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End of the line: environmental justice, energy justice, and opposition to power lines

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ABSTRACT

This study draws on environmental and energy justice research to develop the analysis of energy infrastructure opposition from a justice perspective. A comprehensive data set of 70 cases of opposition to socioenvironmental effects of proposed electricity power lines in North America was developed. The analysis of strategic frames used by opposition groups provides the basis for an evaluation of theoretical categories of justice, their empirical operationalization, and their limits. Four categories of justice are associated with eight of the 12 main types of frames. In turn, frames are connected to types of opposition actors in the analysis of sequences of justice-related actions and outcomes. Subnational governments are important actors in many cases that have outcomes of remediation and/or a decision not to build the line. Coalition breadth and opposition from federal government actors, marginalized groups, and environmentalists are also associated with those outcomes.

KEYWORDS Power lines; coalitions; environmental justice; energy justice; NIMBY

Introduction

The siting and construction of energy infrastructure pose a recognized political dilemma. From one perspective, the infrastructure may be necessary to meet broad policy goals, such as satisfying growth in energy consumption and providing support for the transition to a decarbonized energy system. Governments frequently back infrastructure development in the name of energy-supply reliability and greenhouse-gas reduction. From another perspective, the infrastructure is built on landscapes with pre-existing uses such as agriculture, recreation, ecosystem services, Indigenous stewardship, and wilderness preservation. Moreover, governments also provide protections for these other uses and against the health and environmental side effects of new infrastructure.

These contradictory values and policies generate the conditions for extensive conflicts over energy infrastructure development. Developers sometimes frame local opposition to energy infrastructure as self-centered 'NIMBY'

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(not-in-my-backyard) action that partially stems from a lack of knowledge about necessity. However, an extensive social science literature has painted a more complex picture and argued that the description is inadequate (e.g., Bell *et al.* 2013). In the case of power lines, researchers have found that local opposition is better characterized as based on concerns, risk perceptions, or beliefs that are anchored in place-based attachments and identities (Devine-Wright 2009). Other studies also point to the lack of democratic decision-making processes as an important concern of communities and source of opposition (e.g., Keir *et al.* 2014, Ceglarz *et al.* 2017).

One solution to address the conflicts is to improve procedural justice through better public participation and engagement in the decision-making process. Although public engagement helps to address the dilemma of conflicting values, we contribute to a broader approach to the study of the democratic governance of energy infrastructure and environmental conflict that recognizes the importance of political conflict and structural inequality (Cuppen 2017, Pellow 2018, Batel 2020). In developing this approach, we draw on perspectives from the literatures in environmental justice, energy justice, and local environmental mobilizations (e.g., Schlosberg 2013, Ogilvie and Rootes 2015, Fuller and McCauley 2016, Jenkins 2018). Because structural inequality limits the effectiveness of participatory and consultative approaches, siting conflicts often involve protracted mobilizations with broad coalitions and diverse tactics.

This study is based on a comprehensive data set of cases of public opposition to power-line siting or expansion proposals in the US and Canada from 2009 through 2019 (with updates into 2020). The North American context is of interest from a comparative perspective for several reasons. Continued population and demand growth, shifts in population to new regions, the vast expanses of territory covered by the grid, the interconnected continental grid, and the need to build power lines to connect new energy sources (including renewable energy) have motivated government actors to support new construction and expansion. These pro-development actors come into conflict with diverse goals such as wilderness preservation, alternative land use, strong property rights sentiment, and treaty rights for Indigenous (Native American and First Nation) territories. Moreover, the market-oriented political culture tends to weaken consultative processes and to result in high levels of mistrust of claims of necessity.

Through comparative analysis, we develop two main arguments. First, we shift the analysis of reasons for opposition from the study of individual beliefs and place attachments to the more publicly produced frames in the context of political conflict. We draw on the environmental and energy justice literatures to focus on how categories of justice can help to interpret the justice dimensions of local opposition, and in turn we show how the analysis of frames can help to clarify theoretical categories in environmental

and energy justice research. Second, we contribute to the environmental justice and local environmental mobilizations literatures by addressing a problem of great relevance to the communities involved: the relationship between strategy, including the selection of coalition partners and tactics, and outcomes defined as remediation or a decision to advance or retract the proposed project. We adopt the frequently used phrase 'end of the line' to suggest three meanings: the goal of some communities to bring about an end to the power-line project, the sense that priorities identified by community opposition groups can be at the end of the line of priorities, and the ends or values that are at play in the project to support and oppose a power-line.

