Local and regional conflicts in the energy transition

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Key points

- Energy conflicts occur mostly at regional and local scales.
- Distribution and procedural conflicts are the most common types of energy conflict.
- Energy conflicts entail material, spatial, temporal and actor dimensions.

Abstract

Energy transitions are accompanied by a range of conflicts, which mostly occur at local and regional scales. To help understand these, this chapter provides a typology of energy conflicts, of which the most common are distribution and procedural conflicts. Energy conflicts entail material, spatial, temporal and actor dimensions. For both major types of energy conflict and their different dimensions, the chapter provides empirical examples from Denmark and the United Kingdom. Energy conflicts are a challenge for energy transitions, but they are also drivers of social change, which are inherent in the pluralistic structure of modern societies.

Introduction: Energy transition as a contested issue

Attempts to transform the current centralized fossil fuel and nuclear energy system, and to expand renewables, are associated with a large number of conflicts. Many of these conflicts are related to geopolitical factors (Blondeel et al., 2021), such as contested narratives of energy transitions, peak oil, or the politics of phasing-out and phasing-in, as well as related power struggles and resource conflicts. Other conflicts stem from the multiple territorializations of energy politics in different nation states (Bridge and Gailing, 2020). As a result, even within a supranational entity such as the European Union, which has common policy instruments for a "Green New Deal" and an energy union strategy, it is not possible to speak of a truly uniform energy policy. Instead, the diversity of national policy designs, based on national traditions and specific national objectives, leads inevitably to disruptions and inconsistencies, and sometimes even to conflict, which can become even more apparent on a global or continental level it occurs in the course of military conflicts and wars (Yasmeen and Shah, 2024), which has often been the case in recent decades.

Energy politics is based on goals, policy instruments and subsidies defined by national governments. Each national energy transition is politically organized as a national phenomenon. But national energy policies only become effective at other scales: in regions and municipalities. On these small—local or regional—scales, old energy generation plants are being dismantled, open-cast mines closed, renewable energy plants built, etc. A national energy transition is ultimately made up of numerous, very different, local and regional energy transitions. Regions in which open-cast lignite mines are located or in which natural gas is extracted have actor constellations, infrastructural features and discursive practices that differ from the new energy landscapes dominated by wind farms, photovoltaic systems or biomass cultivation. This is true not only because of various material factors such as different infrastructural facilities or differences in the natural and geological environment, but also with regard to social differences: is it a relatively economically prosperous region where the inhabitants have the financial means to invest in the development of renewable energies—or not? Do the local residents have ownership of the land and other relevant means of production? Do the people of a municipality have opportunities to formally influence the procedures for decisions about siting?

Thus, spatial differentiation within nation states plays an important role in the way an energy transition is realized—and whether the related processes eventually lead to conflictive situations in regions and local communities. One specific aspect of these spatial

differentiations may result from regions' changed functions in the previously existing spatial division of labor: some regions may lose their status as energy production regions,some may gain this status and so on. Such roles are also moving from urban to rural areas, or vice versa, as a result of the energy transition. This is especially so because the decentralization of the energy system, in the course of the expansion of renewable energies, has so far led to the expansion of generation capacities, especially in rural areas (Gailing, 2022). These aspects of spatially uneven development between—or even within—specific energy regions may result in conflicts. Combined development is another source of conflict, which highlights how the remaining remnants of previous eras of energy generation come into conflict with new ones (Brophy, 2018). Conflicts may arise regarding the controversies over "new" and "old" energy spaces, with their different ways of relating to meanings, traditions and identities within the same region (Kuchler and Bridge, 2018; Gailing et al., 2020).

Even if the fundamental goals of a nationwide transition to renewable energies continue to meet with great approval, the construction of wind power plants and other new installations of renewables, such as solar and biogas plants or new transmission grids, may also be met with a great deal of resistance at local or regional scales. Martin Pasqualetti states: "The social barriers to renewable energy have been underappreciated and underexamined" (2011, p. 219). It is therefore often not so much the general question of the use of renewable energies, but their specific locations and resulting implications are the subject of conflicts. There is now a significant amount of research dedicated to protests against local and regional energy transition projects. This deals mainly with protests against wind power (Devine-Wright, 2011a; Reusswig et al., 2016; Wheeler, 2016), but also geothermal and solar energy systems (Pasqualetti, 2011; Yenneti et al., 2016; Kunze and Hertel, 2017) and the expansion of grid networks (Neukirch, 2016). Especially in the context of research on the political ecology or political economy of energy transitions, the embedding of local conflicts in global resource flows, power inequalities and financialization processes around renewable energies have also been addressed (Avila-Calero, 2017; Tornel, 2024). All these conflicts, whether in the Global South or Global North, pose specific and considerable challenges for regional development and local planning. Key challenges for resolving these conflicts include issues of transparency, acceptance and political participation, as well as questions regarding the financial participation of citizens.

This article addresses the topic as follows: firstly, we present a typology of local and regional energy conflicts. Then, we discuss aspects and dimensions of this typology, illustrating it with different empirical examples of local and regional energy conflicts. Finally, we conclude with the outlook for future research topics in the empirical field.

Dimensions and issues of local and regional energy conflicts: a typology

The large number of energy conflicts raises the question of whether, despite their often very small-scale nature, there are nevertheless general patterns and characteristics. The explanation that protests against wind turbines, for example, are solely due to a "NIMBY (Not in my Backyard)" attitude has been criticized in the literature as being too short-sighted (Bell et al., 2005; Reusswig et al., 2016). The theory of NIMBYism has been accused of delegitimizing opposition (Aitken, 2010; Devine-Wright, 2011b) and neglecting the arguments of local communities against infrastructure projects (Wolsink, 2006).

