examine the manner in which the ongoing energy transition also gives rise to territorial impacts, particularly at the local level. This study examines the traditional fishing community of Enxu Queimado, which has been settled on the coast of the municipality of Pedra Grande in the state of Rio Grande do Norte for over a century⁴. The state is a significant contributor to the national production of electric energy from wind kinetics. It is crucial to underscore the remarkable growth of wind and photovoltaic projects, each of which has distinct implications. Nevertheless, the analyses presented in this manuscript will concentrate on the installation of wind projects. This decision is not arbitrary; rather, it is the result of the fact that wind projects correspond to a centralized energy model with a high amount of fixed capital invested.

In order to achieve this objective, a number of methodological procedures were employed. Besides reviewing the literature on the subject, quantitative data were collected from official sources such as the Generation Information System of the National Electric Energy Agency (Sistema de Informações de Geração da Agência Nacional de Energia Elétrica - SIGA) and the Geographic Information System of the Electric Sector (Sistema de Informações Geográficas do Setor Elétrico - SIGEL). It was of the utmost importance to conduct documentary research, particularly with regard to documents produced by multilateral institutions and international agreements where climate change is the primary focus. Fieldwork was also conducted in the municipality of Pedra Grande, focusing on the traditional fishing community of Enxu Queimado during 2023. In these field studies, alternative methodologies were employed, including the administration of interviews and the conduct of participant observation during meetings convened by the community.

The article is structured into three principal sections, in addition to the introductory and concluding remarks. The initial step will be to examine the framework of the energy transition, with the objective of initiating a discussion on international climate change agreements. In particular, the commitments made by Brazil will be highlighted. The subsequent section will examine the role of Brazil in the so-called energy transition, with a

⁴ Considering only the wind power granted and in operation.

particular focus on the expansion of wind energy. Finally, the case study of the traditional fishing community of Enxu Queimado will be presented, highlighting the territorial impacts and contradictions of the current energy model based on wind energy.

The landmark of the energy transition

Since the last decades of the 21st century, multilateral institutions have brought sustainable development to their agendas, with an effective example being the organization of the United Nations Conference on Environment and Development, known as Eco-92 or Rio-92, in Rio de Janeiro, which, according to Oliveira (2011), was central to the consolidation of the concept of sustainable development. As the environmental and climate crises intensify, the narrative gains strength. It is important to reinforce that in this scenario of environmental and climate catastrophe, two positions emerge. The first is related to the fact that the capitalist system itself is responsible for the climate situation, considering its predatory model and historical accumulation. And the second is linked to the idea that the so-called environmental and climate crises can be business opportunities, as addressed by the World Bank.

An example of this is the "Stern Review: The Economics of Climate Change," published in 2006 by Nicholas Herbert Stern and Baron Stern of Brentford, commissioned by the British government. This document, according to Moreno (2016, p. 266), "managed to translate the costs - but also the business opportunities and profits - of climate change into economic terms and made the environmental/climate issue a serious economic case." In light of the aforementioned considerations, the environmental and climate crises have been addressed from the perspective of market-based solutions. These solutions posit that technological advancement and diplomatic agreements are sufficient to reduce greenhouse gas emissions and, consequently, mitigate global warming.

These international agreements, as well as the documents/recommendation reports elaborated by multilateral institutions, reflect on the geopolitics of sustainable development (Oliveira, 2011). In an effort to delineate the temporal scope of these events⁵, a timeline was constructed, delineating the principal milestones that elucidate the construction of the imperative of energy transition, as presented in Table 1. It is of paramount importance to make two key observations at this juncture. The initial point to be made is that the list of documents does not include all agreements and reports on the subject matter. It is limited to those that have been signed on a global scale and are of significance in achieving the

⁵ We understand the concept of event from Milton Santos (2002), based above all on the relationship between space and time. According to the author, "events change things, transform objects, giving them, right there where they are, new characteristics" (Santos, 2002, p. 144).

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objective set out in this article. The second observation pertains to the fact that there are some documents that are not directly related to environmental and climate crises but are fundamental for the debate on the advancement of capitalist relations, territorial incorporation, and so-called sustainable development.

Table 1: Key Events on the International Scale Responsible for the Inclusion of Environmental/Climate Issues in Government Agendas.