Background

Beliefs, frames, and justice

Using surveys or content analysis, several researchers who have studied opposition to power lines have identified the concerns or reasons that people give for opposition (e.g., Cotton and Devine-Wright 2013, Keir *et al.* 2014). The research shows that local opposition is not based on technical misunderstanding or selfish NIMBY sentiment, as developers sometimes claim, but instead that opponents have complex attachments to their places, and they seek to defend pre-existing land uses. We build on these findings by developing an approach that focuses less on individual beliefs and more on publicly articulated frames that are part of strategic action in mobilizations that often involve coalitions (Walker 2012, Watts and Kaza 2013, Fuller and McCauley 2016). We then use the environmental and energy justice literatures to inform the analysis of frames.

The environmental justice literature has long recognized different types or forms of justice (Bullard 1994). Schlosberg (2004) argued that researchers tended to focus on distributive justice and that there was a need for greater attention to justice as participation and recognition. Distributive justice refers to the fair or just allocation of outcomes (including resources), and in environmental justice cases it frequently involves equitable treatment and outcomes. In contrast, justice as participation is understood here to be part of the broader family of concepts grouped under procedural justice, or the processes that enable legitimate and fair decisions (Bell and Carrick 2018). In the environmental justice context, the processes highlight access to participation in and influence on decision-making. Because fair procedures can help to ensure equitable outcomes, procedural and distributive justice can be closely linked.

Recognition justice involves respect for and acknowledgement of difference in contrast with the devaluation of categories of individuals and groups. This type of justice is particularly important where the oppression of

marginalized groups is salient (Walker 2012, Pellow 2018, Kojola and Pellow 2021). Although terminology in this area is imperfect, we will use the term 'marginalized groups' as the general category to refer to Indigenous societies; African American and Latinx communities; and other categories of ethnic or religious actors that have been historically marginalized. In the data set of power-line cases analyzed here, injustice related to marginalized groups appears in about 28% of the cases, and recognition justice frames appear largely in these cases. However, many of the cases also involve landowners and small businesses in rural areas with populations mostly of European descent. Although their ancestors were on the front lines of settler colonialism, the rural and mostly white communities now face ongoing attempts by nonlocal actors to recolonize the land, and in some cases the mostly white, rural communities make common cause with Indigenous nations.

Increasingly, environmental justice researchers have identified a fourth main type of justice, termed here 'ecological' justice (Pellow 2014, Celermajer *et al.* 2021). This perspective challenges the assumed dichotomy between 'wilderness' and 'civilization' by taking a non-anthropocentric perspective. Rather than focus on human dimensions as in the previous three types of justice, this perspective considers the effects of proposed infrastructure development on plant and animal species and on the ecosystems in which they are embedded.

There is significant overlap between the conceptualizations of justice in the environmental justice literature and discussions in the subsequent literature on energy justice. Although the energy justice literature generally does not highlight ecological justice, it does refer to distributive, procedural, and recognition justice (e.g., Sovacool and Dworkin 2015, Jenkins *et al.* 2016). The focus of attention in energy justice research can be more on policy, but some researchers also include community mobilizations. For example, Fuller and McCauley (2016) point to opposition to fossil-fuel extraction and electricity generation, which overlaps with environmental justice research. Energy justice studies also draw attention to frames that may not be salient in the environmental justice literature, such as the distributive justice frames of energy poverty and the cost savings benefits of energy-efficiency programs (Fuller and McCauley 2016).

In this study, we focus on four main categories of justice that have emerged consistently in the literature (distributive, procedural, recognitional, and ecological). We considered the capabilities perspective as another type of justice (Schlosberg 2013), but it was difficult to match it without overlap of the other four types of justice (see below). Likewise, we also considered the parallel concepts of energy and environmental democracy, which researchers have argued are closely related to justice (Bell and Carrick 2018, Jenkins 2018, Szulecki 2018). Although there is inconsistency in the definitions of energy democracy, researchers often identify two main

components: improvements in public participation in the governance of energy and calls for greater collective ownership or control of energy (Szulecki 2018, Van Veelen 2018). Because these components of energy democracy overlap with procedural and distributive justice, and because we did not find frames about collective ownership of energy in the data set, we will focus on the four main categories of environmental and energy justice.

The analysis of frames from a justice perspective provides a way of connecting various related strands of research. With respect to studies of energy infrastructure, we provide a model for the systematic and comprehensive analysis of the types of frames used and how the frames are connected with justice. With respect to environmental and energy justice studies, we show how theoretical discussions of the types of justice can be operationalized in empirical research that investigates which different types of justice frames are salient. However, we also identify other frames that are less easily accommodated to the concept of justice, and thus we can identify the limits of a justice approach to energy infrastructure opposition. For this part of the study, we ask the following research question:

Research question 1: What types of frames appear in community opposition to power lines in the data set, to what extent do the frames correspond with broad theoretical categories of justice, and what other frames are being used that are less easily characterized as justice-related?