Based on a typology of conflict in the German energy transition (see Becker and Naumann, 2018), below we present a typology designed to depict similar and different types of conflict. This typology can help us to understand general patterns of energy conflict and to make them accessible in their diversity. The most common types of energy conflict include:

- *Distribution conflicts*, which relate to participation in financial returns as well as other gains from the construction of plants and the utilization of the electricity or heat generated. This is not only about the direct income generated by the plants, but also about tax payments in the municipalities where they are located or subsidized electricity or heat prices for residents.
- *Procedural conflicts*, which include planning and decision-making procedures, access to information and opportunities for participation, as well as the transparency and timing of decisions. Disputes about procedures center on the question of how and to whom planning is communicated.

Further types of conflict include *location and land use conflicts* which relate to the use of land for energy supply and its consequences for the landscape, odor and noise pollution. The shade caused by wind turbines, flashing radar lights, etc., are among the particularly controversial effects of the construction of energy infrastructures. *Identity conflicts* involve the overarching vision or imaginaries of the development of municipalities or regions; for example, whether a region sees itself as an "energy", "health" or "tourism" region. The issue here is what role the energy industry should play in the self-perception or external perception of municipalities and regions. *Conflicts over energy sources or technological conflicts* center on the fundamental question of whether to use certain energy sources or energy supply technologies. These conflicts also include the question of the general approval or rejection of the energy transition as a whole.

These types of conflict often occur in combination and intertwine with each other. Distribution and procedural issues, for example, can overlap and reinforce each other. One particular challenge is that energy conflicts often involve issues that are not directly related to energy—including personal harm. For example, ideas about nature and rurality, which play a key role in energy conflicts, also depend on personal experiences and social contexts (Wheeler, 2016, p. 128).

Energy supply issues can thus become an "outlet" where problems that go far beyond energy issues are expressed. Energy conflicts, especially in the small-scale context of regions and local communities, therefore always have a history. On the other hand, these conflicts can also have an impact on other fields of action. Disputes over wind turbines can "divide" entire villages,

while a successful energy co-operative or other organizations of an energy democracy (Wahlund and Palm, 2022) can also promote civic engagement in other areas of a municipality.

Furthermore, conflicts are often characterized by more than just two opposing parties. Fast (2015) distinguishes between discourses of "impatient support" and "idealistic support" as well as between discourses of "qualified" and "absolute opposition". From a historical perspective, Brinkman and Hirsh (2017) describe a "Please in My Backyard" (PIMBY) phenomenon for the construction of wind turbines in the rural Midwest of the USA. Current debates in urban and regional studies also refer to "Yes In My Back Yard" (YIMBY) attitudes (Wyly, 2022). In addition to those pro-energy policy ideas and their antagonists, there is another larger, sometimes indifferent group that the parties to the conflict aim to convince. Actors' roles should not be understood as static but can change again and again in the course of a conflict. Conflict locales are also important. The "arenas" of energy conflicts can be municipal committees, public events, but also online forums and social media.

Finally, when analyzing local energy conflicts, there are four dimensions to consider (Becker and Naumann, 2018). These go beyond the types of energy conflict and actor constellations involved to provide a general framework for analyzing conflicts. Firstly, the *material dimension* describes the specific object of a conflict, such as the expansion of an electricity grid or a planned biogas plant. The *spatial dimension* looks not only at the location of the conflict, how it spreads spatially and how it affects or is affected by other spatial scales, but also at how spatial conditions affect the conflict. Thirdly, the *temporal dimension* refers to the development history and course of a conflict, such as development paths and turning points. Fourthly, the *actor dimension* focuses on the actors involved in the conflict, their interests, resources and strategies, as well as who is able to assert themselves and in which constellations.

Overall, conflicts represent a "repoliticization" of the energy sector. Energy supply is thus being transformed from an area of technical, legal and business experts into a field of debate in which not only are technologies and locations subject to negotiation, but also the fundamental transformation of the energy system (and beyond). In the following section, we provide some examples of the different types and dimensions of energy conflicts.

Empirical illustrations of local and regional energy conflicts

Various examples of conflicts around energy infrastructures could be given at this point. However, this section uses cases only from Denmark and the UK (see **Fig. 1**) to illustrate the statements made in the previous section.

Distributional conflicts

In light of the imperatives of green growth and sustainable development, the expansion of renewable energy infrastructures is not only intended to tackle climate change but is also expected to contribute to economic development. However, while economic and climate-related benefits are usually argued to materialize at national levels, adverse impacts are often perceived as occurring at the local level where renewable energy facilities are placed (see for example, Haggett, 2011). Hence, distributional conflicts refer to the horizontal and vertical distribution of impacts and benefits of the energy transition across different scales and regions, in particular those emerging from the deployment of renewables. Distributional conflicts and concerns range from the localized consequences that emerge from the spatial distribution of renewable energy facilities to scalar tensions over the economic benefits of renewable energy expansions for local, regional, national and transnational actors. These include the distribution of socio-economic benefits in terms of the allocation of revenues between different localities or communities or along global value chains, as well as potential burdens in terms of losing access to land, altered livelihoods or compromised space-related values and amenities.

Fig. 1 Anti-wind farm rally in front of Scottish Parliament (2012). *Source:* own photograph by the authors.

In particular, the distribution of revenues and rents from harnessing renewable energy, generated through the capitalization and marketization of the energy generated by wind and solar farms has become a contentious issue in advanced energy transitions. There are manifold examples that give some indication of how distributional conflicts have not only become relevant in the energy transition, but also affect the trajectory of renewable energy developments in different contexts, especially in countries of the Global North that are deemed to be the frontrunners in the expansion of renewables.