Year	Agreement / Report / Program	Main Points	Authors / Institution / Organization Responsible
1987	Our Common Future - Brundtland Report	Document responsible for spreading the concept of sustainable development, defined in the report as "meeting the needs of the present without compromising the ability of future generations to meet their own needs" (p. 46). According to the document, the fundamental elements to understand sustainable development are "needs" and "limitations".	World Commission on Environment and Development
1992	Creation of the United Nations Framework Convention on Climate Change Agenda 21	Created during the United Nations Conference on Environment and Development (Rio 92 ⁶). The member countries of the Convention periodically gather in meetings called Conferences of the Parties. The creation of this convention led to the establishment of the Conference of the Parties. There are different agreements signed over the years. At this conference, Agenda 21 was signed, which was responsible for institutionalizing the concept of sustainable development.	UNFCCC (ONU)
1997	Kyoto Protocol 3rd Conference of the Parties (COP03) of UNFCCC	Mandatory targets for developed countries to reduce emissions by 5%. The protocol came into force in 2005. In 2002, Brazil voluntarily joined the protocol.	UNFCCC (ONU)
2006	Stern Review: The Economics of Climate Change	Brings to the debate the economic dimension of climate change, discussing the costs and business opportunities. The recommendations of the report point to three angles: technological policies,	Nicholas Herbert Stern and Baron Stern of Brentford (commissioned by the British government)

⁶ In addition, the Rio 92 Conference approved the following conventions: The Convention on Biological Diversity and the United Nations Convention to Combat Desertification and Mitigate the Effects of Drought were also approved.

		carbon pricing, and energy efficiency. This publication points to land grabbing for agroenergy production as a solution to the climate crisis.	
2008	Energy Sector Management Assistant Program (ESMAP)	Case studies for low-carbon development for different countries in the global South, including Brazil. One of the results for Brazil was the elaboration of a "low-carbon development plan," published by the World Bank in 2010.	World Bank
2011	Rising Global Interest in Farmland: Can It Yield Sustainable and Equitable Benefits?	In this report, the World Bank identified 446 million hectares suitable for agribusiness expansion worldwide. This document tends to consider such areas as uninhabited and marginal from a capitalist logic.	World Bank
2012	Inclusive Green Growth: The Pathway to Sustainable Development	The document promises to demystify the concept of green growth, bringing to the debate "inclusive green growth." According to Moreno (2016, p. 284), the document intends to "demystify the notion that green growth is a luxury that most countries cannot afford, and that the main obstacles are political barriers, deeply entrenched behaviors, and lack of appropriate financial instruments."	World Bank
2012	Voluntary guidelines on the responsible governance of tenure of Land, fisheries and forest in the context of national food security (VGGT)	The aim of the document is to improve land governance so that everyone benefits from the so-called Large-Scale Land Acquisition. The idea is that if public and private institutions follow the guidelines, land transactions would tend to bring benefits to vulnerable populations. The big question is that such guidelines are, as the title itself expresses: voluntary. The VGGTs are a "code of conduct" regarding what academia calls land grabbing. According to Borras Jr. and Franco (2010), such codes of conduct tend to transform (in terms of narrative) land control into a rural development policy.	FAO
2015	17 Sustainable Development Goals (SDGs)	Seventeen goals were established to be achieved by 2030. Among these goals are: zero hunger and sustainable agriculture; clean water and sanitation; clean and affordable energy; sustainable cities and communities; action against global climate change; life below water; life on land.	UN
2015	Paris Agreement 21st Conference of the	Signing of the Paris Agreement, in which governments committed to take action to keep the increase in global average	UNFCCC (ONU)

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	Parties (COP21) of UNFCCC	temperature below 2°C above pre-industrial levels and to endeavor to limit the increase to 1.5°C. For this, the 195 countries that signed the Agreement presented comprehensive national action plans to reduce their emissions, these plans are called "Nationally Determined Contribution" ⁷ (NDC), which are periodically updated (Brazil, 2017). The main difference from its predecessor (Kyoto Protocol) is the extension of emission reduction to all countries.	
2021	Glasgow Climate Pact Glasgow Leaders' Declaration on Forests and Land Use 26th Conference of the Parties (COP26) of UNFCCC	Parties agreed to review and strengthen their 2030 targets in their NDCs as needed to align with the temperature goal of the Paris Agreement by the end of 2022, taking into account different national circumstances.	UNFCCC (ONU)

Source: Survey conducted by the authors (2023).