Just outcomes

One of the problems identified in the environmental and energy justice literatures and in the power-lines siting literature is that even though there are important considerations of justice for the affected communities, developer coalitions (usually utilities, construction companies, and government allies) often resist attempts to gain remediation or reconsideration. Developers often determine the dimensions of the project, such as route options, during the upstream phase of the decision-making process (Cotton and Devine-Wright 2013). Public consultation can occur later, and community meetings can have the goals of limiting engagement to final route selection and of selling the project.

The widespread failure to attain procedural justice in the siting of power lines and other energy infrastructure can motivate other repertoires of action by affected communities (Cuppen 2017, Hess and Satcher 2019). Often their mobilizations involve forming coalitions across a wide range of different groups, and the frames noted above become attached to different categories of coalition members. Thus, we adopt the view that

frames are built, modified, and maintained in the context of strategic action and changing coalition partners (Hess 2019, Williams and Sovacool 2020). For example, rural landowners and urban homeowners are often focus on property rights, whereas parents whose children attend school near proposed power lines may be particularly concerned about health effects. Thus, an important part of studying the politics of infrastructure is to connect the analysis of values and frames to coalition composition.

With respect to tactics, coalitions select between institutional and extra-institutional tactics (e.g., protest), and different partners in the coalition may focus on one of the two broad categories of tactics. The two categories tend to be inversely related, and institutional tactics tend to be more prominent where there is support from actors in the government (Sherman 2011). Litigation is one of the possible institutional tactics, but it is not always effective, and it is difficult to find general patterns that relate litigation to outcomes (Hess and Satcher 2019).

With respect to coalition building, researchers have associated support for opposition from at least some government officials (local, subnational, or national) with favorable outcomes, even if other government officials support the proposal to develop the site (Sherman 2011, McAdam and Boudet 2012, Ogilvie and Rootes 2015, Hess and Satcher 2019). National government actors can also play an important role in outcomes, and in this sense the local mobilizations are often multi-scalar, especially for power lines that traverse long distances. However, support from national government actors is not always easily achieved because the issue salience varies across the different levels of government and over time (Rootes 2013).

The response of incumbent organizations and supporters of energy-infrastructure development also matters. Incumbent organizations can mobilize support among government officials and community groups, and their coalitions can also affect outcomes. For example, developers sometimes hold community meetings and make concessions about the siting of the power lines (both across space and above and below ground), and they sometimes agree to additional compensation packages.

Although justice can be defined broadly to include the long-term project of redressing the deep structural inequalities of society, in this study we focus more on the near-term problem of immediate justice-related outcomes. These outcomes can include a decision not to build the infrastructure, but they can also include a variety of forms of remediation, such as providing economic compensation, shifting power lines underground, and selecting different routes than those originally proposed. Thus, the second research question contributes to the analysis of outcomes in struggles associated with environmental justice and locally unwanted land use, and it does so in a way

that addresses an applied research question, that is, a problem of interest to coalitions on the ground:

Research question 2: Are tactics and actor types in coalitions (both opposing and supporting the proposed project) associated with the likelihood of gaining an outcome favorable to the opposition, and if so, in what ways?

Method

Data

The unit of analysis in this study is a case of opposition to planned power-line construction in Canada and the US. The inclusion criteria are as follows: the case was active during the period of 1 January 2009, through the end of 2019; the proposed project had opposition; and there was sufficient information available to develop a case study from documentary sources. To identify cases that met the inclusion criteria, searches were conducted in Proquest News and Newspapers for the time period. The initial searches used combinations of the term 'power line' or 'power N/1 line*' and controversy, oppose, or opposition. The review of sources resulted in the identification of 57 cases where proposed power lines in the US and Canada were associated with public opposition that was significant enough to generate sufficient data to develop a case study. Additional cases were identified using Internet search engines, including in French for the Quebec cases, with similar search terms, and new cases were identified in the course of the research. The information was updated in 2020 for ongoing cases. We include both US and Canadian cases for reasons discussed above, including the similar political culture and geography of the two countries.

Information for each case was gathered from a wide range of publicly available sources, including media reports, government documents, company reports, and opposition group websites and social media pages. Although it is possible that the method missed some cases of community opposition, the resulting data set (N = 78) is a fairly comprehensive group of cases with sustained public opposition during the period.

To develop the cases, the research team developed case studies that followed a detailed guide. The guide included the following sections for each case study: a timeline of events and opposition from the initial proposal to the outcome or the end of the year 2020; background information on the power line (voltage, length of the line, jurisdictions crossed, map); demographics of the communities involved (especially to identify marginalized groups); concerns or frames for opposition; opposition actors (local, state-

Table 1. Variables included in the analysis for research question 2.

