

Power, property, and participation: Rethinking the role of municipalities in German wind energy development

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1. Introduction

Municipalities play a crucial role in the transition to renewable energy technology, specifically wind energy. They are responsible for implementing state directives and adapting them to local conditions. In carrying out these tasks, municipal administrators must address the concerns of local citizens, which, regarding the expansion of wind energy, often involve issues of justice, such as the unequal distribution of benefits and burdens (Carley and Konisky, 2020; LaBelle, 2017; Jenkins et al., 2016; Groth and Vogt, 2014). Deeply intertwined with these questions of justice are issues of local acceptance for wind energy projects. For example, Brouwer et al. (2025) explore the difficulties commercial developers encounter when attempting to build local trust for onshore wind projects in the Netherlands. Their findings highlight that residents frequently view these developers as profit-driven outsiders with little regard for community well-being. Importantly, the authors emphasize that offering community benefits, in an effort to balance the benefits and burdens, does not necessarily ensure public acceptance—when engagement is poorly managed or benefits are perceived as misaligned with local needs, such efforts can actually reinforce negative attitudes toward wind energy initiatives (Brouwer et al., 2025, p. 2). Similarly, Kerker et al. (2024, p. 9) note that financial compensation can create tensions between those who receive payments and those who do not, reinforcing perceptions of an unjust distribution of wind energy's benefits and burdens. As Saglie et al. (2020, p. 148) point out, municipalities are caught in the middle of these dynamics and play a crucial role in shaping acceptance through inclusive processes and fair distribution of benefits. While they are often briefly mentioned as partners in wind energy projects, municipalities' potential contribution to local energy justice is frequently overlooked, in part because they are commonly subsumed under the ambiguous and underdefined umbrella of “energy communities” (see e.g. Bauwens et al., 2022; Baxter et al., 2020). Energy justice research mainly focuses on cooperatives and other civic energy projects, as their “characteristics include the involvement of the wider public (enabling the direct participation and ownership of

members), the pursuit of non-commercial benefits (such as the fostering of community spirit) and the motivation to accelerate the transition to sustainable energy systems (e.g., phasing out nuclear power, regaining local ownership and control of energy provision)” (Wierling et al., 2018). However, Yildiz et al. (2015, p. 64) find that a significant majority of energy cooperative members are male, highly educated and high-income individuals and as such are fairly exclusive. In contrast, local governments are meant to represent all citizens. “Representative democracy,” Palm et al. (2025, p. 6) write “also provides a more stable and long-term approach to energy planning”. While citizen-led initiatives are sometimes more focused on short-term goals or have limited resources to maintain sustainable engagement, municipally owned energy utilities (MEUs) aim to ensure “that energy projects can be planned and implemented over decades, thus providing consistency and reliability in energy transition efforts” (ibid.).

Against this background, this paper addresses the following research problem: despite the importance of municipalities in renewable energy governance, little is known about how municipal ownership of land, infrastructure, and energy assets affects questions of energy justice at the local level. Specifically, how does municipal ownership shape the distribution of benefits and burdens, decision-making power, and access to participation in the expansion of wind energy?

This topic is particularly relevant as Germany's energy transition increasingly depends on decentralized actors and locally negotiated arrangements. Understanding the justice implications of municipal ownership is thus essential for assessing whether local energy transitions can contribute to broader social equality rather than reproduce existing hierarchies. To explore these questions, this paper empirically examines the role of municipal ownership (particularly of assets such as land and wind turbines) in shaping local energy justice.

To address the role of municipalities (and MEUs) for local energy justice, it is crucial to consider and examine issues of property, specifically, the relation between the “Haves” and the “Have-Nots”, since property relations play a pivotal role in moderating the distribution of costs and benefits associated with wind energy expansion. Questions of

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property are deeply intertwined with power dynamics and social inequalities, as they govern access to land, ownership of wind turbines, and even rights to the energy resource itself (Sonnberger et al., 2024, p. 2). In this paper, I will apply the concept of property chains to explore the power asymmetries that unfold in the process of turning the resource wind into the commodity electricity and as such “along a line of different property objects (in particular, land, technologies, and the resource itself) with the involvement of various property holders (i.e., owners of specific property objects)” (Sonnberger et al., 2024, p. 2). This approach is instructive for a better understanding of the multiple property objects and property subjects and their relations that are involved in the process of turning wind into the commodity electricity, and sheds light on the power imbalances between property owners and non-owners, not just in terms of shareholding for wind energy projects, but also with regard to who gets to access wind suitable land parcels and technology, which is crucial for understanding who holds the power to decide on the degree of citizen involvement in renewable energy projects.