These events were pivotal in framing energy transition as an imperative and the sole viable solution to the climate and environmental crises (Cataia and Duarte, 2022; Marques, 2023). As illustrated in Table 1, the institutionalization of climate and environmental concerns can be traced back to the neoliberal regime (Porto-Gonçalves, 2004). Energy transition has long been a topic of debate, especially regarding the imperative to diversify the energy matrix following the oil crises of 1973 and 1979. Nevertheless, in the 21st century, the concept of energy transition assumes a new significance due to a specific moment within the crisis of capitalism.

This pivotal moment is the financial crisis of 2007/2008, which was intertwined with environmental, food, climate, and energy crises, collectively termed the convergence of multiple crises (Borras Jr. and Franco, 2010). In the context of an overaccumulation crisis that originated in the 1970s (Harvey, 2005), capitalist agents seek to diversify their investment portfolios by incorporating new spaces and establishing new markets. Despite narratives from multilateral institutions, governments, and companies suggesting these spaces are vacant, they are, in fact, territories inhabited by various peoples and traditional communities with logics not subservient to capital. This situation gives rise to interest in

⁷ The term "Nationally Determined Contribution" (NDC) is used in the context of the Paris Agreement. The Paris Agreement stipulates that these documents must be reviewed and reissued every five years.

energy transition, particularly in the Northeast region of Brazil, which is perceived as a potential space for capital accumulation.

It is noteworthy that as early as 2001, in the midst of an energy supply crisis in Brazil, the state implemented a series of regulations with the objective of facilitating diversification of the energy matrix. Federal programs like the Emergency Wind Energy Program (PROEÓLICA) and the Program for Incentive to Alternative Sources of Electric Energy (PROINFA), established in 2001 and 2002 respectively, were complemented by streamlined environmental licensing processes and public financing through the National Bank for Economic and Social Development (Pereira, 2023). Despite these incentives, the anticipated diversification did not materialize. Nevertheless, an environment conducive to meeting the future demands of wind energy companies was created (Lima, 2022).

Currently, in Brazil, energy transition is characterized by two primary renewable sources: wind and photovoltaic energy. As of September 1, 2023, the Information System of Generation of the National Electric Energy Agency (SIGA) reports that there were 19,541 photovoltaic energy generation projects in Brazil, with a total licensed capacity of 138,090,933.14 kW. It is crucial to acknowledge that photovoltaic energy generation exhibits a dual nature, encompassing both centralized and decentralized forms. In other words, there are micro-generators of energy whose purpose is to generate energy for small consumer units. With regard to projects licensed above 10,000 kW⁸, there are 3,224 parks in Brazil, with a total capacity of 137,639,464.61 kW. Regarding wind energy, as of the same date, there were 1,588 licensed projects in the country, totaling 53,478,845 kW of capacity. It is in this context that we need to understand the role of Brazil in energy transition and the contradictions resulting from this new imperative.

Renewable Energy: What Role Does Brazil Play in Energy Transition?

The Brazilian state follows the environmental agenda through established diplomatic commitments, such as the example of the Paris Agreement. It should be noted that the government of Jair Messias Bolsonaro (PL) (2019-2022), through various actions, resulted in the substantial dismantling of numerous aspects of environmental policy. The dismantling occurred in legislation, lack of enforcement, militarization of agencies, budget cuts, denialist statements, and attacks on indigenous peoples and traditional communities, among other factors (De Olho nos Ruralistas, 2022a). This policy has resulted in a number of notable outcomes, including elevated deforestation rates across various biomes, an

⁸ In accordance with Law 14.300 of January 6, 2022, microgenerators are defined as projects that generate up to 75 kW of energy from renewable sources in consumer units such as rooftops, condominiums, and farms. Mini-generators are those that generate between 75 kW and 10,000 kW of energy from renewable sources.

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increase in the number of wildfires, and the centrality of gold mining in the debate, even encroaching upon indigenous lands (De Olho nos Ruralistas, 2022b). Concomitantly, the government "let the cattle pass" concerning agrarian issues (Pereira, Coca and Origuéla, 2021). All of this contributed to Brazil's poor international image, resulting in cuts to financial support for Amazon preservation, for instance.