Groups of Variables	N	Variables within Each Group
Outcomes (dependent variables)	5	Three main variables and three subcategories of outcomes for remediation: not built; remediation (significant compensation, major rerouting, and/or undergrounding); or combined not built and/or remediation
Conditions (independent variables)		
Opposition coalition actors	13	Organized local coalition to oppose the power line, local government, state or provincial government, local-state-provincial government, federal government, state or local environmentalists, national environmentalists, all environmentalists, consumer organizations, rural landowners, marginalized groups, local utility or other energy company, opposition coalition breadth (sum of previous)
Opposition coalition tactics	6	Litigation, rallies or protests, gaining an independent assessment, petitions, use of experts and formal research, articulate alternative plan
Power-line supporter actors	7	Local government, state or provincial government (other than electricity regulators), federal government (other than electricity regulators), environmentalists or renewable-energy industry, local or independent power agencies, other support, supporter coalition breadth (sum of previous)
Power-line supporter tactics	3	Formal research, community meetings, align project with sustainability benefits
Background conditions	2	Length in miles, number of states or provinces involved
Total	36	

Key: N = number of variables for each category

provincial, and national); regime actors (utilities, developers, government supporters); tactics for opposition actors; tactics for regime actors; outcomes (e.g., build, remediation, design change); assessment of the relationship between tactics and outcomes; and full references for each item in the case. (See Table 1. More details also appear in the results section.)

After each case was completed, the coauthors reviewed the case and sent it back with queries for additional information. In 2020, the research team reviewed all cases for consistency and provided additional information where gaps were identified. Cases ranged in length from 1013 words to 17,536 words, with a total of 222,657 words across all 78 cases (about 742 pages). The length of the power lines varied from 2 miles to 1000 miles, with a mean of 189 miles. Most power lines were intrastate, but 23 crossed multiple state or provincial jurisdictions. The average voltage was 357 kV, and the average duration of the case (including those in progress at the end of 2020) was 5.9 years.

Analytic strategy

The analytic strategy is in the tradition of comparative methods in the social sciences, where middle-N data sets are built by constructing variables from case studies (e.g., Ragin 2014). Thus, although the cases in the data set are

fairly detailed, we do not focus on individual case studies. An interview-based or ethnographic approach would be more appropriate for case study analysis, which could enable hypothesis development for a broader range of research questions. Likewise, if it were possible to develop a larger data set, multivariate analysis with a large set of variables is another alternative. Instead, the analytic strategy uses a middle method of systematic comparative research, where the goal is to answer the two research questions and to develop hypotheses about associations between strategy and outcomes.

The approach that we use to developing case studies enabled the cost-effective construction of a comprehensive data set for the specified scope, and the data set enabled systematic analysis that is not possible in case studies. However, the method has potential limitations. One possible limitation is that reliance on documentary sources could create a bias against cases that do not have any record on social media, mass media, web sites, and government documents, and these cases could involve less privileged communities and marginalized groups. However, only six cases were dropped because of lack of information, and these cases also appeared to have low opposition and did not have a higher percentage of marginalized groups than the main data set. Furthermore, our method enabled the inclusion of many cases (28%) that involved at least some opposition from a marginalized group. Thus, the method also captured cases that approximate classic community-based environmental justice struggles in addition to mobilizations led by white rural landowners, suburban homeowners, environmentalists, local governments, and a range of other actors.

Cases were coded on an Excel spreadsheet using theory-driven initial categories with modification as new categories emerged from the cases (Brooks *et al.* 2015). Following the master coder method (Syed and Nelson 2015), Hess completed the first round of coding by connecting each of the variables with information in the case by noting the exact location in the case where the variable appeared (e.g., presence or absence of litigation noted in section 8e of case #33) so that it was easy to find the rationale for the coding decision. Hess coded the entire data set of 78 cases. The second round of coding was completed by Pietzryk. Following a codebook, she independently coded variables for 75 of the 78 cases, then checked her results against those of the first round of coding by Hess, conferred with the case studies, and recorded discrepancies. Hess then reviewed the discrepancies and made corrections. Hess then converted the qualitative source for the variable (e.g., 8e) for each of the observations to a 1 if the variable was present in the case and 0 if it was not. For the analyses presented below, we excluded eight cases that were still in progress at the end of 2020 to have a data set of 70 cases.