Using qualitative data, I will then investigate whether when municipalities take an active role and invest in wind energy through their public utility companies, they can ensure equitable access to essential goods and services, thus ensuring that all local citizens can benefit from local wind energy projects. This, I hypothesize, is only possible if certain property objects within the property chain of wind energy production, such as land, infrastructure companies, and wind turbines, are publicly owned. With this, I intend to contribute to a larger discussion on energy justice by highlighting the role of municipalities in an increasingly decentralized energy system and by exploring if and how the democratizing potential of municipalities can be useful in creating a locally just wind energy expansion.

The article is structured as follows: First, I briefly outline the conceptual foundations of energy justice and property chains. The next section examines the role of municipalities within the electricity market and their involvement in the expansion of wind energy. This is followed by a presentation of the empirical data and main findings regarding the role of municipalities in local wind energy expansion and the relevance of (municipal) ownership in this process. These findings are put in context and critically reflected upon in section 6, and further discussed in section 7. The paper concludes with a summary of key insights and final remarks.

2. Energy justice

The concept of energy justice seeks to identify injustices within energy systems, explore how they can be prevented or corrected, and ensure that the needs of disadvantaged or marginalized social groups are recognized (Jenkins et al., 2016, p. 5). It is grounded in three key principles: distributive justice, procedural justice, and recognition justice (Jenkins et al., 2016). These principles help operationalize the concept and assess how fairly energy projects are designed and implemented.

Distributive justice refers to the even distribution of costs and benefits. In the context of wind energy projects, such benefits are frequently financial in nature, including lease payments to landowners, compensation to nearby property owners municipal tax revenues, as well as “community payments or infrastructure investments” (Chewinski et al., 2023, p. 478). The costs or burdens associated with wind energy projects include noise pollution, shadow flicker, and restricted views, as well as investment risks. Procedural justice focuses on who can participate in decision-making processes that affect the distribution of costs and benefits (Jenkins et al., 2016, p. 12). The emphasis here is on understanding who determines participation in energy projects and how energy projects are implemented. Chewinski et al. (2023, p. 478) point to three measures of procedural justice, which are “public inclusion in planning processes; public influence in decision-making; and access to information about renewable energy development” Finally, recognition justice addresses the question of which groups in society are underrepresented

or systematically excluded in both distributive and procedural justice. It also considers whose needs and concerns are taken into account. It is primarily the responsibility of energy policy to address these injustices, for example through measures such as subsidies, pricing structures, and ensuring access to infrastructure (McCauley et al., 2013, p. 2).

Questions of energy justice are intrinsically linked to issues of ownership, since ownership and control of energy assets determine who benefits from energy production and who bears its risks and costs. It is therefore somewhat surprising that energy justice literature addresses ownership only implicitly. Much of this literature acknowledges the importance of ownership indirectly, by focusing primarily on community energy and their internal dynamics or, to a lesser extent, on “the actors and institutions that they are intertwined with” (Van Bommel and Höffken, 2021, p. 4). By contrast, energy research that engages more directly with ownership, rarely connects these discussions to the broader discourse on energy justice. For example, Traill and Cumbers (2025, p. 1810) emphasize the significance of infrastructural ownership in energy transitions, arguing that “ownership in relation to energy infrastructures and services is critical for urban actors to undertake the kinds of transformative strategies required to achieve zero carbon goals.” However, they do not consider the power relations embedded in ownership or their implications for procedural, distributional and recognition justice. Notably, Wansleben and Terhorst (2025, p. 2) highlight the role of municipal ownership in climate change mitigation, noting that “public infrastructures are considered to promote equality, whereas infrastructures under the control of private owners can serve to entrench inequalities” (own translation). Yet, while their critical analysis focuses on the distributive effects of the energy transition (specifically in the heating sector), they do not address questions of participation in decision-making processes. Drawing on the concept of property chains, I argue that understanding who can benefit from wind energy projects, and who is involved in or excluded from decision-making processes, requires and examination of property relations along the entire value chain of turning the commons wind into the asset electricity.

