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CLIMATE SOLUTIONS LAB

**Tracking Opposition to New Wind Infrastructure  
in the Developing World**

CSL White Paper

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## Introduction

Community opposition to wind power can drive up costs for developers and stymie policymakers' efforts to reduce greenhouse gases. In developing countries, how often do communities oppose wind power, why does the opposition happen, and to what extent will it become a barrier to clean energy expansion? This White Paper offers lessons learned for developers and policymakers seeking to promote climate policy goals while remaining sensitive to local community concerns.

To our knowledge there is no systematic data about opposition to wind in developing countries.<sup>1</sup> This is a significant oversight. The developing world has the majority of the world's operating and prospective wind farm capacity.<sup>2</sup> Yet there are significant knowledge gaps in our understanding of the social acceptance of wind in these important world regions.

Our work contributes foundational knowledge on this topic, in two respects. First, we complement work on North America<sup>3</sup> by measuring the prevalence of opposition to wind in the developing world, finding that opposition occurs on approximately the same scale. This affects a small but potentially significant number of projects: we find that 12.6% of coded projects are opposed with another 4.5% of projects subject to significant complaints that have not yet resulted in collective action.

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<sup>1</sup> Carley, Sanya, David M Konisky, Zoya Atiq and Nick Land. 2020. "Energy infrastructure, NIMBYism, and public opinion: a systematic literature review of three decades of empirical survey literature." *Environmental Research Letters* 15 093007.

<sup>2</sup> Global Energy Monitor. "Summary Tables." *Global Wind Power Tracker*. <https://globalenergymonitor.org/projects/global-wind-power-tracker/summary-tables/>.

<sup>3</sup> Giordano, Leanne S., Hilary S. Boudet, Anna Karmazina, Casey L. Taylor, and Brent S. Steel. "Opposition "overblown"? Community response to wind energy siting in the Western United States." *Energy Research & Social Science* 43 (2018): 119-131. Stokes, Leah C., Emma Franzblau, Jessica R. Lovering, and Chris Miljanich. "Prevalence and predictors of wind energy opposition in North America." *Proceedings of the National Academy of Sciences* 120, no. 40 (2023): e2302313120.

Second, we document the grievances of those opposing new wind projects. Contrary to narratives about NIMBY politics,<sup>4</sup> we find that the grievances of protesters typically combine concerns about biodiversity, land rights, and/or indigenous rights. We sketch several illustrative examples.

This opposition — while affecting a small minority of projects — matters because protest can derail efforts to site projects rejected by their host communities. Thus, local opposition can become a barrier to the expansion of clean energy globally. In the conclusion, we offer three lessons learned from our analysis.

## Data Collection

How much opposition is there to wind power? Two large-scale data collection efforts have tried to systematically measure the extent of opposition to wind development in North America. Looking at all proposed wind projects in the Western states of the United States from 2008-2013, Giordono et al. (2018) found that 12% of projects faced oppositional collective action - with opposition defined as community lawsuits, protests, or petition.<sup>5</sup> Stokes et al. (2023) conducted an analysis of all projects proposed between 2000 and 2016 and found that 17% of proposed projects in the United States and 18% of proposed wind projects in Canada were opposed, and that opposition was growing over time.<sup>6</sup> They defined opposition slightly more broadly to

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<sup>4</sup> See also Boyle, Kevin J, Jessica Boatwright, Sreeya Brahma, and Weibin Xu. 2019. "NIMBY, not, in siting community wind farms." *Resources and Energy Economics* 57(1): 85-100.

<sup>5</sup> Giordono, Leanne S., Hilary S. Boudet, Anna Karmazina, Casey L. Taylor, and Brent S. Steel. "Opposition "overblown"? Community response to wind energy siting in the Western United States." *Energy Research & Social Science* 43 (2018): 119-131.

<sup>6</sup> Stokes, Leah C., Emma Franzblau, Jessica R. Lovering, and Chris Miljanich. "Prevalence and predictors of wind energy opposition in North America." *Proceedings of the National Academy of Sciences* 120, no. 40 (2023): e2302313120.

include court challenges, legislative proposals, physical protests, and letters to the editor. In combination, both of these projects suggest that a small but potentially significant minority of projects are opposed.

To systematically track opposition to proposed wind infrastructure in the developing world, we first selected a random sample of 221 wind projects proposed in developing countries (excluding China)<sup>7</sup> as of May/July 2022. This sample was selected from the comprehensive list of 1,168 proposed wind projects over 20 MW listed in the Global Energy Monitor's "Global Wind Power Tracker" dataset.<sup>8</sup> We collected data on opposition around these projects from the time that they were first proposed until December 2024.

