TRACING THE COSTS OF LOCAL OPPOSITION TO ENERGY INFRASTRUCTURE: EMPIRICAL INSIGHTS FROM THE CASE OF WIND ENERGY

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Overview

Climate change mitigation targets call for a significant scale-up of zero-carbon energy capacity, likely increasing the density of new energy infrastructure close to population centers and raising the associated risks of local opposition. Although social resistance to energy infrastructure projects can enable local communities to shape more participatory management and ownership structures, it may also induce severe managerial and socio-economic consequences, including project delays, additional planning costs, cancellations, suspensions, and violent protests (Temper 2020, Sovacool 2022). Several prior studies have investigated the reasons for local opposition to energy infrastructure (Lantz 2010, Petrova 2013, Susskind 2022), or examined specific economic impacts, e.g. by estimating effects of new renewable energy projects on real estate values (e.g., Hoen 2016, Droes 2021). However, no empirical study exists to document project-level costs of local opposition to energy projects and compare these costs across countries with different approaches to managing social resistance to energy infrastructure.

Gaining a better understanding of the project-level costs (e.g., legal and consulting fees, community benefit fund payments) of local opposition to new infrastructure is important for various reasons. First, better availability of empirical data can help improve estimates of overall costs of decarbonization pathways (e.g., by populating acceptance-related variables in energy-economic models). Second, comparing the costs of different approaches for opposition management can guide project developers, policymakers and communities in weighing these approaches' pros and cons and identifying best practices.

Here we advance research on energy infrastructure opposition and costs by developing a framework for identifying project- and system-level costs of local opposition to zero-carbon power projects, using wind power projects as an example to illustrate broader insights. Using a novel dataset of project-level costs in five countries, we show that costs related to local opposition have been stable or rising in most countries, even as capital expenditures for wind projects have trended downwards and countries have taken more active approaches to managing local opposition.

Methods

We collect empirical data on different types of project-level costs associated with local opposition, including legal and administrative fees, payments into community benefit funds, property devaluation compensation payments, and consulting fees. We assume the perspective of project developers and owners, taking monetary benefits to local communities as costs. We distinguish between proactive ways for manging local opposition, where a standardized approach exists for developers and wind farm owners to interact with and compensate local communities, and reactive approaches where conflicts are managed ad hoc. Our dataset contains 390 unique entries, each representing one project and summing over various project-level opposition costs extracted from from publicly available sources (e.g., reports from wind farm owners, data repositories by taxation authorities). The final dataset covers two decades (2000-2022) and four countries (Australia, Denmark, United Kingdom, United States). Using our data and project-level capital expenditures supplemented by country averages, we compute an estimate of opposition related costs as a percent of upfront installed costs, and compare estimated opposition

costs across pro-active and reactive cases. For the UK case, we also match the projects with community benefit funds with records in the Renewable Energy Project Database to compare the length of project pre-commissioning phases.

Results

Overall, the capacity-weighted average costs of local opposition in the four countries we study (Australia, Denmark, UK, U.S.) fall into a range of 1000-100,000 USD/MW or 0.3-10% of overall installed costs, with significant variation of local opposition costs across countries. Estimated opposition costs are highest for the U.S. (dominant approach: reactive) and UK (dominant approach: proactive), and lowest for Denmark (dominant approach: proactive) and Australia (dominant approach: reactive). The differences in estimated local opposition costs are not new but have persisted for more than a decade.

Trends in estimated opposition costs also vary across countries. In the UK, costs have trended upwards over the 2000-2022 period, driven in part by an increase in government recommendations for payments into community benefit funds. At the same time, new projects with associated community benefit funds (CBFs) exhibit reduced variability in pre-commissioning times compared to projects without a fund, demonstrating trade-offs between higher upfront costs and better project plannability. Interestingly, the variability in CBF payments in the UK has increased over time rather than decreased, despite the introduction of the payment recommendation as early as 2011.

Conclusions

Our preliminary findings indicate that proactive conflict management approaches do not necessarily reduce the estimated costs of local opposition relative to reactive approaches, although advantages of proactive approaches may manifest in other ways (e.g., better plannability). Importantly, estimated costs associated with local opposition fall into a similar range as other types of upfront non-hardware or "soft" costs of wind power projects, indicating a need to better document costs associated with social resistance and incorporate these costs in standard cost estimation practices (e.g., cost benchmarking).

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