3. Property chains

The process of converting wind into electricity involves a series of steps, starting with securing the rights to access land, followed by the construction of wind turbines that capture the wind’s kinetic energy and convert it into electricity. Once generated, the electricity is measured, creating tradeable units, and then integrated into the grid for distribution to consumers (Sonnberger et al., 2024). In this process, the transformation of wind into a resource (electricity) also leads to the transformation of other resources—specifically land and technical infrastructure such as wind turbines and electricity grids (Sonnberger et al., 2024, p. 8). Sonnberger et al. (2024, p. 8) explain that land, electricity grids and wind turbines are all legally recognized as property objects, governed by laws that define who can own them and what rights property holders have over them. This system of legal codification is based on the concept of the “bundle of rights,” which sees property not as a single, unified concept but as a set of distinct rights. These typically include the right to use, exclude others from, access, transfer, and even destroy the property. Property rights are always embedded in cultural, political, and historical contexts, and are fundamentally tied to power relations. The rights associated with property are not neutral but reflect the social and political forces that shape who controls and benefits from resources. In this context, the expansion of wind energy involves not only navigating the complex property rights associated with both natural resources (like wind) and technical assets (like land and turbines), but also the power dynamics between different property subjects (those who own and control these resources and those that do not). Within the wind energy production, Sonnberger et al. (2024) identify three major property subjects: 1) Wind project companies; 2) Landowners and 3) Grid operators. These subjects hold a specific set of rights regarding the property objects wind turbines, electricity, land and the electricity grid.

They will be explored in the following.

3.1. Grid ownership

Since land in Germany is primarily privately, state-, or church-owned, and wind turbines are owned by private investors, co-operatives, public utilities or a combination of these actors, decisions regarding participation are made at various links within the property chain. The electricity grid, to a certain extent, poses an exception. The transmission grid is currently in the hands of four large provider companies, while the distribution grid, which is divided up into smaller regions, is managed by around 900 operators. What is now referred to as “natural monopoly” can be traced back to the historical development of the German/European electricity market:

“For much of the twentieth century and up until the 1990s, electricity sectors worldwide were largely controlled by either state- or privately owned, often vertically integrated, corporations heavily regulated as ‘natural monopolies’ in terms of prices, market participation, and investment. Language and the very meaning of electricity had carried connotations of being a right or a public and social good, especially in the developing world, where it was seen as essential for economic development.” (Ferguson-Cradler, 2020, p. 3)

However, the wave of deregulation in Europe in the late 1990s, driven by the creed “private before state”, did not stop at the German electricity market, leading to the liberalization of many areas of electricity production and their introduction to the competitive free market economy. The only exception was the electricity grid (meaning both transmission and distribution grids), as was reasoned that competition in the electricity market could only be possible if all competitors had guaranteed access to it (Führmann and Schlösser, 2008, p. 78). The rights that make up ownership of the electricity grid are significantly shaped and limited by public regulation. The operators do not own the grid per se, they are operators required to allow fair access for third party providers according to the German Energy Industry Act (§11(1) EnWG; §17(1) EnWG; §20(1) EnWG) and can only use the grid if they follow the rules set by the Federal Network Agency (“Bundesnetzagentur”). The right to transfer is limited, as it is subject to regulatory approval to prevent abuse of monopoly power (§4 EnWG). Grid operators have the right to profit, however, how much is tightly regulated by the Federal Network Agency. Thus, the electricity grid is an example of a hybrid property regime, in which the grid is nominally “owned,” but in practice, it functions as infrastructure commons under state-guaranteed access and regulatory oversight.

3.2. Landownership

While long underexplored, landownership has increasingly become a focal point in social science discussions on the expansion of wind energy (e.g. Kirkegaard et al., 2023; Pfeiffer and Sonnberger, 2025; Wade and Ellis, 2022; Wade and Rudolph, 2024). The use of wind is fundamentally tied to access to land, as without land, harnessing wind is impossible. As such, securing land represents the first and arguably most critical step in planning wind energy projects.