The government has undergone a change of administration, and with it has come a resurgence of environmental policy, with the stated goal of reducing deforestation and combating climate change. The expression "Climate Change" was added to the name of the Ministry of the Environment. There has been a narrative dispute surrounding environmental policy since the presidential campaign. The Workers' Party has made the energy transition a central tenet of its political platform, with the goal of positioning Brazil as a leader in the global South's energy transition on the international political agenda. Consequently, at both the federal and state levels—with particular emphasis on the federative units governed by the Workers' Party (PT)—the energy transition has become a primary focus of political discourse. The challenges are numerous, especially given the immeasurable damage over the past four years.

It is in this context that renewable energies emerge even more as central to the energy transition. Prior to examining the data on electricity generation from renewable sources, it is essential to recall the commitments made by Brazil in the Paris Agreement (2015). In the Intended Nationally Determined Contribution (iNDC) of 2015, a document in which the Brazilian government recorded the main commitments and contributions of Brazil to the Paris Agreement (2015)⁹, the points stipulated regarding energy were: i) The objective is to achieve an estimated 45% share of renewable energy in the energy matrix composition by 2030, with the expansion of the use of renewable sources beyond hydroelectric energy. This expansion is aimed at achieving a share of 28% to 33% in the total energy matrix by 2030. ii) The objective is to expand the domestic use of non-fossil energy sources. This expansion is intended to increase the share of renewable energies (beyond hydro) in electricity supply to at least 23% by 2030. This expansion is to include increasing the participation of wind, biomass, and photovoltaic energy.

It's important to mention that Brazil's Nationally Determined Contribution underwent two updates in the years 2020 and 2022. In the most recent version, the following updates were presented: i) mitigation of 37% of greenhouse gas emissions by 2025 and a reduction of 50% by 2030 (base year 2005); ii) achieving net-zero emissions by 2050; and iii)

⁹ The document was presented as an intention, thereby rendering the NDC official from the moment the Paris Agreement entered into force in 2016. On November 3, 2023, just prior to the 2023 United Nations Climate Change Conference (COP 28), Brazil presented the fourth iteration of the NDC.

achieving zero illegal deforestation by 2028. This revision was a result of the Glasgow Climate Pact, signed during the 26th Conference of the Parties (COP26) of the UNFCCC in 2021, as expressed in Table 1. According to a document prepared by the BRICS Policy Center (March 2023) indicates that, in comparison to Brazil's initial Nationally Determined Contribution (NDC) (2015), there has been a regression in Brazil's ambition, resulting from a change in the baseline for calculating Brazilian emissions in the year 2005. The current NDC may result in Brazil emitting more greenhouse gases than it had proposed in its initial target back in 2015.

As previously stated, Brazil's energy matrix is already centered around renewable energy sources. According to the National Energy Balance (BEN) for the year 2022, published by the Energy Research Company (EPE), the share of energy from renewable sources in Brazil's electricity matrix was 87.9%. The installed capacity for photovoltaic generation grew by 82.4% compared to 2021, while wind generation expanded by 14.3%. The generation of electric power from photovoltaic and wind sources is presented in Tables 1 and 2, respectively.

Table 1: Brazil - Photovoltaic projects (with power above 10,000 kW) granted according to the federation unit and project status (2024).

UF (Federation Unit)	Operational		Planned	
	Quant.	Power (kW)	Quant.	Power (kW)
Alagoas	0	0.00	4	102700.00
Bahia	63	2043782.55	552	24932197.00
Ceará	31	957587.00	434	16787194.00
Goiás	0	0	128	6243993.00
Maranhão	0	0	4	226168.00
Mato Grosso	0	0	38	1246500.00
Mato Grosso do Sul	0	0	64	3550928.00
Minas Gerais	92	3789906.00	844	38798698.00
Paraíba	14	457064.00	87	3973818.00
Pernambuco	25	1030500.18	102	4397504.00
Piauí	40	1459512.00	469	20445677.00
Rio de Janeiro	0	0	4	174563.60
Rio Grande do Norte	10	553062.00	231	10358400.65
São Paulo	26	869607.28	7	287715.42
Sergipe	0	0	16	732488.00
Tocantins	0	0	18	577532.00
Total	301	11161021.01	3002	132836076.67

Source: SIGA/ANEEL (consolidated data as of January 1 2024); Org.: The authors (2024).