For research question one, the categorization of frames began with those identified in a review of articles published between 2010 and 2020

that discussed the topic for power-line opposition (N = 27). In descending order of frequency across the 27 studies, the review identified the following categories: viewshed and noise, health risks from electromagnetic fields (EMFs), property values and rights, environment and ecosystems, unfair process of decision-making, other uses for the landscape (e.g., tourism), safety (e.g., airplane crashes, fire risk), not necessary or no local benefit, threats to agriculture, local job loss, and use of the infrastructure for fossil-fuel generation. The resulting process of iterative rounds of coding resulted in a modification of these categories, which included condensation, splitting (e.g., not necessary and no local benefit), and new categories of frames. The final list of frames appears in the results section.

In the analysis that follows, the four categories of justice described above are used to classify the different types of frames. Frames that did not provide a clear match were classified as residual categories. Thus, the analysis provides a way of assessing both the applicability of categories of justice to the frames used by opposition groups and the limits of those categories. We did not code for frames of developers and supporters because our research questions are focused on community opposition; moreover, developer frames were generally based on some version of a public necessity argument, which is required to gain regulatory approval.

For the second research question, we coded for tactics and categories of actors for both opposing and supporting coalitions. We use the term 'outcomes' following the terminology in comparative research. In the first stage of analysis for the second research question, an analysis of sequences was conducted. A sequence is an action by one or more actor types, the associated frames, and one of the three main types of outcomes. Each case was reviewed multiple times, sometimes with consultation of primary sources, to identify sequences. Sequences are not additive with respect to the cases because some cases had multiple sequences and some had none.

In the second stage, we used bivariate analyses to determine which conditions (similar to independent and control variables) were associated with the outcomes. Conditions include (for both opposition and supporters) the frames, tactics, types of coalition actors, and background conditions (length of the power line and number of state or provincial jurisdictions). Previous research was used to create a preliminary set of variables, which were then modified as new categories emerged from the cases. The phi measure was used to measure relationships between conditions and outcomes because it is generally preferred for binary data, and for this type of data, it is equivalent to the broadly understood Pearson's r. Note that assessments of association at the level of the whole data set do not imply or preclude causality at the level of case studies, and vice-versa. For example, in the data set as a whole,

litigation is not related to an outcome to build or not to build a power line, but in some individual cases litigation led to a blocking decision or remediation.

Results

We present our results in two subsections that correspond with the two parts of the background literature and the two associated research questions.

Justice and frames

The four types of justice we described above are used to categorize the frames of the opposition actors. Eight frames match the four justice categories well, and four frames are classified as residual categories. (See Table 2.) The frequency count is based on the number of cases where a frame appears at least once. We also found that although it was possible to categorize specific statements or reasons given for opposition with the frames, often frames were linked in ways that indicated connections across the different types of justice and even with the group of 'other frames'.

Distributive justice frames were so frequently used that it was necessary to break them into the four subcategories shown in Table 2. Generally, these frames drew attention to potential outcomes for communities, businesses, and residents. The category of 'high cost' refers to the cost of construction of the power line, and sometimes it points to the cost to the utility of construction and the likelihood that the costs would be passed on to consumers in the form of higher bills. In some cases, the 'high cost' frame was also linked to the 'not necessary' frame, where technical arguments were made to suggest that the justification for the new construction was not credible. The ecological justice frames points to effects on both the landscape and ecosystems, but they were sometimes also connected to the effects on the local economy (e.g., tourism and recreation industries) and to technical frames involving fire risk. Procedural justice frames include improper decision-making processes (sometimes accompanied by litigation or appeals of regulators' decisions), lack of transparency, and lack of notification. Procedural justice frames also are connected with other categories, including property rights, recognition justice for marginalized groups, and violations of various environmental protection laws. Recognition justice frames include lands controlled by Indigenous nations, neighborhoods (generally urban) of marginalized groups, and the Amish in rural areas. We did not find a need for a separate category of capabilities frames; however, some of the distributive justice frames, notably the health and safety frames and the effects on local economy frames, could also be considered relevant for the analysis of justice as capabilities.

Table 2. Frequency of the appearance of a frame at least once in a case.

Frame Type	N (%)	Description
Distributive Justice		
Effects on local economy	45 (64)	Negative effects on local industry and tax base
Health and safety	50 (71)	Risk from electromagnetic fields, noise from lines, construction effects
High cost	21 (30)	Construction cost, effects on consumer bills
No local benefit	10 (14)	Electricity only benefits distant customers and suppliers
Property	51 (73)	Effects on property values, opposition to eminent domain, unfair compensation
Ecological Justice	49 (70)	Threats to natural areas, wildlife, ecosystems
Procedural Justice	46 (66)	Unfair process
Recognition Justice	18 (26)	Native American or First Nation territory, ethnic or racial minority neighborhoods
Other frames		
Disaster risk	6 (9)	Potential for fire (mainly in arid states), toppled poles, landslides
Greenhouse-gas emissions	9 (13)	Power lines supply fossil-fuel energy or compete with local renewable energy
Not necessary	30 (43)	No evidence that the power line is needed
Viewshed	31 (44)	Effect on viewshed or landscape