Germany aims to install 157 GW of wind energy capacity by 2035 (Umwelt, 2023). To accelerate the expansion of onshore wind energy, the German federal government has established specific land area targets for wind energy development in 2023 (Garcia, 2023, p. 5). These targets account for the land potential of each federal state (“Bundesland”), requiring the states to allocate certain percentages of their land area for wind energy. By the end of 2032, a total of two percent of Germany’s land area is to be made available for wind energy use (Garcia,

2023, p. 6).¹ Wind energy sites are designated by regional planning authorities at the state level (Bons et al., 2019, p. 46). However, not all federal states have completed their regional planning processes, in part because these plans have been contested in court (ibid.). In areas where regional planning is not finalized, additional land can be designated for wind energy through municipal land-use planning (Bons et al., 2019, p. 80). The practice of land designation, however, can vary significantly across municipalities and the actual use of private land generally requires the consent of landowners.

While land designation targets primarily apply to the federal states, these states can also establish municipal sub-targets, which obligate municipalities as the responsible planning authorities. In such cases, municipalities can fulfill their obligations by designating wind energy areas as special zones in their land-use plans, or through similar zoning designations (Garcia, 2023, p. 8).

With suitable land for renewable energy expansion becoming increasingly scarce, the competition for leasing land parcels in designated wind energy zones is intensifying. This has placed landowners in a position of considerable power (Pfeiffer and Sonnberger, 2025). They act as key veto players, capable not only of blocking projects by denying access to their land (right to exclude), even if it is in a designated wind energy zone, but also of determining who profits from wind energy by choosing to whom they lease usage rights (right to transfer). In doing so, they can secure significant rents from landownership (e.g. Wade and Rudolph, 2024) (right to profit). These profits are often independent of a project’s economic viability: landowners benefit from leasing their land to energy companies or cooperatives, regardless of whether the project ultimately succeeds (Pfeiffer and Sonnberger, 2025). As Pfeiffer and Sonnberger (2025) demonstrate, landowners hold substantial decision-making authority in wind energy implementation, including the ability to advance projects without the consent of nearby residents or even the local municipality, adding to local perceptions of unjust distributions of power, profits and burdens.

3.3. Technology ownership

Unlike landowners, wind turbine owners profit directly from wind energy projects. However, the amount of income they receive depends on several factors, including the land lease price (and thus the landowners), the turbine’s operational efficiency and other connected property subjects (such as banks, grid operators, etc.) (Sonnberger et al., 2024, p. 10). Furthermore, the structure of ownership plays a crucial role in determining the amount of revenue generated from these projects. For example, the tax rules and exemptions applied to wind energy projects, as well as the ability to depreciate asset value, are often closely tied to the ownership model and can significantly influence profitability.

Discussions on energy justice are often shaped by debates about participation in the ownership of wind turbines. This often brings energy cooperatives into focus, as they are characterized by the involvement of the wider public in terms of shares in and the planning of wind energy projects, allowing for direct participation and ownership by members (Wierling et al., 2018). Citizen energy projects focus on collectively investing in the necessary technology and sharing in the profits generated from selling electricity through power exchanges, feeding it into the public grid, or direct marketing. While there are various participation models, in citizen energy projects organized as limited liability companies (which is common for wind energy projects, rather than as co-operatives) the general rule is: the more one invests, the greater the potential for profit. This also reinforces economic inequalities, as those who have more financial resources to begin with, also benefit more from these projects. Apart from financial resources, these projects also require time resources, as well as a certain interest in self-management and

¹ As of 2023, 0.8 percent of the national land area is designated for wind energy (Garcia, 2023, p. 6).

renewable energy (Wittmayer et al., 2022, p. 10). As pointed out above, they are also fairly exclusive with regard to their intersectionality (Poppen, 2015; Yildiz et al., 2015) and thus do neither necessarily lead to a more just distribution of burdens and benefits among locals nor to a more inclusive, and accessible decision making process in wind energy planning (see also Wieg et al., 2022, p. 150).