We then collected original data on the presence or absence of opposition to these 221 wind projects. We defined opposition quite broadly to include all events with two or more individuals or a civil society organization engaging in collective action to try to influence the outcome of the project. Our definition of collective action includes a full range of both contentious forms (e.g., public demonstrations, marches, pickets, strikes) and conventional forms (e.g., press conferences, speeches, petitioning).

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<sup>7</sup> While inclusion of China would be interesting given its significance in global wind power, we also suspect that the politics of power-generating infrastructure in China are sufficiently distinct to require separate investigation, and note a large literature focused on this topic. See: Alkon, Meir, and Audrye Wong. "Authoritarian energy transitions undermined? Environmental governance cycles in China's power sector." *Energy Research & Social Science* 68 (2020): 101531.

<sup>8</sup> Global Energy Monitor. "Global Wind Power Tracker." 2023. Available at: <https://globalenergymonitor.org/projects/global-wind-power-tracker/> (last accessed February 2025).

For each project, our team searched extensively on traditional and social media for any references to opposition. These searches were conducted in English as well as the native languages of the project site.<sup>9</sup> We spent a minimum of 30 minutes on each project to verify our coding. Where evidence of opposition was found, we also collected primary source documents that provided additional information about tactics and motivations. Our full sample was first coded by one researcher, followed by two secondary coders for sub-samples of the data. After training to refine and consistently apply the coding procedure, our coders reached an extremely high level of agreement in their classification of cases.<sup>10</sup>

## Results

We find that 12.7% of our sampled wind projects were opposed, which leads us to estimate that between 8.84% and 16.56% of projects globally are opposed. In addition, another 4.5% of projects were subject to complaints by locals (with no collective action at present), suggesting that they could become sites for opposition in the future. We observe that the majority of opposition to wind projects takes the form of protests, demonstrations, or marches and often culminates in attendance at community meetings or hearings regarding the project.

Qualitatively, we observed three prevalent types of complaints related to biodiversity, indigenous rights, and land rights. These objections were often layered together.

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<sup>9</sup> Members of our team were proficient in English, Arabic, French, Hindi, and Spanish. Other language searches were conducted using Google Translate.

<sup>10</sup> Our measure of intercoder reliability indicates 98.4% agreement amongst coders, with a Cohen's Kappa of 0.95.

For example, Canudos Wind Farm 1 (Complexo Eólico Canudos 1) is an onshore renewable energy project situated in Canudos, Bahia, Brazil. Developed and owned by Voltalia, a multinational energy company based in France, the Canudos wind farm project started construction in 2021 and became operational in 2022, boasting a capacity of 50 megawatts.<sup>11</sup>

This project encountered local outcry and opposition due to concerns regarding its impact on local biodiversity.<sup>12</sup> Opponents argue that Voltalia's decision to construct the Canudos wind farm in a Key Biodiversity Area (KBA), in close proximity to the habitat of the entire world's population of Lear's Macaws, an endangered species of birds, could potentially reverse decades of conservation efforts aimed at preserving this species.<sup>13</sup> In August 2021, 70 local organizations issued a public letter outlining the adverse effects the Canudos wind farm would have on biodiversity and the surrounding small-scale farmers, ranchers, and traditional communities, calling for Voltalia to halt the project.<sup>14</sup>

In another example, the Campo Lindo wind farm (Parque Eólico Campo Lindo) was announced and began construction in 2020 near Los Angeles city, Biobío Region,

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<sup>11</sup> "Voltalia Starts Construction of the Canudos 1 Wind Power Plant in the State of Bahia." *EvWind*, February 15, 2021. <https://www.evwind.es/2021/02/15/voltalia-starts-construction-of-the-canudos-1-wind-power-plant-in-the-state-of-bahia/79362>.

<sup>12</sup> Martins, Rafael, with Ramon Sahnkrow. "Brazil Faces Dilemma: Endangered Macaw vs. Wind Farm." *Phys.org*, May 23, 2023. <https://phys.org/news/2023-05-brazil-dilemma-endangered-macaw-farm.html>.

<sup>13</sup> "French Corporation Destroying Habitat of Endangered Brazilian Parrot: International Conservation Community Unites Against Turbine Threat." American Bird Conservancy, September 7, 2021. <https://abcbirds.org/news/voltalia-destroying-habitat-of-lears-macaw/>.