(I)

Denmark is renowned as an international frontrunner in the energy transition. The development of renewable energy, especially the evolution of wind energy, has been strongly associated with the emergence of collective ownership of wind turbines, in terms of energy cooperatives as the principal business model in the early days of utilizing wind energy. Revenues generated by wind turbines have remained local, allowing members of cooperatives to profit from the electricity produced and sold, which was also remunerated with generous tariffs. Wind turbines have also allowed farmers who establish their own turbines to diversify their income. However, changing policies and the liberalization of the energy market, including the removal of local ownership requirements, have allowed commercial actors to enter the stage and to develop and own wind farms (Mendonca et al., 2009). This has led to a gradually changing ownership landscape of wind energy in Denmark, a process reinforced by technological advancements and progress within the wind industry, which has resulted in larger and more efficient, but also technologically more complex and costly wind turbines. These changes made it less viable for community groups to establish their own wind farm projects, whereas a greater policy focus on cost-efficiency and competition along with the need to increase renewable energy capacities to meet climate targets have favored large-scale projects. These conditions have contributed to a further commercialization of wind energy, driven by utilities and energy companies, leading to what has been described as a "paradigm shift" (Kirkegaard et al., 2020) in the Danish wind energy discourse. The displacement of collectively owned wind farm projects has gone hand in hand with the detachment of wind energy from the local economy, since revenues were increasingly harvested by regional or external companies, contributing to a dwindling local acceptance of new wind farm projects in rural Denmark (Mey and Diesendorf, 2018). To counteract this trend and respond to the heightened conflicts that were impeding the implementation of new wind farm projects, the Danish Government created incentives to involve local communities in commercial developments and reattach them financially to nearby wind farm projects (Olsen, 2018). These incentives included a co-ownership scheme through which wind farm owners were obliged to offer 20% of ownership shares to residents in the vicinity of planned wind farms, a fund to foster local investment in wind energy, and payments into municipal funds by the developers aimed at enhancing the livelihood and sustainable development of areas affected by wind turbines (Tegner Anker and Jørgensen, 2015; Jørgensen et al., 2020). A further approach to the alleviation of conflicts included financial compensation for potential negative impacts. However, the co-ownership scheme was revoked after a few years, as it did not fulfill the purpose and turned out to be rather impractical. It was replaced by an obligation to provide lump-sum payments to all neighboring properties. This was because some developers had been less vocal about the chance to buy shares, because share purchasing is not a financially appealing way to generate revenue at a time when electricity prices were low, and because wind farms are usually built in rural and marginalized areas where residents may have other economic priorities than investing in wind turbines. Generally, the option of owning individual shares in wind turbines also primarily benefits people who can afford to buy shares in the first place, which does not address the ontological underpinnings of distributive injustice. In order to meet short-term energy transition goals and open up new areas for renewable energy development, the Danish Government has currently taken a path that involves compensation and expropriation, whereas an envisioned increase of payments to neighboring properties and municipalities is supposed to incentivize their willingness to permit the designation of new priority areas for wind and solar farms. An obligation for wind farm owners to buy properties if neighbors wish to sell and move away formalized earlier practices involving agreements between developers and residents to purchase houses if wind farms are approved (Rudolph and Kirkegaard, 2019). However, developments in Denmark have shown how the issues of benefits, co-ownership and financial compensation not only become entangled in distributional conflicts underlying the energy transition but can also be tools for handling such conflicts.

(II)

A similar but more locally pronounced conflict over the distribution of benefits from harnessing wind energy has evolved in the UK. The Scottish Government pursues an energy transition agenda that envisages a critical role for local communities both in driving the transition forward and in benefitting from the local exploitation of renewable energy resources. On the one hand, this agenda pursues the goal of fostering greater autonomy and self-determination for dealing with socio-economic issues locally, through greater control of the utilization and capitalization of energy resources (Markantoni et al., 2018). On the other hand, it also involves expectations for wind farm developers to share the benefits of the commercial exploitation of renewable resources with local host communities in the shape of benefit payments (Kerr et al., 2017). While these payments are supposed to facilitate a positive developer-community relationship, appease conflicts and create local value in the absence of direct economic impacts, their underlying rationales can also entail conflicting perspectives (Macdonald et al., 2017; Määttä, 2024). The ambition to give communities more control over renewable energy has manifested in the establishment of several community organizations that have built their own renewable energy projects, usually small wind farms, with the support of governmental grants, bank loans and logistic guidance from governmental organizations. While these organizations function partly as charities, revenues from these projects are reinvested locally in order to enhance the livelihoods of communities and address local needs, whereas different organizations pursue different strategies and objectives to cope with the hardships of rural areas. Due to their setup, functionality and goals, local

organizations founded with the aim of establishing locally owned energy projects can be viewed as reaping redistributive, emancipatory and autonomous benefits from exploiting renewables.