4. Municipalities within the wind energy property chain

Questions of municipal ownership have been central to the development of the energy sector. In Europe during the 1980s and 1990s, austerity politics, combined with calls for the liberalization and unbundling of the European energy market, led to widespread privatization of energy transmission, distribution, and production infrastructures (Wagner and Berlo, 2017, pp. 396). However, while the liberalization was intended to foster greater competition, it paradoxically resulted in a consolidation of the market. Mergers and acquisitions in the German energy market reduced the number of major players to the “Big Four” companies (RWE, E.ON, EnBW, and Vattenfall). In this context, the effects of austerity were not only felt by municipalities but also by their ability to maintain public control over essential services (Wagner and Berlo, 2017, pp. 396). In Germany, municipalities finance themselves primarily through a combination of local taxes (such as property and trade taxes), state and federal transfers, and profits from municipal companies, such as municipal energy utilities. While some federal states have distribution mechanisms that allocate funds from rich to poor municipalities, this is not the norm. “[In] all of the federal states, the transfer system is primarily designed as a vertical equalization with a horizontal effect. This means the funds of the federal state are not equally distributed right from the start across the municipalities, but according to the capacity of the individual municipalities to generate their own income” (Thöne and Bullerjahn, 2020, p. 46). As municipal budgets were squeezed by rising debt and chronic underfunding, local governments were increasingly forced to privatize or sell off public assets, including energy infrastructure, in an attempt to mitigate financial pressure. This privatization trend, though aimed at addressing short-term fiscal challenges, further contributed to the market consolidation, as it facilitated the dominance of a few large corporations in the energy sector. It also, as Wagner and Berlo (2017, p. 397) note, did not address the medium-term financial issues of municipalities, ultimately threatening the provision of essential public services in sectors like infrastructure (e.g., gas, water, and electricity supply) and social services.

Because the promises of the “private over state” creed were not fulfilled, calls for a return to municipal ownership, especially in the energy sector, grew louder in the new millennium (Bauer et al., 2012, p. 7). The energy transition and the associated decentralization of the energy market require polycentric governance, providing municipalities with the opportunity to play an active role in the energy transition (Wagner et al., 2021; Wagner and Berlo, 2017). Thus, many municipalities have established their own municipal energy utilities (“Stadtwerke”) or decided to remunicipalize existing energy utilities and distribution grids after concessions for private owners had run out (Becker, 2017, p. 121). From 2005 to 2016 alone, Germany recorded 284 remunicipalizations within the energy sector (Becker, 2017, p. 118). This trend was partly driven by disappointment with the Big Four’s lack of progress in advancing renewable energy, as well as the largely unfulfilled promise of increased efficiency through privatization. Additionally, municipalities came to see energy sector profits as an important and necessary source of long-term funding for other welfare services (Becker, 2017, p. 121).

In Germany, MEUs are usually (majority-)owned by the municipality, which acts as a shareholder and exerts influence via the utility’s supervisory board (Wagner et al., 2021, p. 2). However, how much influence the municipality can factually exert is dependent on the legal form in which the company is organized. Most of the about 1.000

German MEUs are organized as limited liability companies, in which there is more entrepreneurial flexibility, while municipal utilities that are organized as institutions under public law (“Anstalt des öffentlichen Rechts”) are often more closely bound to municipal requirements. That means that, although the municipality often sets guidelines and targets (such as climate targets) for the MEUs and has decision power on authorizations for major investments or the strategic direction of them via municipal bodies (such as the local council or city council), limited liability energy utilities generally finance themselves through their own services and thus often have a certain degree of autonomy in operational matters in order to remain competitive within their market. In Germany, the municipal constitutions of the individual federal states provide the legal framework for the organization of municipalities. Since the supply of electricity is a service of general interest (“Daseinsvorsorge”) and therefore falls within the competence of the municipalities, the municipal constitutions provide a framework within which the municipalities can determine the organization of the supply of electricity themselves.

MEUs are “characterised by economic involvement along the whole value chain of energy supply. Their main activities are therefore the generation, transmission, distribution, trading and supply of energy. [...] In short, it can therefore be said that having a municipal power utility is a manifestation of local control over the energy transition” (Wagner and Berlo, 2017, p. 399).² Municipalities are charged with the duty to guarantee services of general interest, such as public transportation, libraries, daycare centers and public swimming pools, which are often not economically self-sustaining. Funds can also be allocated to support general budgets or fund infrastructure improvements. Thus, the revenues generated by MEUs are integrated into the municipal budget (Schmidt, 2022, p. 254). How this budget is managed is shaped mainly by local regulations and council decisions. While there are no strict nationwide restrictions on the use of these revenues, the overarching principle is that they must serve the public interest, supporting infrastructure and services that meet local needs rather than advancing purely financial or commercial objectives (Thöne and Bullerjahn, 2020). Although there is no specific national cap on the profits that municipalities can extract from their utilities, these profits must not compromise the utilities’ financial health or hinder their future investment needs. Hence, through the governance of MEUs, municipalities are uniquely positioned to address issues of energy justice: By reclaiming control over energy infrastructure, they strengthen local autonomy and ensure that profits from renewable energy stay within the regions where the energy is produced. As Rudolph and Tolnov Clausen (2021, p. 503) point out, municipal revenues from renewable energy projects arise either from the leasing of land to the operators of energy plants or from the direct municipal operation of such installations (or both). This is directly linked to “the socialization of ownership structures and to the need to socialize profits, which would allow for a partial detachment of the profit generated by wind energy installations from capitalist modes of production” (ibid., own translation). Economic gains from these locally rooted enterprises are ideally reinvested in public services and infrastructure, fostering a fairer distribution of energy’s socioeconomic benefits. Unlike market-based models, this approach ensures that even low-income households—regardless of their ability or interest to invest in wind energy—can share in the advantages of the energy transition.