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Table 2: Brazil - Wind projects granted according to the federative unit and project status (2024).

UF (Federation Unit)	Operational			Planned		
	Quant.	Power (kW)	Acres	Quant.	Power (kW)	Acres
Bahia	312	8900470.64	106153.80	265	11007200.00	77162.09
Ceará	100	2577840.00	26413.09	72	2875800.00	21165.38
Maranhão	16	426022.50	2423	3	130200.00	594.83
Minas Gerais	1	156	N.I.	8	384448.00	1443.82
Paraíba	39	992240.00	36258.78	59	2229300.00	18094.99
Pernambuco	42	1088365.00	11989.19	18	567300.00	838.21
Piauí	115	3907050.00	39003.80	58	2936200.00	11421.23
Paraná	1	2500.00	N.I.	0	0	0
Rio de Janeiro	1	28050.00	354.7	0	0	0
Rio Grande do Norte	280	9074136.00	143575.37	105	4116600.00	42202.93
Rio Grande do Sul	81	1835891.98	32572.95	50	2137320.00	35334
Santa Catarina	18	250599.50	7741.19	0	0	0
São Paulo	1	2.24	N.I.	0	0	0
Sergipe	1	34500.00	296.44	0	0	0
Total	1008	29117823.86	380369.00	638	26384368.00	208258.00

Source: SIGA/ANEEL (consolidated data as of January 1 2024); Org.: The authors (2024).

Upon analysis of the data, two points emerge as particularly noteworthy. The first is the significance of the number of planned photovoltaic and wind projects, that is, whose status in ANEEL is "under construction" or "construction not started". With regard to large-scale photovoltaic projects (exclusive of micro and mini-generation), it is observed that only 9.11% of those granted have commenced operations. When considering the granted capacity in these projects, only 7.75% is actually being generated. With regard to wind projects, 38.76% of the parks have not yet commenced construction or even been initiated, and 47.63% of the granted wind potential remains outside the National Interconnected System (SIN). Therefore, the expansion of these energies will be even greater and will have an impact on the national energy matrix.

The second aspect worth highlighting is the central role that the Northeast region assumes in the energy transition. When considering only the granted photovoltaic projects (operational and planned), it is observed that 63.03% are located in the Northeast region, which represents 61.43% of the granted capacity. With regard to wind energy, the total number of approved parks by ANEEL is 1,485, with the Northeast region accounting for 90.21% of the total wind energy projects in Brazil. In terms of granted capacity, 91.64% is in

the Northeast. The initial deployment of wind energy companies in the Northeast occurred along the coast, and this trend is now expanding towards the mountain ranges situated in the semi-arid region.

A hypothesis can be derived from the data on the installation of wind and photovoltaic projects, along with the two aforementioned issues. This hypothesis suggests that there will be an expansion of Hybrid Generating Plants (Centrais Geradoras Híbridas - UGHs), where electricity generation will occur through both wind and photovoltaic sources. On December 6, 2021, Regulatory Resolution ANEEL No. 954 was enacted, marking the authorization for the implementation of Hybrid Generating Plants (UGHs) and Associated Generating Plants for energy obtained through renewable sources. In March 2023, President Luiz Inácio Lula da Silva participated in the inauguration of the first hybrid project authorized by ANEEL, the Chafariz Park, owned by the Spanish group Neoenergia, located in the municipality of Santa Luzia, Paraíba.

In the majority of cases, companies gain access to the territory through lease contracts (Maia et al., 2024). It is already known that wind energy companies, when leasing rural properties, include in the contract the possibility of future implementation of photovoltaic panels. Exactly for this reason, territorial enclosure occurs. In fieldwork conducted in a land reform settlement located in the municipality of São Miguel do Gostoso, on the coast of Rio Grande do Norte, it was reported that the lease contracts presented by third-party companies for area prospecting for anemometric measurement included clauses regarding the future installation of photovoltaic panels. At the same time, while this model of electricity generation project is interesting and, in terms of utilization, leads to more impacts for affected populations, particularly because photovoltaic energy is an activity that requires a considerable number of pesticides and water.