These efforts have resulted in conflicts over entitlement to the utilization of wind energy and the distribution of revenues and rents in the Outer Hebrides (Rudolph and Tolnov Clausen, 2021; Wade and Rudolph, 2024). The biggest landowner on the Isle of Lewis has for many years wanted to have a large wind farm on its land in order to attract investment to the island and create jobs. Consequently, it has made a long-term land lease agreement with a foreign energy company to develop a wind farm project. However, despite substantial effort over two decades, this project has not yet been realized due to local environmental conflicts, which have led to a rescaled project, continuous changes in British energy policies, which have created uncertainty about financial support, and a failure to succeed in tenders for subsidies. However, in the meantime, several smaller and community-owned wind farm projects have been established on the island, either by leasing land from private landowners or buying up land and transferring it into community ownership enabled by Scottish land reform policies (Dalglish et al., 2018). Income from the electricity sold fulfills two purposes for the community organizations: refinancing the land buyout and supporting activities for community development. Given the success and local economic impact of these projects, other community groups are trying to establish their own wind turbines. However, their available land (the common grazings of crofters; that is, small landholdings for joint use) belongs to the big landowner and overlaps partially with the area already promised and leased to the external company. This has led to conflicts over access to land and the right to build turbines, where crofters have lodged objections to the large wind farm proposal while promoting locally owned wind farms, which would allow all profits to return to the community rather than going to a foreign company. While the landowner considers rental income from their land, community benefit payments and the possibility of co-ownership with the council as ways to grab value from wind turbines and its land, community groups argue that full ownership of a few wind turbines generates a much bigger economic impact than a share of the benefits and rents from a large wind farm (Wade and Rudolph, 2024). In addition, it would give communities more economic independence to make investments where they see fit rather than having local resources "colonized" by external developers. Hence, this conflict is not only about the distribution of impacts, but about the question of from where local development should be initiated (Rudolph and Tolnov Clausen, 2021), which also hints at identity conflicts. Overall, this conflict does not revolve just around the acceptance of or opposition to certain types of renewable energy development, but also concerns the issue of who is allowed to build and profit from wind turbines.

In a nutshell, a fundamental element of distributional conflicts involves questions of who is allowed or enabled to utilize and benefit from renewable energy, and how can or should economic gains be distributed in an equitable way.

(III)

Distributional conflicts over the energy transition also involve contentions over the distribution of renewable energy, in addition to the dissemination of the revenue from the electricity produced. In Ireland, this has found expression in two different but related issues. First, in the early stages of the rollout of wind energy in Ireland, British companies backed by the UK Government outlined plans to build onshore wind farms in Ireland and export the electricity back to the UK (The Independent, 2012). The rationale of this plan was, allegedly, to take pressure off the British countryside where the deployment of wind turbines had become increasingly contested due to their visual impact. These plans caused disputes about whether or not the expansion of wind energy by foreign companies reflected a new form of "green colonialism", extracting resources by grabbing land in Ireland while preserving the British countryside. They also affected the public discourse of wind farm development in Ireland by raising awareness of unequal power relations and distributive fairness in the use of wind energy and the achievement of energy targets (Brennan et al., 2017). Second, in the context of changing energy policies and the gradual abandonment of state support for renewable energy, power purchase agreements (PPAs) with utilities or corporations have increasingly replaced subsidies, but still provide long-term certainty over revenue streams. In the case of corporate PPAs, the offtaker of electricity is the end user rather than a distributor or reseller of electricity (Christophers, 2022). In Ireland, this has led to an increasingly important role for international tech companies like Microsoft, Facebook and Amazon in pushing the energy transition forward by means of PPAs to supply and satisfy the high electricity demand of their data centers. In turn, this development has evoked an almost symbiotic relationship between wind energy and data centers in rural Ireland, as data centers are encouraged to be located closer to sites of electricity generation (Breshnihan and Brodie, 2021). This has engendered a transformative energy culture (Breshnihan and Brodie, 2023), where some local stakeholders start to question "the forms of development that enable large-scale wind farms to go up" (Breshnihan and Brodie, 2024, p. 111). Distributional issues therefore also revolve around the use of electricity, as energy companies tend to rely on large corporate offtakers that dictate energy futures in some regions rather than on the state to catalyze development and disperse benefits.

Similar conflicts about extractive frontiers—akin to colonization—embedded in the rollout of renewable energy have also emerged in other countries. While they are more prevalent in transnational contexts in relation to energy production in countries of the Global South (e.g. Dunlap, 2021a; Alonso Serna, 2022), they have also become part of contested center-periphery relations within countries the Global North, such as Denmark (Rudolph and Kirkegaard, 2019), Norway (Normann, 2021; Karam and Shokrgozar, 2023) and France (Dunlap, 2021b).

Procedural conflicts

Procedural conflicts are related to the consequences of procedures for, and institutional approaches to, realizing the energy transition in general and the implementation of renewable energy projects in particular. The underlying understanding of the emergence

of procedural conflicts is that unfair or unjust processes also produce unjust outcomes. In reverse, this implies that democratic and equitable decision-making is fundamental to the production of just and fair outcomes. Hence, procedural conflicts are closely linked to issues of procedural justice comprising access to information, meaningful participation during the decision-making process and possibilities for redress. However, there are many examples of procedural conflicts that have occurred either despite the use of democratic planning principles, or because of a deficiency in or absence of participatory processes in decision-making. The following examples showcase some of the reasons for and causal relations of procedural conflicts.

(I)