The concept of justice is so broad that it can arguably be used to cover all of the frame types that were prominent in the cases. However, we classified four types of frames as residual, and they could also be characterized as sociotechnical or sociomaterial. With respect to the 'disaster' frame, several of the cases made a claim of potential risk from fire, landslides, or earthquakes (generally found in the cases in the more arid western United States). Another group of frames focused on greenhouse-gas emissions, such as the source of the electricity of some power lines in fossil-fuel generation and competition with renewable energy. The frame of 'not necessary' was often used as a counter-frame to the necessity frame of developers, which must be justified to gain regulatory approval. The opposition's frame was sometimes accompanied by expert research on the lack of good evidence for future demand projections and the potential for energy efficiency to meet demand. The fourth type of frame, viewshed, was often linked to property value or the tourism industry, and this use of the frame was included under property or effects on industry. However, viewshed frames sometimes also recognized the natural beauty of the area or the historic value of the landscape.

Even in the four residual frames, there were connections with justice. For example, the disaster and greenhouse-gas emissions frames have ecological and distributive justice implications. Likewise, the 'not necessary' frame was sometimes linked to procedural justice where it appeared in questions raised about procedures used to justify a necessity claim. Finally, the viewshed frame, when not instrumentalized as important for property values or the

tourist industry, was a type of recognition of the connection between the landscape and people.

Justice and outcomes

This section used three main categories of outcomes (with three subcategories for remediation): 'not built' indicates that the power line was not approved or not built; a 'combined outcome' is a decision not to build and/or to provide at least one type of remediation; and 'remediation' is broken down into three subtypes. First, a significant compensation package is an agreement to transfer funds, beyond standard tax or property payments, that is usually tied to local economic development or environmental amelioration. Second, remediation can mean a significant route change. If the changes were within the developer's original route options, they were classified as minor route changes; otherwise, they were classified as a major or significant route change. Third, remediation can mean an agreement to locate all or part of the power line underground. These outcome categories focus on the more immediate goals and effects rather than outcomes that involve the longer term and deeper structures of inequality.

Where there is an outcome that addresses the concerns of at least some community members that involve justice-related frames, the outcome can be considered justice-related. However, opponents often have differentiated goals, and a just outcome for one member of a coalition may be unjust for another. The situation is especially evident where route decisions have a zero-sum relationship between one group and another, such that some actors advocate for placement of the route in areas where there is also opposition. Other examples involve limited remediation for some groups and not others, such as agreeing to put only a portion of the line underground. Developers sometimes initially proposed multiple routes and limited remediation, both of which can weaken opposition by dividing it. Thus, outcomes are justice-related, but the type of justice and the question of for whom it applies varies across and within cases.

There were two main analyses. The first analysis is of the sequences, as defined above, of opposition actors and frames with respect to an outcome of interest. (See Table 3.) Across the different types of outcomes, local, state, or provincial government actors are the most prominent (other than local grassroots groups). Organized and unorganized grassroots citizen networks were ubiquitous and are not included in this analysis; however, in some cases, they preceded and motivated government involvement ($\text{phi} = .30$, $p < .05$).

With respect to the compensation outcome, most of the compensation packages provided funding for environmental amelioration, sometimes in combination with economic development funding for local or Indigenous

governments. Actor-frame couplings (e.g., local governments and local economic impact, environmentalists and ecological justice) matched these packages. Major route changes had similar coalition composition, but rural landowners were more prominent, and in these cases, property and ecological frames were frequently linked to their efforts. In several cases, Indigenous nations also opposed power lines in their territories.

For undergrounding cases, often only a portion of the line went underground, and local governments were involved as they addressed the concerns of citizens. Two of the nine cases with an underground outcome involved recognition of the undue burden of proposed routes on urban marginalized groups, and one included opposition from a Native American government. In the underground outcomes, health and safety frames (primarily risk from EMFs) were more evident. Developers resisted undergrounding because of the expense, and even where they agreed to limited undergrounding, they sometimes tried to shift the cost to the local government.

There were 19 cases with the 'not built' outcome. In 16 of the cases, there was opposition from local or state government officials, again often in combination with rural landowners and/or environmentalists. The frames with the highest frequency were threats to property, the local economy, and local ecology or the environment. In nine of the cases, there was a crucial decision by an influential institutional player (federal government entity, a state government utilities commission, a state supreme court, or local power company partners) that withdrew support and led to the collapse of the project. In seven of the other cases, the length of the line was short (under

Table 3. Outcomes, actor types, and number of sequences.

