Energy Research & Social Science 40 (2018) 82–88

Contents lists available at ScienceDirect

Energy Research & Social Science

journal homepage: www.elsevier.com/locate/erss

Perspectives

Wind power gone bad: Critiquing wind power planning processes in northeastern Brazil

Adryane Gorayeb[a,*], Christian Brannstrom[b], Antonio Jeovah de Andrade Meireles[a], Jocicléa de Sousa Mendes[a]

[a] Department of Geography, Universidade Federal do Ceará, Campus do Pici, Bloco 911, Fortaleza, CE 60455-900, Brazil
[b] Department of Geography, MS 3147, Texas A&M University, College Station, TX 77843, USA

ARTICLE INFO

Keywords:
Wind power
Conflict
Erasure
Traditional community

ABSTRACT

Social and political opposition to wind power in North America and Europe has complex origins, but recent analyses emphasize exclusionary planning processes and human attachment to cultural and physical landscapes. In the global South, knowledge is far less developed regarding reasons for opposition to wind power. Physical and economic marginalization of affected people, whose lands may be appropriated for wind farms, from the positive benefits of renewable power is thought to motivate opposition. We analyze results of pilot research on the planning and licensing process and mitigation policies responding to negative impacts of a wind farm in Ceará state, Brazil. The pilot work reveals flaws in siting wind farms and need for more careful approaches to mitigation policies. These preliminary findings suggest the need to modify policies and procedures governing Brazil's wind-power development and in locations elsewhere in the global South.

1. Introduction

A globally significant cluster of wind farms has developed in coastal areas of northeastern Brazil in response to government subsidies, high wind quality, and increasing demand for electricity. Installed wind power capacity (11.2 GW) places Brazil as the world's ninth-largest player and Latin America's leading country [1]. Rapid increases in capacity occurred in Ceará state, from 28.6 MW in 2005 [2] to 1.7 GW in July of 2017 [3]. Overall in Brazil, hydropower accounts for 66% of Brazil's total electricity generation, followed by natural gas (10%), biomass (8%), and wind (6%) [3]. Wind power may reach nearly 24 GW (12% of power generation) by 2024 [4].

This cluster of wind power generation resulted from an electricity crisis in 2001 caused by low water levels in reservoirs supporting hydroelectricity plants, leading to power outages and approximately US $10 billion in economic losses [5]. In response to the power crisis, government subsidies such as state-led auctions, reduced import duties, streamlined licensing, and finance from the national development bank stimulated wind farm construction [6,2,7], and high wind quality coinciding with low hydropower output [6,8]. Optimistic engineering estimates indicate that wind penetration in northeastern Brazil could reach 55% from 16 GW installed capacity by 2020 [9].

Most reports on Brazilian wind power ignore social, political, or environmental problems and portray utility-scale wind power as a "win–win situation" for the country ([6], p. 833). Wind farms "harmoniously share land with the original farm and ranch activities" while offering rents to landowners ([7], p. 441). Government documents describe wind power as "practically inoffensive" that should be implemented with "simplified means without requiring detailed and lengthy environmental impact studies" ([10], p. 3).

Injustices in siting processes and material benefits and disruptions to place attachment contribute to the "social gap" between broad support for renewable power and site-specific opposition [11,12]. Opposition to renewable power in North America and Europe originates from diverse and complex sources ranging from socioeconomic aspects to aesthetics and environmental concerns [48]. Another source of opposition results from challenges of renewable power to human attachment to cultural and physical landscapes [13–15].

Causes of social opposition to renewable energy outside the global North are poorly understood. In Mexico, procedural injustice and land tenure insecurity helped generate opposition [6,16–18], while top-down plans for solar power in Morocco have violated land claims [19]. In India, Yenneti et al. [20] argued that solar projects enclosed common land and harmed livelihoods. The emerging research gap in the global South includes the need to understand processes of siting decisions, land dispossession, and place attachment in determining opposition to

* Corresponding author.
E-mail addresses: gorayeb@ufc.br (A. Gorayeb), cbrannst@geos.tamu.edu (C. Brannstrom), meireles@ufc.br (A.J. de Andrade Meireles), jociclea30@hotmail.com (J. de Sousa Mendes).

https://doi.org/10.1016/j.erss.2017.11.027
Received 13 August 2017; Received in revised form 20 November 2017; Accepted 27 November 2017

renewable power development across a geographically diverse range of complex land tenure arrangements and socio-political systems. It is important to fill this knowledge gap because large land demands of utility-scale wind and solar power may generate a global land rush and produce social conflicts that strain weak political and economic institutions [21,22].

In this "Perspectives" essay we present results of a pilot study of an emblematic wind farm on the west coast of Ceará, Brazil, focusing on (1) how the planning processes "erased" a traditional community, making residents "invisible" to decision makers who provided necessary state approvals for construction of the wind farm and (2) unintended effects of a mitigation program. Social opposition, rooted in claims to land and resources occupied by the wind farm, led to mitigation efforts that produced mixed results for the community. Flaws in the licensing process and unintended consequences of mitigation efforts may be present in many other locations of wind power development but are not yet reported in the scholarly literature.