However, it should be pointed out that while MEUs may have the potential to advance energy justice through local control and reinvestment in public goods and services, they are not equipped to resolve the

² While the German Energy Industry Act (“Energiewirtschaftsgesetz - EnWG”) mandates the unbundling of distribution networks from other areas of energy supply, companies with fewer than 100,000 customers connected to their electricity distribution networks (“de minimis companies”) are exempt from this regulation. Therefore, the unbundling of the energy sector primarily affects large corporations and less so small to medium-sized municipal utilities (EnWG §7).

broader structural inequalities in energy affordability. While basic supply of electricity and heat is legally guaranteed, interruptions in service can occur due to unpaid bills (Hanesch, 2020, p. 9). “Assistance with energy costs for low-income people is provided in the form of cash benefits” and various municipal emergency measures aimed at preventing disconnections (*ibid.*). Despite these support mechanisms, the financing of essential services in Germany (partially through public grants and private user fees) creates a regressive cost structure, with lower-income households spending a higher portion of their income on energy services compared to wealthier ones (Hanesch, 2020, p. 13). Although the principle of equal charges on usage applies at both the national and municipal levels, the costs of energy are indirectly adjusted through welfare benefits, which only partially address the disparities in household energy needs (*ibid.*). This is especially evident when considering the variation in energy costs due to “differences in energy efficiency of buildings. As a consequence, the same level of energy service costs comparable households different amounts of money” (Hanesch, 2020, p. 16). Thus, the challenges associated with varying energy needs, driven by factors such as housing and energy efficiency, require additional measures to ensure that all households can benefit equally from the energy transition.

5. Methods

In the following, the positions of representatives of MEUs and municipalities on their role in creating a more just and renewable energy system at the local level will be explored. The data was collected as part of a research project that focused on municipal transformation processes and examined the co-determination potential of employees in the infrastructure sectors of energy, public transport and waste management. The study focused on municipalities and their public infrastructure companies in the sectors of public transport, waste management, and energy that have already developed climate protection and sustainability strategies. In total, 93 semi-structured interviews were conducted with key stakeholders, including trade union experts from the respective infrastructure sectors, mayors, sustainability managers, as well as staff and works councils, management, specialists, and employees from municipal enterprises from November 2022 to June 2024. The interviews were conducted in the four federal states of Baden-Wuerttemberg, North Rhine-Westphalia, Saarland and Brandenburg.³ The interviews lasted between 45 and 120 min. Interviewees were asked about the measures the municipality/infrastructure company is already implementing with regard to environmental protection, climate protection and social sustainability, which framework conditions are particularly conducive to this, and which are a hindrance. They were also asked about the role of employees and civil society groups in the socio-ecological transformation. Particularly relevant for this paper are statements on the implementation of renewable energy projects and the local, federal and state regulations that prevent or promote this implementation. While the focus was not explicitly and solely on energy justice, we integrated questions such as: “How are wind energy projects planned?”, “Who is involved in the planning process?”, “Why are citizens specifically invited to participate in or excluded from different stages of the planning process?”, and “What avenues for citizen participation in the distribution of benefits (e.g., investment opportunities in wind energy parks) are available, and what barriers exist to participation?” in our interview guide. These questions were aimed at assessing issues of distributive, procedural and recognition justice.

To explore these dynamics in greater depth, three municipalities were examined more closely. These cases were chosen due to the

particular relevance of wind energy in their area—either because they are actively engaged in its expansion or, conversely, because they are impacted by wind energy developments without directly benefiting from them.