Description	Frequency (number of cases with attribute)
Compensation Package	10 cases
Actors	Local, state or provincial government (8), environmentalists (7), federal government (3), Indigenous government (3)
Frames	Ecological (6), local economy (4)
Major route change	18 cases
Actors	Local, state, or provincial government (14), rural landowners (8), environmentalists (7), marginalized group (5), federal government (4)
Frames	Property (11), ecological (10), health and safety (6), local economy (6), recognition (4), not necessary (2), viewshed (2)
Undergrounding	9 cases
Actors	Local, state, or provincial government (8), marginalized group (3)
Frames	Health and safety (5), local economic harm (2), property (2), recognition (2)
Not Built	19 cases
Actors	Local, state, or provincial government (16), rural landowners (11), environmentalists (11), federal government (4), marginalized group (3)
Frames	Property (14), local economic harm (13), ecology (11), health and safety (7), unfair process (6), not necessary (3), no local benefit (2), high cost (2), viewshed (2)

Note: Numbers in parentheses are the number of cases in which the frame or actor appears for the cases with the outcome type (e.g., compensation). Actors and frames are only shown if they appear in two or more sequences for each outcome.

100 miles), and local governments had more capacity to influence the decision not to build the line.

In summary, the configurations of actors and frames vary with outcome type. Support from government officials, especially at the local or state-provincial level, provided resources and credibility for the coalition. Environmentalists, rural landowners, and Indigenous nations were also prominent actors, especially in the cases with longer lines that traverse multiple political units. When federal government actors were involved, they could play a significant role in facilitating or blocking both remediation and the build decision.

The second analysis provides a complementary, synoptic view of the entire data set, using the variables described in Table 1 and with inclusion of supporter actors and tactics. Table 4 shows variables for which there was a correlation with one of the outcomes at the threshold ±.30, which is a standard threshold for a low association. Most of the variables did not meet this threshold.

Table 4 suggests several similarities to the qualitative analysis. Environmentalists are associated with compensation packages; marginalized groups are associated with undergrounding and combined remediation; and environmentalists, the federal government, and the breadth of coalition actors is associated with the combined remediation outcome. The importance of local and state/provincial government actors is not evident in this analysis even though, as the analysis above indicated, in many cases they played an important role. They are active in most cases in the data set (N = 51 out of 70), both 'successes' for opposition groups and failures.

For developers, the outcomes of undergrounding, major route changes, and compensation packages can also be treated as tactics that might affect a build decision, but the associations with the 'not built' outcome did not meet the threshold. In some cases, developers attempted to gain support for the power line by emphasizing its clean energy content and by recruiting

Table 4. Actors and conditions associated with three types of outcomes.

Actor	Comp.	Under.	Remed.	Not Built	Combined
Opposition Actors					
All environmentalist	.34**				.43***
Federal government					.30*
Marginalized group		.32**	.37**		
Opposition coalition breadth					.35**
Supporter Tactic					
Align with clean energy policy				.35**	.30*
Background Conditions					
Multiple states or provinces					.32**

Key: *p < .05, **p < .01, ***p < .001. Comp., significant compensation package, beyond tax or property payments; Under., accept portion underground; Remed., remediation as significant compensation, undergrounding, or major reroute; not built, decision not to build; and Combined, either remediation, not built, or both.

associated allies. For example, clean-energy was associated with support for the project from the local utilities (phi = .38, $p < .01$) and from the renewable energy industries and environmentalists (phi = .42, $p < .001$). In these cases, environmentalists sometimes split between the green-energy oriented groups (often non-local) that supported the power line and more locally oriented landscape groups that opposed it. Although our expectation was that this variable would benefit the cause of the supporter coalitions, it had a positive association with outcomes sought by opponents (not built and combined remediation). At the level of cases, some US cases with clean energy had strong opposition from local and/or state governments that saw no local benefit in the infrastructure, and the project of developing clean energy fell out of favor after the Trump administration came to power in 2016. The projects also tended to be long enough that they crossed multiple state government jurisdictions (phi = .26, $p < .05$), thus increasing the opportunities for the not built or remediation outcomes. In general, power lines that cross multiple state or provincial boundaries tended to be associated with a combined outcome.

We focus on bivariate relationships because the goal of the study is to identify relationships rather than to develop causal inferences with a full set of control variables. However, for an additional perspective, we ran models for the variables in Table 4 using logistic regression with the stepwise method (elimination). In these models, the only variables significantly associated with the combined outcome were environmentalist opposition and opposition from marginalized groups. In these cases, ecological and recognition justice were evident.