Wind projects of the traditional fishing community of Enxu Queimado (Pedra Grande/RN)

The municipality of Pedra Grande is located within the citizenship and rural identity territory of Mato Grande¹⁰, locality where the first wind projects in the state were installed, with the first concession dating back to 2001. By January 2024, there were 166 wind farms licensed by ANEEL in Mato Grande, with 137 in operation and 29 planned, accounting for approximately 43% of the state's projects. According to ANEEL data (2024), in terms of the spatial distribution of wind projects, the municipality of Pedra Grande hosts 16 wind energy

¹⁰ It has sixteen municipalities: Bento Fernandes, Caiçara do Norte, Ceará-Mirim, Jandaíra, Jardim de Angicos, João Câmara, Maxaranguape, Parazinho, Pedra Grande, Poço Branco, Pureza, Rio do Fogo, São Bento do Norte, São Miguel do Gostoso, Taipu and Touros (Vital, 2023).

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parks, covering a total of 4,867.82 hectares of land. Out of these, 14 parks are operational and two are in the planning phase. Thus, the local population has already experienced various changes brought about by wind energy throughout the different installation phases.

The community of Enxu Queimado, situated 10 kilometers from the municipal seat, has received the greatest extent of territorial occupation by these projects, with the inaugural wind farm being granted by ANEEL in 2011. Among the total projects in operation in the municipality, the community of Enxu Queimado has nine projects in operation and one planned, all of which are the responsibility of the Serveng Group, which controls the União dos Ventos Wind Complex. The company controls 2,794.24 hectares of land for wind energy generation in the Enxu Queimado community. The advent of the initial wind farms in the region followed a similar pattern observed in other locations where wind energy is a significant economic activity. These projects promised to create jobs and income through leasing portions of small properties, while avoiding the loss of land and the necessity of agricultural work. Furthermore, they aimed to promote the generation of "clean" energy. These assertions were swiftly refuted.

Due to the gap left by the Resolution of the National Council for the Environment (CONAMA) n. 279, dated June 27, 2001, the environmental licensing process was simplified, and public hearings were not held for the implementation of wind projects. According to reports from a group of fishermen in the community during field research, the company only conducted a visit to a municipal school in the community to promote the benefits of installing wind projects. Non-compliance with International Labour Organization (ILO) Convention number 169 is common in the territorialization process of wind projects, especially in the early stages when the real impacts of these ventures were not fully understood.

During the field research, it became evident that wind energy generation is not without negative impacts, as previously documented in various studies (Lima, 2022; Meireles, 2011; Gorayeb, 2019; Hofstaetter, 2021; Pereira, 2021; Vital, 2023). In the community of Enxu Queimado, the contradiction between the dominant narrative about renewable energies in the Brazilian context and the reality of wind and photovoltaic energy is evident. These energies are presented as "clean" and necessary for reducing CO₂, despite the fact that they are not as "clean" as they are made out to be, especially in light of the model of development that has been employed to bring them to fruition. While wind energy is a renewable source of energy, it is not as "clean" as it is often presented, particularly when viewed through the lens of its development model.

The construction of wind farms has a number of adverse effects, including the filling in of lagoons, the mortality of dunes, changes to landscapes, and alterations to the social

and cultural way of life in the communities where they are installed. In Enxu Queimado, in addition to these factors, conflicts and confrontations have occurred in the traditional territory where the wind projects were installed, situations that remain increasingly evident. The alterations were observed across multiple dimensions, including environmental, cultural, social, and economic factors. This multiscale, multidimensional, and multiterritorial perspective is essential for understanding the territorial impacts of such developments (Fernandes, 2009).

The territorialization of wind projects was accompanied by promises to boost the municipality's economy through job creation and local development. The hegemonic discourse from the company and municipal administrations was (and still is) that the companies, upon entering the territory, create jobs and increase the income of residents, contributing to the economic growth of the municipality. However, nearly a decade after the initial project's implementation in the community, it is evident that the vulnerabilities have not been overcome, and unemployment and local development have not reached the anticipated levels of success, as initially promised by both parties.