Denmark prides itself on its democratic planning principles and extensive chances for citizens to become involved in the siting, deployment and development of renewable energy projects. This has been reflected in the promotion of a "good process" of wind farm planning, as a code of conduct which sets out legal procedures underlying the planning of wind farms and, more importantly, the practical steps of including the public in the process. The rationale of the good process is that if the steps as they are enshrined in law are followed, the planning process will be "good" and straightforward, leading to fair, equitable and democratically founded planning decisions (Tolnov Clausen et al., 2021). In theory, the planning process for land-based projects in Denmark consists of two stages that are not very different from those in other European countries, including strategic and project planning phases (Armeni and Tegner Anker, 2019). The strategic planning phase, as part of spatial planning, principally involves the identification and designation of priority areas for renewable energy projects, whereas the subsequent project phase identifies a local plan by implementing a specific renewable energy project (Tegner Anker and Jørgensen, 2015). Both phases are carried out by municipalities as the planning authority, and provide opportunities for the public to articulate their interests, concerns and suggestions regarding location and project design, thus shaping the outcomes in terms of the site and setup of the final project. This takes the form of consultation periods during which citizens can submit written representations based on previously distributed information about the plans, and usually hearings where people can meet with developers and municipal planners to discuss and raise concerns about them in person. However, citizens have encountered challenges in the implementation of the processes, leading to conflicts over the actual influence that they have in informing the decision-making process (Tolnov Clausen et al., 2021). Amongst other issues, the participation process has often been perceived as "closed" and as failing to allow an open dialog and citizen influence due to predefined rules, power structures and poor timing. A lack of transparency in the flow of information during the consultation period and the technocratic and formalized manner in which participatory events have been conducted have been felt to constrain the handling of people's actual concerns, despite the formal possibility of articulating their concerns (Tolnov Clausen et al., 2021). These conditions have not only ended in procedural conflicts over particular projects but have also given rise to an understanding of participatory processes as nothing more than a means of ensuring legitimacy rather than achieving co-produced or co-created outcomes (Gjørtler Elkjær and Horst, 2023; Gjørtler Elkjær et al., 2023). This mirrors a common deficiency of "invited participation", as members of civil society find themselves confined to the participatory conditions produced by the planning system (Cuppen et al., 2018; Tolnov Clausen et al., 2021).

(II)

In addition to the practical shortcomings already outlined, which constitute procedural conflicts in Denmark and elsewhere, there are structural and institutional flaws that interfere with the formal requirements of a "good process". First, in practice, not all municipalities in Denmark conduct a strategic planning process and create spatial plans for renewable energy projects, or they do not strictly enforce their plans, which allows developers to look for suitable sites elsewhere and integrate identified sites in plans retrospectively. While this provides developers with more flexibility, in practice it deprives citizens of a chance to participate in the planning process or revokes their preceding input into spatial planning. Second, given the increased scarcity of available sites for building viable and sufficiently large onshore wind farm projects in Denmark, there is greater competition between developers to get access to private land to build wind turbines. Without access to land, developers do not have a viable project. Hence, the scarcity of available land has induced a land rush in which developers hold private and clandestine negotiations with landowners to get access to land, as the very first step in initiating the development process. Only when access has been obtained are project plans made public and the municipality and adjacent community involved (Kirkegaard et al., 2023). However, this again deprives citizens of the opportunity to participate in locational decisions and instead creates grudges and resentments toward developers and landowners due to this lack of engagement. In turn, this situation gives landowners greater power to shape local energy futures and benefit financially from wind turbines. The same challenges seem to recur in relation to the large-scale rollout of solar farms in Denmark, which also tend to sideline municipalities. A similar process of provoking procedural injustices has been described in relation to a solar rush in Germany (Müller and Pampus, 2023).

(III)

Besides these practical issues, a particular procedural conflict has also recently occurred with regard to the planning procedure for offshore wind farms in Denmark, which has overthrown the institutional framework for handling offshore wind and caused a temporary halt to the planning process. The planning of offshore wind farms in Denmark is regulated by the Danish Energy Agency; it involved two different procedures for obtaining permits, either through government tenders for previously designated areas or a so-called "open-door procedure" through which developers take the initiative to choose and assess sites (Monteiro de Vasconcelos, 2022). In order to simplify the licensing process and ensure trust and investment certainty for developers, the Danish Energy Agency acted as a "one-stop-shop" and issued all permits. These licensing procedures differed to the extent that only the

government tenders were allowed to bid for subsidies by supporting the one that required the least financial backing, while the open-door-procedure did not include financial support. However, an infamous tender round for a particular offshore site resulted in several zero-bids, which meant that the interested developers no longer required financial support to build and operate wind farms, so that a lottery had to be used to select the winner of the concession to a marine area. The prospect that future offshore wind farms could be built without subsidies prompted an unprecedentedly large number of applications through the open-door route in a short period of time, which caused statutory conflicts within the Energy Agency. First, it was not prepared to handle the sheer number of proposals logistically on a first-come-first-served principle. Second, some of the proposed sites appeared to overlap with areas possibly already earmarked for future tenders. This caused the Energy Agency to suspend the open-door procedure and put all proposed projects on hold, fearing an interference with EU state aid law (DEA, 2023).

(IV)

A unique expression of procedural conflict over wind farm developments has also evolved in Ireland, largely grounded in the absence of legal requirements to involve affected communities in planning processes. Statutory guidelines encourage developers to engage with and consult communities during all planning stages, but there has been no mandatory requirement to do so (Brennan and van Rensburg, 2016). Thus, wind farm developers have often conducted community engagement as a box-ticking activity in order to comply with the minimum legislative requirements, which typically include the provision of information about projects that have essentially already been designed, thus limiting the influence of the affected communities (AstonEco, 2020). A code of practice for developing wind farms in Ireland also includes guidelines for community engagement, requiring developers to report on how they have enabled local communities to contribute to the planning process (DCCAE, 2016). Although communities are heard, in practice they are usually not given any meaningful way to contribute to the outcome and therefore perceive a lack of transparency in the way their concerns have been considered. Procedural conflicts have thus been articulated in frequent litigation during the later stages of planning, where developers have been sued on the grounds that they have not taken environmental and social impacts sufficiently into account. As a consequence, the Irish Wind Energy Association introduced a new community engagement strategy and acknowledged that, "We haven't always got it right in the past, but this new community engagement approach heralds a step change in how we intend to work with neighboring communities (…)" (IWEA, 2018, n.p.). This was later complemented and refined by a Stakeholder and Community Engagement Toolkit established by the Sustainable Energy Authority of Ireland (SEAI, 2023).