<sup>14</sup> "French Corporation Destroying Habitat of Endangered Brazilian Parrot: International Conservation Community Unites Against Turbine Threat." American Bird Conservancy, September 7, 2021. <https://abcbirds.org/news/voltalia-destroying-habitat-of-lears-macaw/>.

Chile.<sup>15</sup> Owned and operated by AES Andes, the onshore Campo Lindo wind farm was initially planned to have a capacity of 73 megawatts of renewable (MW) energy.<sup>16</sup> Part of a cluster of wind farm projects initially projected to total 480 MW,<sup>17</sup> the Campo Lindo project commenced commercial operation in 2023 with a capacity of 66 MW.<sup>18</sup>

The Campo Lindo project encountered consistent local opposition,<sup>19</sup> related to several different issues,<sup>20</sup> particularly from indigenous communities.<sup>21</sup> In July 2022, for instance, members of the indigenous Moluche group in Mulchén, Biobío Province, protested in Los Angeles against the construction of the Campo Lindo wind farm due to its anticipated negative impacts on their livelihoods and the ecosystem.<sup>22</sup> José Escalona, a Moluche community representative, stated that they were protesting for

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<sup>15</sup> "AES Gener Announces the Start of the Campo Lindo Wind Farm Project." *Portal Minero*, October 22, 2020. <https://www.portalminero.com/wp/aes-gener-anuncia-el-inicio-del-proyecto-parque-eolico-campo-lindo/>.

<sup>16</sup> "AES Gener Announces the Start of the Campo Lindo Wind Farm Project." *Portal Minero*, October 22, 2020. <https://www.portalminero.com/wp/aes-gener-anuncia-el-inicio-del-proyecto-parque-eolico-campo-lindo/>.

<sup>17</sup> "AES Gener Announces the Start of the Campo Lindo Wind Farm Project." *Portal Minero*, October 22, 2020. <https://www.portalminero.com/wp/aes-gener-anuncia-el-inicio-del-proyecto-parque-eolico-campo-lindo/>.

<sup>18</sup> "AES Andes Advances in Its Transformation Process with a New Wind Farm in Operation and Entry of New Renewable Projects." *AES Andes*, May 4, 2023. <https://www.aesandes.com/en/press-release/aes-andes-advances-its-transformation-process-new-wind-farm-operation-and-entry-new>.

<sup>19</sup> Leal, Christian. "Wind Project in Los Angeles Accused of Affecting Groundwater: Company Denies Damage." *BioBioChile*, January 22, 2022. <https://www.biobiochile.cl/especial/aqui-tierra/noticias/2022/01/22/acusan-a-proyecto-eolico-en-los-angeles-de-afectar-napas-subterranas-empresa-niega-danos.shtml>.

<sup>20</sup> *Latin American Observatory of Environmental Conflicts*. "Socio-Environmental Leader Denounces Harassment Amid Conflict Between Rural Communities of Los Ángeles and AES Andes." April 12, 2023. <https://olca.cl/articulo/nota.php?id=110047>.

<sup>21</sup> Martínez Tapia, Sandra. "Moluche Indigenous Community Protests Against Construction of Wind Farm in Los Angeles." *BioBioChile*, July 3, 2022.

<sup>22</sup> Martínez Tapia, Sandra. "Moluche Indigenous Community Protests Against Construction of Wind Farm in Los Angeles." *BioBioChile*, July 3, 2022. <https://www.biobiochile.cl/noticias/nacional/region-del-bio-bio/2022/07/03/comunidad-indigena-moluche-protesta-contra-construccion-de-parque-eolico-en-los-angeles.shtml>.



the “right to have a better quality of life, to conserve and preserve the environment, our biodiversity and our culture”.<sup>23</sup>

In other cases, opposition stemmed from the perception that developers had violated land rights or local agreements regarding land acquisition. For example, the Fuerza y Energía Limpia de Kukulcan wind farm was a proposed project in Sinanche, Yucatan, Mexico, in 2016. Owned by Aldesa Energías Renovables de Mexico SA de CV, it was planned to be developed with an operational capacity of 151 megawatts of renewable energy and a total of 72 wind turbines.<sup>24</sup> This wind farm was one of several wind energy projects that faced significant local opposition in the communities of Oaxaca and Yucatán. Opponents accused the developers of failure to fulfill payments and taking advantage of them during contract negotiations. They also complained that the agreements made with developers lacked provisions for protecting the ecosystem. Demands varied from legal action to address contract violations to halting the project altogether.<sup>25</sup> Eventually, a court ruled in favor of Sinanché residents and suspended the construction of the project in 2020 citing the company’s failure to process the required permits and to conduct adequate environmental impact assessments.<sup>26</sup>

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<sup>23</sup> Martínez Tapia, Sandra. "Moluche Indigenous Community Protests Against Construction of Wind Farm in Los Angeles." *BioBioChile*, July 3, 2022.