In wind energy generation, the jobs created are temporary and low-skilled, primarily during the construction phase of projects (Lima, 2022). Once the construction of a wind farm is completed, the employment opportunities cease. During fieldwork, community residents reported leaving traditional artisanal fishing to work in construction jobs at the wind farms surrounding their community. When the construction ended, many returned to fishing. Concerns have arisen, particularly with offshore wind projects, about the enclosure of the sea, which could prevent fishing activities. One poignant remark from a conversation with fishermen was, "when the wind farm construction finished, I went back to the sea. If the wind farm is built in the sea, where will I work?". The state of Rio Grande do Norte has fourteen offshore wind farms undergoing environmental licensing, with seven planned along the coast of the traditional community of Enxu Queimado, totaling 921 wind turbines, around 55% of the total towers planned for installation on the state's coastline (IBAMA, 2024).

It is evident that the area in question is experiencing a multitude of adverse effects, including infringements upon the rights of local communities, conflicts, and disputes. This is of particular concern given the precarious situation of the artisanal fishing community of Enxu Queimado, which is facing challenges due to a lack of land ownership. The absence of legal documentation regarding land ownership facilitated the entry of this company into the traditional territory. According to the studies by Lima (2022) and Vital (2023), the company took advantage of this factor to lease or purchase the lands even before the start of the construction of the parks, thereby exacerbating social issues and territorial conflicts.

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The narrative around solutions for ensuring energy security in Brazil, associated with "clean energy," along with the urgency to meet the deadlines agreed upon in the Paris Agreement (2015), facilitated the construction of wind energy parks throughout Brazil. This was particularly due to the possibility of obtaining environmental licensing with only simplified studies, approving the construction of projects with "unforeseen" territorial impacts, whether they be environmental, social, economic, or even cultural. In addition to the impacts observed during field research, the traditional fishing community of Enxu Queimado has experienced the loss of both material and immaterial connections resulting from the construction of wind energy projects. In addition to the transformation of the landscape, the community has been significantly affected by land occupation, whether by the turbines or by fencing.

The construction of these parks initiated a process of transformation in the territory, which had previously remained unaltered by human intervention. The area was characterized by the presence of fishermen and subsistence agriculture, and the introduction of structures altered the landscape, influenced traditional practices and shaped the identity of the community. This resulted in the segregation of the community through the fencing of lands, which prevented or hindered access to collective use spaces, thereby reducing the original territory of this community. A significant issue is that these developments fail to recognize the community's fishing territory and the importance of shared spaces for life, work, and leisure, which have been disregarded by the company since the installation phase of the parks in the community. The enclosure of the territory results in changes to its use, leading to alterations across multiple dimensions and transforming social systems (Stock, 2022). Figures 1 and 2 illustrate the traditional fenced territory, which encompasses spaces for collective use, including the vazantes and the salt pond. This area was previously utilized for fishing *Artemia*, a species of microcrustacean that is a valuable resource for the community, both for consumption and for marketing.

Figures 1 and 2: Fencing of common spaces (dunes, lagoons and ebb and flow) by the wind energy company in the traditional fishing community of Enxu Queimado, Pedra Grande/RN.



Source: Field research records (May 2023).

Enxu Queimado was a territory in which there were no fences. Today, as can be seen in Figures 1 and 2, access to the territory is forbidden. If the signs, padlocks, fences, and armed surveillance weren't enough, ditches were dug to prevent the movement of residents, transport over the dunes, and even animals. Thus, the prohibition of access to the lagoons, the vazantes, the dunes, and even the orchards (located in the areas where the parks are built) can be characterized as a process of deterritorialization, as Lima (2022) points out.

The Simplified Environmental Report of the União dos Ventos 14 Wind Farm highlights the low territorial occupancy of wind projects, emphasizing "peaceful coexistence with other activities such as livestock farming, agriculture, fish farming, shrimp farming, etc., through shared land use, thus avoiding expropriations" (Biogeo Gestão e Projetos, 2015, p. 20). In this report, the company used an image of a wind project located in the municipality of Palmas, in the interior of the state of Paraná, as an example of this peaceful coexistence. However, the Eólio - Elétrica de Palmas wind farm, which is not part of a wind complex, has only five wind turbines, whereas the União dos Ventos 14 wind farm has ten turbines. All wind projects in the complex located in the community of Enxu Queimado together total 70 wind turbines, representing a significantly higher proportion than the illustration used in the Simplified Environmental Report.