In summary, and in light of the empirical examples, procedural conflicts that occur during the energy transition may in future be aggravated by growing tensions between the required pace of transition, as well as the consequential need to streamline processes and maintain democratic planning principles. This also applies to other types of energy conflict, such as location and land use conflicts, identity conflicts or technological conflicts.

The empirical illustrations of previous, existing and emerging conflicts above have demonstrated that the different dimensions of conflicts cannot always (or easily) be separated but in practice are often interrelated and interdependent. In particular, distributional conflicts often go hand in hand with procedural issues, as the misrecognition, misrepresentation or lack of participation of local stakeholders is at risk of producing unjust outcomes, eventually involving an uneven distribution of burdens and benefits. More fundamentally, shedding critical light on the procedural and distributional character and implications of contestations over the expansion of renewable energy projects also requires us to reconsider the simple, narrow and judgmental views inherent in the alleged NIMBY rationales that are often accused of causing and fueling conflicts. Instead, there is a need to turn our attention to the local context, as well as to the regulatory conditions and political-economic underpinnings of the energy transition in order to understand the formation and manifestations of conflict (Batel, 2020; Batel and Rudolph, 2021).

Conclusion

Energy conflicts are often embedded in other local and regional disputes. For example, rural areas were and are also the sites of protests against district reforms, against the dismantling of infrastructural services such as schools, doctors' surgeries etc., but also of racist mobilizations against the accommodation of refugees. It should also be noted that infrastructural transformations are not only taking place in the energy sector. Wastewater disposal, telecommunications and the transport sector are also undergoing very different processes of change. These different transformations and conflicts must be examined for possible overlap.

Furthermore, energy conflicts must be placed in relation to overarching guiding principles of energy supply and beyond. Taking the debate about local and regional energy transitions as an example, we need to ask what general terms such as energy justice (Jenkins et al., 2016) or energy democracy (Becker and Naumann, 2017), which have not yet been conceptually or empirically defined, can encompass. How can questions of energy supply be linked to questions of spatial justice (Bouzarovski and Simcock, 2017; Yenneti et al., 2016).

Analyzing energy conflicts offers the opportunity to better understand the difficulties and contradictions of energy transitions to promote the sustainable transformation of the energy system. Energy conflicts can therefore make a valuable contribution to research on infrastructure and spatial development from both a theoretical-conceptual and an empirical perspective. In this regard, conflicts should not be interpreted exclusively as negative phenomena to be overcome. From a scientific perspective, instead, it is first of all interesting simply to understand and analyze conflicts. The typology presented here can be helpful in this regard. Local and regional energy conflicts are drivers of social change and like all conflicts (Dahrendorf, 1958; Coser, 1957) are inherent in the

pluralistic structure of modern societies (Eichenauer and Gailing, 2022). In this respect, politics in the field of local and regional energy transitions should not aim to create a supposed consensus, but rather to force confrontation between political opponents who are trying to push through their respective ideas of the common good, and organize it in a way that is compatible with a pluralistic understanding of democracy (cf. Mouffe, 2000; Krüger, 2021).

References

Aitken, M., 2010. Why we still don't understand the social aspects of wind power: a critique of key assumptions within the literature. Energy Policy 38, 1834—1841.

Alonso Serna, L., 2022. Land grabbing or value grabbing? Land rent and wind energy in the Isthmus of Tehuantepec, Oaxaca. Competition Change 26, 487—503.

Armeni, C., Tegner Anker, H., 2019. Public participation and appeal rights in the decision-making on wind energy infrastructure: a comparative analysis of the Danish and English legal framework. J. Environ. Plann. Manag. 63, 842—861.

AstonEco, 2020. Earning local support for wind energy projects in Ireland. Literature Review. AstonEco & NUI Galway. https://www.seai.ie/documents/research-projects/RDD-000569-03-Literature-Review.pdf.

Avila-Calero, S., 2017. Contesting energy transitions: wind power and conflicts in the Isthmus of tehuantepec. J. Polit. Ecol. 24, 992—1012.

Batel, S., 2020. Research on the social acceptance of renewable energy technologies: past, present and future. Energy Res. Social Sci. 68, 101544.

Batel, S., Rudolph, D., 2021. A Critical Approach to the Social Acceptance of Renewable Energy Infrastructure. Going Beyond Green Growth and Sustainability. Palgrave Macmillan, Cham.

Becker, S., Naumann, M., 2018. Energiekonflikte erkennen und nutzen. In: Kühne, O., Weber, F. (Eds.), Bausteine der Energiewende. Springer VS, Wiesbaden, pp. 509—522.

Becker, S., Naumann, M., 2017. Energy democracy: mapping the debate on energy alternatives. Geogr. Compass 11, e12321.

Bell, D., Gray, T., Haggett, C., 2005. The "Social Gap" in wind farm siting decisions: explanations and policy responses. Environ. Polit. 14, 460—477.

Blondeel, M., Bradshaw, M.J., Bridge, G., Kuzemko, C., 2021. The geopolitics of energy system transformation: a review. Geogr. Compass 15, e12580.

Bouzarovski, S., Simcock, N., 2017. Spatializing energy justice. Energy Policy 107, 640—648.

Brennan, N., van Rensburg, T.M., 2016. Wind farm externalities and public preferences for community consultation in Ireland: a discrete choice experiments approach. Energy Policy 94, 355—365.

Brennan, N., van Rensburg, T.M., Morris, C., 2017. Public acceptance of large-scale wind energy generation for export from Ireland to the UK: evidence from Ireland. J. Environ. Plann. Manag. 60, 1967—1992.

Breshnihan, P., Brodie, P., 2021. New extractive frontiers in Ireland and the moebius strip of wind/data. Environ. Plann. 4, 1645—1664.