2. Background

Social scientists studying wind-power siting controversies in North America and Europe emphasize how the planning process, place attachment, and material benefits determine whether wind-power projects fail or succeed [23,15]. An example of institutional, financial, and multidimensional factors is the technocratic siting process, described by Baxter et al. [24] as "decide-announce-defend," which helped produce conflicts within communities hosting wind power in Ontario, Canada [25]. Procedural injustices, originating from technocratic planning processes that marginalize people from decision making, are a major source of opposition [26–28]. Distributional injustice, which describes how negative impacts are often felt by people who are not compensated for harms, adds to opposition [29]. When analyzed together using hypothetical wind farms in Europe, procedural justice is thought to have greater importance than distributional justice in determining social acceptance of wind power [30]. Wolsink [31], reporting on opposition to a coastal Netherlands wind farm, offered a similar critique of a "technocratic, top-down" decision to site turbines on a nearshore environment. Sovacool and Ratan [32] argue that participatory project siting is associated with sites of renewable power acceptance, a view supported by Pasqualetti [13,14], who argued that "imposition" of wind power spurred opposition among people whom wind farms had marginalized from resources without compensation.

Negative consequences of the "decide-announce-defend" model have been described by Juárez-Hernandéz and León [6], Huesca-Pérez et al. [17], and Rueda [16] for Mexico, while a synthesis of conflicts in northeastern Brazil revealed the importance of land-tenure insecurity [33], as suggested by Pasqualetti [13,14]. Rignall [19] studied the visibility of marginalized people by detailing "legal and bureaucratic procedures" that erased "political and resource claims" of people living near a solar energy project covering 3000 ha in Morocco. Government classifications of "waste" land helped authorities obtain land for a solar project in western India [20].

In Brazil, an important legal instrument supporting "decide-announce-defend" is simplified environmental licensing (*Relatório Ambiental Simplificado*; hereafter, RAS) for energy projects considered to have low environmental impact, including wind farms and other renewable energy projects [34]. Brazil's 2001 electricity crisis provided political cover for federal authorities to create a streamlined procedure for environmental licensing that would accelerate power generation: investors only had to present the RAS, which includes a declaration of the technician responsible stating that the project had low potential for environmental impact; a maximum 60-day period was imposed for licensing projects that were seen as necessary to increase electricity supply in Brazil. Notably, the RAS outlived the electricity crisis and was further institutionalized in 2014, when a federal environmental council issued a requirement that a full environmental impact report would be required only if wind farms were implemented in "fragile" environments such as dune fields and mangroves, or if wind farms required communities to be relocated [35].

However, Ceará notoriously lacks infrastructure, information, and bureaucratic controls that would reduce abuses in the RAS regime. For example, the owner of the largest environmental consulting firm hired by wind-energy firms in Ceará, which produced 50% of the RAS for Ceará's operational wind farms [36], was sentenced in 2014 to 32 years in prison for having produced biased environmental impact studies. A federal police operation, begun in 2008, apprehended complicit state environmental managers for issuing fraudulent licenses, although the guilty parties are appealing the sentence and verdict without having been jailed [37]. Moreover, demarcation of federal and private land in coastal Ceará has never been carried out, creating land tenure insecurity for traditional communities. These institutional weaknesses exist in a context where nearly 90% of Ceará's wind farms are located on or near dunes, beaches, and mangroves in search of high-quality wind. But these are also sites settled by traditional communities who engage in artisanal fishing and small-scale agriculture, often without formal legal title to land.

3. Methods and study site

Our findings are informed by several periods of field work in a community in coastal Ceará state that was the location of a 104 MW wind farm with 50 turbines (Fig. 1). The Praia Formosa wind farm, which started operation in August 2009, has the capacity to supply 7% of the state's electricity demand. The community, known as Xavier, is a traditional settlement of 22 families (66 residents) who rely on fishing with non-motorized boats, collection of shellfish and shrimp, and small-scale agriculture. No tourism infrastructure is present.

Between 2010 and 2016 our research in Xavier included several activities with community participation, such as participant observation, group workshops, transect walks, construction of a problem-potential matrix, and collective discussion regarding land-use planning, in addition to a structured survey and analysis of textual materials. Field notes and recordings from interviews were transcribed and organized according to major emergent themes. Participatory field work provided us with the knowledge to analyze documents contained in the RAS licensing process, obtained in the library of the state environmental licensing agency (Superintendência Estadual do Meio Ambiente do Ceará; SEMACE) in Fortaleza, the capital of Ceará state.

4. Results

Residents of Xavier beach did not have access to preliminary information regarding construction of the wind farm, conforming to the "decide-announce-defend" siting model, even though this is required under Brazilian law [34]. According to residents, technical staff from the wind power firm started surveying houses in 2005, shortly after the state government installed an anemometer ~20 km from Xavier [38]. The community receives no financial benefit from the wind farm such as rents, royalties, or social or community services even though construction of the wind farm buried interdunal lakes, impeded free access to goods and services outside the community, and created fear after one turbine exploded [39]. Below we discuss specific events and processes below that encouraged conflict.

4.1. Cartographic and physical erasure

Cartographic erasure is apparent on a 2002 map contained in the RAS. The map has several technical errors and omissions, the most egregious of which is the fact that the community living at Xavier Beach was not depicted. Fig. 2 compares the map in the RAS with the wind farm as built on dunes next to the Xavier community.

Only 200 m separate the nearest house from a wind turbine (Fig. 3),