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The territory that once belonged to the community and was used through socialization practices or as a source of income, has been transformed into private property (Pereira, 2021). It is noteworthy that this process is not exclusive to the case under analysis here; Stock and Birkenholtz (2024) reported on the privatization of common areas in India through the installation of photovoltaic projects. In line with this, as highlighted by Vital (2023), the communal space has now become "private" property, where to this day, the community gains access by cutting fences (an act of resistance), as a means to reclaim access to the territory historically occupied by the community, and also as a way to reject private ownership. It is important to note that with the installation of wind turbines, the community became completely surrounded by wind turbines. Currently, members of the community are organized to confront this situation; however, they are surrounded by instances of violence perpetrated by external agents and by environmental, social, and economic damages that violate their way of life (Vital, 2023).

What does this enclosure signify? Marx (2013 [1867]), in his discussion of primitive accumulation, already noted that the enclosures that took place in England in the 17th century resulted in the monopoly of large leases, increased prices of subsistence means, depopulation, and the usurpation of communal land. During the global land rush of the early 21st century, attention was drawn to observe this process as new enclosures (White et al., 2022; Cotula, 2013). Given the current reality, there is an urgent need for reflection on the enclosures promoted by wind projects, justified by the imperative of energy transition, with Enxu Queimado being a case in point.

Closing remarks

Climate change is an urgent reality that needs to be debated at all scales. The issues highlighted in this text refer to solutions via the market, which in essence continue to reproduce the capitalist logic and reinforce the historical patterns of extractivism. This guarantees the possibility of profit regardless of the territorial impacts generated and/or suffered at local level. The energy transition is not a recent issue; its rise in the international geopolitical debate dates back to the oil crises of the 1970s, already under neoliberal auspices, mainly to boost the diversification of the energy matrix, reducing dependence on non-renewable sources such as oil. It is the crisis of capital itself, seen as the convergence of multiple crises, that has taken up the debate on the transition by spreading the narrative of "clean" energies. In the meantime, wind and photovoltaic energies have emerged with ample opportunities to meet the demands of the energy transition discourse by expanding the use of renewable energies, while also diversifying the investment portfolios of capitalist agents.

In Brazil, the energy supply crisis of 2001 endorsed regulations that tried to encourage the diversification of the energy matrix. These measures were not effective in the subsequent period, but they certainly contributed to the favorable environment for the installation of wind farms today. The Northeast region and its well-known wind power potential made it possible for numerous projects to be installed, at first on the coasts of the states, especially Rio Grande do Norte and Ceará, and gradually moving inland. In the fishing community of Enxu Queimado in the municipality of Pedra Grande, the territorial impacts caused by the installation of wind projects are perceptible, whether material or immaterial. The deprivation of the use of collective spaces with the establishment of fences by the company that manages the parks stands out as a process of deterritorialization, based on legal insecurity, since the residents of the fishing community do not have ownership of their land.

The occupation of rural areas by these large-scale energy generation projects makes it necessary to debate the resizing of the global race for land and the consequences of this model for the Brazilian agrarian question. The structure of land, property relations, production and work are profoundly modified, ultimately culminating in the de-territorialization of rural populations. The centralized generation model in which wind and photovoltaic energy generation has been developed is land-intensive and enclosure, as evidenced by the case of the Traditional Fishing Community of Enxu Queimado, is imminent. This model imposed on the diversity of traditional communities results in increased concentration of land and income, worsening poverty, food insecurity, violence and generating social conflicts, among other aggravating factors. This is why the argument that the current energy transition is a new frontier for capital accumulation is not a solution to the climate and environmental crisis, but an attempt to resolve it in order to guarantee the existence of the capitalist system of production.

The article began with a quote from the book "*A terra dá, a terra quer*," authored by *mestre Nêgo Bispo*. Throughout this book, Nêgo Bispo emphasizes the impacts of the territorialization of wind and photovoltaic projects on his territory in Piauí. The argument put forth by the quilombola leader revolves around the enclosure of his land through the appropriation of common goods such as wind and sun, continuing the historical legacy of colonialism. When discussing the territorialization of wind projects, the act of theft through enclosure becomes a reality in all territories where these "giant pinwheels," as Nêgo Bispo refers to them, are present.

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