Breshnihan, P., Brodie, P., 2023. Data sinks, carbon services: waste, storage and energy cultures on Ireland's peat bogs. New Media Soc. 25, 381—383.

Breshnihan, P., Brodie, P., 2024. From toxic industries to green extractivism: rural environmental struggles, multinational corporations and Ireland's postcolonial ecological regime. Ir. Stud. Rev. 32, 93—122.

Bridge, G., Gailing, L., 2020. New energy spaces: towards a geographical political economy of energy transition. Environ. Plann. 52, 1037—1050.

Brinkman, J., Hirsh, R., 2017. Welcoming wind turbines and the PIMBY ("Please in My backyard") phenomenon: the culture of the machine in the rural American midwest. Technol. Cult. 58, 335—367.

Brophy, S., 2018. The explanatory value of the theory of uneven and combined development. Available at: http://www.historicalmaterialism.org/blog/explanatory-value-theory-uneven-and-combineddevelopment. (Accessed 20 May 2020).

Christophers, B., 2022. Taking renewables to market: prospects for the after-subsidy energy transition. The 2021 antipode RGS-IBG lecture. Antipode 54, 1519—1544.

Coser, L.A., 1957. Social conflict and the theory of social change. Br. J. Sociol. 8, 197—207.

Cuppen, E., 2018. The value of social conflicts. Critiquing invited participation in energy projects. Energy Res. Social Sci. 38, 28—32.

Dahrendorf, R., 1958. Toward a theory of social conflict. J. Conflict Resolut. 2, 170—183.

Dalglish, C., Alan, L., Brophy, K., Macgregor, G., 2018. Justice, development and the land: the social context of Scotland's energy transition. Landsc. Res. 43, 517—528.

DCCAE — Department of Communications, Climate Actions and Environment, 2016. Code of practice for wind energy development in Ireland guidelines for community engagement. https://assets.gov.ie/109110/b419a104-e6df-4a3e-a7ef-172166932bee.pdf.

DEA — Danish Energy Agency, 2023. The Danish energy Agency invites to market dialogue on a potential transition scheme for the open door scheme. https://ens.dk/en/press/danish-energy-agency-invites-market-dialogue-potential-transition-scheme-open-door-scheme.

Devine-Wright, P., 2011a. Place attachment and public acceptance of renewable energy: a tidal energy case study. J. Environ. Psychol. 31, 336—343.

Devine-Wright, P., 2011b. From backyards to places: public engagement and the emplacement of renewable energy technologies. In: Devine-Wright, P. (Ed.), Renewable Energy and the Public. Earthscan, London, pp. 57—70.

Dunlap, A., 2021a. More wind energy colonialism(s) in Oaxaca? Reasonable findings, unacceptable development. Energy Res. Social Sci. 82, 102304.

Dunlap, A., 2021b. Spreading 'green' infrastructural harm: mapping conflicts and socio-ecological disruptions within the European Union's transnational energy grid. *Globalizations* 20, 907—931.

Eichenauer, E., Gailing, L., 2022. What triggers protest? — Understanding local conflict dynamics in renewable energy development. Land 11, 1700.

Fast, S., 2015. Qualified, absolute, idealistic, impatient: dimensions of host community responses to wind energy projects. Environ. Plann. 47, 1540—1557.

Gailing, L., 2022. Die Nicht-Linearität und Räumlichkeit der Energiewende verstehen. Institutionen, Materialität, Macht und Raum. Informationen zur Raumentwicklung 49, 26—35.

Gailing, L., Bues, A., Kern, K., Röhring, A., 2020. Socio-spatial dimensions in energy transitions: applying the TPSN framework to case studies in Germany. Environ. Plann. 52, 1112—1130.

Gjørtler Elkjær, L., Horst, M., 2023. Rights or resources? Local actor roles in "participation" and "co-creation" in wind energy transition. Energy Res. Social Sci. 97, 102966.

Gjørtler Elkjær, L., Rudolph, D., Horst, M., 2023. Different pasts, contested presents and desired futures: local narratives and identities in the co-production of a shared wind energy ownership model. Local Environ. 28, 1515—1533.

Haggett, C., 2011. Understanding public responses to offshore wind power. Energy Policy 39, 503—510.

IWEA [Irish Wind Energy Association], 2018. Community Engagement — Partnership & Progress. https://windenergyireland.com/images/files/9660bdff3ce17339b44c78b7a6c6f624edcaf7.pdf.

Jenkins, K., McCauley, D., Heffron, R., Stephan, H., 2016. Energy justice: a conceptual review. Energy Res. Social Sci. 11, 174—182.

Jørgensen, M.L., Tegner Anker, H., Lassen, J., 2020. Distributive fairness and local acceptance of wind turbines: the role of compensation schemes. Energy Policy 138, 111294.

Karam, A., Shokrgozar, S., 2023. "We have been invaded": wind energy sacrifice zones in Åfjord Municipality and their implications for Norway. Norsk Geografisk Tidsskrift 77, 183—196.

Kerr, S., Johnson, K., Weir, S., 2017. Understanding community benefit payments from renewable energy development. Energy Policy 105, 202—211.

Kirkegaard, J.K., Cronin, T., Nyborg, S., Karnøe, P., 2020. Paradigm shift in Danish wind power: the (un)sustainable transformation of a sector. J. Environ. Pol. Plann. 23, 97—113.

Kirkegaard, J.K., Rudolph, D., Nyborg, S., Cronin, T., 2023. The landrush of wind energy, its socio-material workings, and its political consequences: on the entanglement of land and wind assemblages in Denmark. Environ. Plann. C 41, 548—566.