Discussion

To summarize, in response to the first research question, we take broad categories of justice (distributive, procedural, recognitional and ecological) and show how they can be utilized to categorize frames in environmental politics. We show that many of the frames are justice related and that distributive justice frames are most prominent. We also suggest the limits of the concept of justice for this type of project. By retaining a category of non-justice or residual frames, we identify where a frame is less about justice than some other value such as the accurate assessment of risk claims (albeit with some overlaps with justice frames).

Although there are some interpretive ambiguities in the use of categories of justice to characterize frames in power-line opposition, this approach provides benefits with respect to existing research. First, the justice perspective on opposition frames provides a theoretically consistent way of conceptualizing the reasons for opposition that is more rooted in structural inequality and collective action than social psychological approaches that focus on individual beliefs or place-based attachments. Second, by

addressing the question of the extent to which different forms of justice are more or less salient, the empirical analysis can help to evaluate the relevance of new categories of justice that are emerging in the theoretical discussions (e.g., Pellow 2014, 2018).

With respect to the second research question, we contribute to the analysis of outcomes for environmental justice, energy justice, and local environmental mobilizations. We suggest that although grassroots mobilizations and the breadth of coalition partners are likely to affect outcomes, government support of all types (local, state or provincial, federal, Indigenous) is often crucial for obtaining an outcome of not built or remediation. We identify combinations of actors and frames that are related to specific kinds of outcomes. For example, we show how environmentalists in combination with other actors play a role in gaining major compensation packages. With respect to the more specific power-line and energy infrastructure literatures, we also present a comprehensive list of the range of frames, which can provide a good basis for additional research.

The study also makes a methodological contribution by applying a middle-N comparative approach (that is, between large-N multivariate analysis and case studies) to the problem of public opposition and outcomes. The method shows a relationship between opposition actor types and outcomes, but it also faces some limitations. For example, it does not show a relationship between opposition tactics and outcomes in the data set as a whole. Although there were connections between tactics and outcomes in individual cases, such as effective petition drives or successful litigation, these relationships tend to wash out in the quantification process involved in stepping back to view the data set as a whole. Thus, there is a need for analysis at the level of the case study, especially for the more protracted cases with extensive mobilizations. More detailed case study work could also make it possible to develop a better understanding of how different political jurisdictions and levels of jurisdiction (local, state-provincial, and federal) affect tactics and outcomes. For most cases in this data set, the local and state-provincial governments were the most relevant, but future research could also examine differences between the federal government opportunity structures of different countries. For example, this data set indicates a significant association between multiple jurisdictions and the combined outcome (Table 4), but there is much room for additional work on the mechanisms and multi-scalar analysis.

Likewise, there is also an opportunity to expand the data set (geographically, temporally, or topically to other types of infrastructure) to get to a point where relationships become more evident in multivariate statistical analysis. In a larger data set, it could be possible to test more comprehensively additional control variables and different types of opposition to energy infrastructure.

Conclusion

The comparative analysis of opposition to power-line projects enables contributions to studies of environmental justice, energy justice, and energy infrastructure mobilizations. The study draws on and contributes to the environmental and energy justice literatures to show how the different types of justice can help to guide the interpretation of frames in energy opposition mobilizations. We also use the analysis of frames to explore both the relative salience of the different types of justice in the mobilizations and the boundaries or limits of applicability of the diverse concepts of justice to the frames.

The other main contribution to the literature is the comparative analysis of outcomes in the study of environmental justice and local environmental mobilizations. Although we found that there is great variation from case to case that makes generalization difficult, we did identify some patterns of association. We found that although grassroots mobilizations with citizen networks or local civil society organizations are important and often lead to government involvement, government partners play an important role in some types of outcomes. We also showed how to use the comparative method to disaggregate the categories of strategy and outcome in order to identify specific relationships between, for example, types of coalition partners and types of outcomes. These intriguing findings contribute to hypothesis development, new research questions, and opportunities for additional studies that are discussed above.

A broader implication of this study is to contribute to the use of systematic comparative analysis for both exploratory, theory-development purposes and the identification of relationships. This approach provides a middle way between large-N, quantitative, hypothesis testing and small-N, qualitative research. But more than a demonstration of the applicability of the method to advance research in environmental justice, energy justice, and energy infrastructure, we also select problems that are designed to contribute to the needs of communities. Activists, advocates, and government officials who wish to negotiate or oppose new energy infrastructure find themselves in a situation that often involves very powerful actors. For the opposition coalitions, it can be helpful to know what frames, tactics, and coalition partners are possible and how these elements of opposition strategy may be associated with different types of outcomes. The balance between the theory-oriented and practice-oriented research problems is not always easy to achieve, and the tendency is for studies to fall into a focus on either a theory-oriented project or an applied project. In this study, we develop a resolutely middle path, both methodologically and topically.

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