<https://www.biobiochile.cl/noticias/nacional/region-del-bio-bio/2022/07/03/comunidad-indigena-moluche-protesta-contra-construccion-de-parque-eolico-en-los-angeles.shtml>.

<sup>24</sup> "Clean Energy for the State." *Revista Yucatán*, August 2, 2016.

<https://www.revistayucatan.com/v1/merida/energia-limpia-para-el-estado/>.

<sup>25</sup> Fuentes Lopez, Guadalupe. "Before Wind Farms, Indigenous People Complained of Being Trampled. And They, and Governments, Ignored Them." *sinembargo.mx*, May 22, 2020.

<https://www.sinembargo.mx/3789827/eolicas-que-hoy-reclaman-a-amlo-timaron-a-indigenas-en-oaxaca-y-yucatan-y-violaron-ddhh-acusan/>.

<sup>26</sup> "Wind Farm Canceled in Sinanché." *Sol Yucatán*, May 7, 2020. <https://solyucatan.mx/cancelan-parque-eolico-en-sinanche/>.

## Conclusion: Implications for Wind Energy Expansion

Meeting the world's net-zero goals will require a massive scaling up of wind capacity. Our research shows that new wind projects typically lack opposition. That said, a small but significant minority of projects have been protested or otherwise opposed. The extent of opposition in the developing world is likely to be similar to what previous researchers have found in North America. This opposition holds the potential to make building wind more difficult, and may diffuse to other locations,<sup>27</sup> with implications for the green energy transition. In this context, we suggest that developers and policymakers would be wise to pay attention to local concerns regarding wind project setting. We also find that opposition to wind does not reflect a simple 'NIMBY' politics: those opposed often have specific grievances around biodiversity, land rights, and Indigenous rights.

We propose three ideas for how to improve the development of wind projects to better respond to local concerns. First, a common thread across many cases we examined is that developers have failed to communicate transparently and to follow through on promises made in the course of the project approval process. Whether this relates to payment for land acquired or implementing noise control measures, 'broken promises' often spur collective action. Developers need to deal honestly and transparently with local communities throughout the development process, especially those who have a history of being mistreated or historically marginalized.

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<sup>27</sup> Stokes, Leah C., Emma Franzblau, Jessica R. Lovering, and Chris Miljanich. "Prevalence and predictors of wind energy opposition in North America." *Proceedings of the National Academy of Sciences* 120, no. 40 (2023): e2302313120.

Second, our research shows that developers should anticipate opposition when they attempt to site onshore wind projects near important conservation areas. When possible, such setting should be avoided through early project biodiversity assessments and risk screenings. When such projects must go forward, project developers should follow the IUCN's guidelines for mitigating biodiversity impacts,<sup>28</sup> and communicate their plans to do so to local communities and other interested stakeholders.

Finally, opposition to wind often derives from specific local grievances around land use. Throughout the project lifecycle – from planning to design to construction to operation – developers should work cooperatively with stakeholders to develop solutions that address their unique concerns. For Indigenous communities in particular, developers are ethically obligated to obtain free and prior informed consent.<sup>29</sup> Our research shows that not doing so may result in disruptive local opposition with the potential to generate costly delays or cancellations of proposed projects.

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<sup>28</sup> Bennun, L., van Bochove, J., Ng, C., Fletcher, C., Wilson, D., Phair, N., Carbone, G. "Mitigating Biodiversity Impacts Associated with Solar and Wind Energy Development: Synthesis and Key Messages." Gland, Switzerland: IUCN and Cambridge, UK: The Biodiversity Consultancy, 2021. <https://portals.iucn.org/library/sites/library/files/documents/2021-004-En-Summ.pdf>.

<sup>29</sup>Food and Agriculture Organization of the United Nations. "Free, Prior and Informed Consent: An Indigenous Peoples' Right and a Good Practice for Local Communities." *FAO*, 2016. <https://openknowledge.fao.org/server/api/core/bitstreams/8a4bc655-3cf6-44b5-b6bb-ad2aeede5863/content>.