Krüger, T., 2021. Energiekonflikte und Demokratiekrise. Eine radikaldemokratische Perspektive auf das Ringen um Gemeinwohlziele der Energiewende. Zeitschrift für Politikwissenschaft 31, 539–563.
Kuchler, M., Bridge, G., 2018. Down the black hole: sustaining national socio-technical imaginaries of coal in Poland. Energy Res. Social Sci. 41, 136–147.
Kunze, C., Hertel, M., 2017. Contested deep geothermal energy in Germany — the emergence of an environmental protest movement. Energy Res. Social Sci. 27, 174–180.
Macdonald, C., Glass, J., Creamer, E., 2017. What Is the benefit of community benefits? Exploring local perceptions of the provision of community benefits from a commercial wind energy Project. Scott. Geogr. J. 133, 172–191.
Määttä, S., 2024. Community-developer collaboration and voluntary community benefits in Scotland: are community benefits a gift or compensation? Energy Res. Social Sci., 114164
Markantoni, M., Steiner, A., Meador, J.E., Farmer, J., 2018. Do community empowerment and enabling state policies work in practice? Insights from a community development intervention in rural Scotland. Geoforum 97, 142–154.
Mendonca, M., Lacey, S., Hvelplund, F., 2009. Stability, participation, and transparency in renewable energy policy: lessons from Denmark and the United States. Policy Soc. 27, 379–398.
Mey, F., Diesendorf, M., 2018. Who owns an energy transition? Strategic action fields and community wind energy in Denmark. Energy Res. Social Sci. 35, 108–117.
Monteiro de Vasconcelos, R., Silva, L.L.C., Gonzales, M.O.A., Samtiso, A.M., de Melo, D.C., 2022. Environmental licensing for offshore wind farms: guidelines and policy implications for new markets. Energy Policy 171, 113248.
Mouffe, C., 2000. Deliberative Democracy or Agonistic Pluralism. Institute for Advanced Studies, Vienna.
Müller, K., Pampus, M., 2023. The solar rush: invisible land grabbing in East Germany. Int. J. Sustain. Energy 42, 1264–1277.
Neukirch, M., 2016. Protests against German electricity grid extension as a new social movement? A journey into the areas of conflict. Energy, Sustainability Soc. 6, 4.
Normann, S., 2021. Green colonialism in the Nordic context: exploring Southern Saami representations of wind energy development. J. Community Psychol. 49, 77–94.
Olsen, B.E., 2018. Community wind in Denmark. In: Holstenkamp, L., Radtke, J. (Eds.), Handbuch Energiewende und Partizipation. Springer VS, Wiesbaden, pp. 1037–1046.
Pasqualetti, M., 2011. Social barriers to renewable energy landscapes. Geogr. Rev. 101, 201–223.
Reusswig, F., Braun, F., Heger, I., Ludewig, T., Eichenauer, E., Lass, W., 2016. Against the wind: local opposition to the German Energiewende. Util. Policy 41, 214–227.
Rudolph, D., Tolnov Clausen, L., 2021. Ländliche Entwicklung auf der Basis erneuerbarer Energien? Emanzipatorische Potenziale zwischen radikaldemokratischer und neoliberaler Logik. PROKLA. Zeitschrift für kritische Sozialwissenschaft 204, 497–516.
Rudolph, D., Kirkegaard, J.K., 2019. Making space for wind farms: practices of territorial stigmatisation in rural Denmark. Antipode 53, 642–663.
SEAI [Sustainable Energy Authority of Ireland], 2023. Community energy resource toolkit. Stakeholder and Community Engagement. https://www.seai.ie/publications/community%20renewables%20stakeholder%20and%20community%20engagement.
The Independent, 2012. UK to outflank objectors with wind farms in Ireland. https://www.independent.co.uk/climate-change/news/uk-to-outflank-objectors-with-wind-farms-in-ireland-8202948.html.
Tegner Anker, H., Jørgensen, M.L., 2015. Mapping the Legal Framework for Siting Wind Turbines — Denmark. Department of Food and Resource Economics. University of Copenhagen, Frederiksberg. IFRO-Report, No 239.
Tolnov Clausen, L., Rudolph, D., Nyborg, S., 2021. The good process or the great illusion? A spatial perspective on public participation in Danish municipal wind turbine planning. J. Environ. Pol. Plann. 23, 732–751.
Tornel, C., 2024. Decolonizing the political economy of energy transitions: new energy spaces and pluriversal politics in Mexico. Rev. Int. Polit. Econ. 31, 1074–1098.
Wade, R., Rudolph, D., 2024. Making space for community energy: landed property as barrier and enabler of community wind projects. Geogr. Helv. 79, 35–50.
Wahlund, M., Palm, J., 2022. The role of energy democracy and energy citizenship for participatory energy transitions: a comprehensive review. Energy Res. Social Sci. 87, 102482.
Wheeler, R., 2016. Reconciling windfarms with rural place identity: exploring residents' attitudes to existing sites. Sociol. Rural. 57, 110–132.
Wolsink, M., 2006. Invalid theory impedes our understanding: a critique on the persistence of the Language of NIMBY. Trans. Inst. Br. Geogr. 31, 85–91.
Wyly, E., 2022. YIMBY: the latest frontier of gentrification. Int. J. Urban Reg. Res. 46, 319–330.
Yasmeen, R., Shah, W.U.H., 2024. Energy uncertainty, geopolitical conflict, and militarization matters for renewable and non-renewable energy development: perspectives from G7 economies. Energy 306, 132480.
Yenneti, K., Day, R., Golubchikov, O., 2016. Spatial justice and the land politics of renewables: dispossessing vulnerable communities through solar energy megaprojects. Geoforum 76, 90–99.