Municipality number 1 (M1) is a city in the federal state of Baden-Wuerttemberg with around 100,000–200,000 inhabitants. The local MEUs are a subsidiary of the city and are already involved in several onshore wind energy projects. Interviews were conducted with the mayor (M1_M) as well as with the chairman (M1_CEO) and the staff council (M1_SC) of the MEUs.

Municipality number 2 (M2) is also in Baden-Wuerttemberg. The city is in the order of 50,000–100,000 inhabitants and also has its own MEU. While currently planning two onshore wind farms, the MEU is already supplying renewable energy to residents by purchasing offshore wind power. Here too, interviews were held with the mayor (M2_M), the chairman of the MEU (M2_CEO), the head of the renewable energy department (M2_RE) and the head of human resources (M2_HR). Both M1 and M2 are known for their student and green population. Both cities have MEUs and have either already implemented wind energy projects or are in the planning stage.

Municipality number 3 (M3) is located in Brandenburg. With a maximum of 10,000 inhabitants, this rural municipality is very sparsely populated. The municipality does not have its own MEU and is not involved in the numerous local wind farms. However, there is a local energy provider solely focused on renewable energies, especially wind energy. Here, we talked to project managers (for wind and solar energy – M3_RE; power-to-heat M3_PH) and a staff council member (M3_SC). An interview was also conducted with the mayor (M3_M). This region is significantly more conservative. While the far-right party AfD had not been very present at the time of the interviews, they have polled at a record high (over 40 %) in the region in the 2024 federal election. The interviews were transcribed by student assistants. Using qualitative content analysis according to Mayring (2014), the interviews were first reduced to core aspects through inductive coding. Second, the interviews were coded deductively along the lines of the questions “what role is assigned to municipalities and MEUs in local wind energy projects?”, “which property objects and subjects are mentioned?”, “what significance is assigned to certain property subjects and objects?”, “how are local citizens involved in the planning and profits of wind energy projects?”. These questions were derived from the theoretical considerations regarding property chains. For the coding process the software MAXQDA was used. The interview passages below were translated by the author.

Due to the limited number of cases, this study is inherently exploratory in nature. While the selected municipalities offer valuable insights into the dynamics of wind energy development, the findings cannot be generalized across all regions. As such, the study aims to stimulate further research in this area, rather than to offer definitive conclusions. However, while the data is exploratory, it does highlight several key issues regarding the wind energy expansion in the rural and comparatively poor North-East versus the urban and affluent South-West, as well as the importance of differences in political leanings within the local population and their elected representatives.

6. Results

The empirical findings of the study highlight the various factors that shape municipal involvement in wind energy development. The chapter is structured along the property chain, focusing on the property objects – namely energy utilities and land – that were especially highlighted by the interview partners. First, the role of municipal leverage and leadership in local energy transitions is outlined, then, focusing on M1 and M2, the dual mandate of MEUs and their role as local(ly connected) energy providers and wind energy operators is explained. Third, the significance of municipal versus private landownership in shaping municipalities’ capacities to initiate wind energy projects is explored. The

³ These states were deliberately selected to reflect a broad spectrum of regional economic structures, including both economically stronger areas (such as Baden-Wuerttemberg and parts of North Rhine-Westphalia) and economically weaker regions (such as Brandenburg and parts of Saarland).

chapter then concludes with a focus on M3, which lacks both land and energy utilities.

6.1. Municipal leverage and leadership in local energy transitions

Municipalities, mayor of M1 explains, have substantial leverage in the energy sector. This is because energy consumption is closely tied to local utilities, and municipalities can directly influence where and how energy is sourced. The mayor contrasted this with the emotional debates often triggered by transportation decisions, noting that energy-related discussions tend to be less “emotional” (M1_M #00:25:03–5#). However, as a leader in a southern German city known for its large student population and green-minded community, this view of energy as a less contentious issue may not apply universally across all municipalities. Still, while other issues, such as consumption patterns, waste generation, or the choice of alternative transportation over private cars, are heavily influenced by local infrastructure, they are also significantly shaped by income levels and individuals’ environmentally conscious motivations. This may be less pertinent in the case of electricity supply where the primary concern, according to the mayor of M1, is that electricity flows from the socket and that its price remains within an acceptable range. Municipal energy providers usually act as default suppliers, requiring customers to opt out if they prefer alternatives. The energy source, whether renewable or fossil fuel, depends largely on these providers and local leaders, such as mayors or councils, who influence public funding decisions. The allocation of funds to renewable energy often reflects local politics, priorities, and resources. In cities with strong environmental values, renewable energy and sustainability initiatives are more likely to be prioritized. The mayor of M2 also explains:

“You can build concert halls, spa complexes, and who knows what else. We invested heavily in renewable energy. The money was there. And third, I made this a top priority, I brought in the right people. Of course, you can’t do it alone, but we have a fantastic team for renewables at the municipal energy utilities.” (M2_M #00:05:13–2#)

The success of local energy transitions thus largely hinges on the priorities set by municipal leaders, as well as their ability to rally support for these projects within their communities. Thus, in terms of sectors with high greenhouse gas emissions, the energy sector remains one of the few where local authorities can have a significant impact, especially when they own MEUs, enabling them to act as both energy suppliers and producers.

6.2. The dual mandate of municipal energy utilities

MEUs have a dual mandate: they aim to implement the political goals set by the municipality while also generating profits. In both M1 and M2 we talked to the CEOs of the MEUs, as well as to staff councils and the heads of department for renewable energy and personnel manager (M2). The latter explained that

“In the field of renewable energies, electricity generation, wind power and photovoltaics, our aim is of course to plan, build and operate the plants in such a way that we also earn money with them. [...] The aim of [our] future expansion is, firstly, to realize the political goals that our Lord Mayor has set. And secondly, to do it in such a way that we can also earn money with it and afford other things” (M2_HR #00:10:18–6#).

The phrase “affording other things” highlights two key aspects for MEUs: First, generating profits is necessary to maintain and invest in local energy infrastructure. Second, any financial surpluses are typically transferred to the municipality to cross-subsidize other public services that cannot self-finance. While the CEO of M2 views this as a constraint, arguing that cross-subsidization reduces the funds available for investment in renewable energy projects, municipal energy utilities also benefit from their close integration within the municipal network. As

one staff councilor pointed out: “As a municipal energy supplier, I would say we have the advantage of not going bankrupt because we are guaranteed by the city. A private company doesn’t have that here” (M1_SC #00:35:07). This means that if MEUs struggle financially, the municipality can intervene with public funds to maintain service. In contrast, a private energy company facing losses would likely go bankrupt and cease operations. Backed by the relatively affluent municipalities of Baden-Württemberg, the MEUs of M1 and M2 thus remain stable pillars of local energy provision.

Our interviewees not only highlight the differences between MEUs and private energy providers but also distance themselves from citizen-led energy projects. They point out, for instance, that local energy co-operatives tend to serve only a limited group, whereas MEUs benefit the broader public. As locally embedded companies operating under the direction of democratically elected district administrators and councils, and that are responsible for providing essential infrastructure to all, interviewees argue that MEUs should themselves be seen as community energy companies. However, this perspective somewhat contrasts with the statement of the CEO of M1’s MEUs, that MEUs can pursue wind energy projects, even in cases where the local council opposes them. This is particularly the case when the land needed for such projects is owned by a non-municipal actor:

“The one wind power project that has just been initiated has been initiated by [non-municipal actor] as the owner. The city has no say in the matter. In other words, the municipal council is having a discussion in which they say we want, but we want and we want, but they have no say at all.” (M1_CEO #00:40:32–1#)

There seems to be a prevailing notion with interviewees from MEUs that they see their companies as the primary local authorities driving the energy transition, working for the benefit of the community, even if the community may not fully recognize it yet. This position is strengthened if the MEUs are not dependent on municipal land for the expansion of wind energy, because, as the CEO of M1 points out above, the local council has no right to have a say if they do not own the land parcels in question. However, this also raises new questions with regard to the extent to which municipalities and MEUs can be seen as a single entity acting on behalf of local citizens.

6.3. Municipal versus private landownership

Despite the argument that MEUs might be able to act more independently if there is no municipal land involved, when municipalities own land in areas suitable for wind energy, the barriers for MEUs to implement wind energy projects are significantly lower compared to those that do not own such land. In these cases, MEUs can avoid the financial and logistical challenges of securing land rights and can move more swiftly to develop projects. While MEUs can still engage in renewable energy projects without direct land ownership, they are often excluded from the competition for available wind sites. This is because private investors, who typically have greater financial resources, can outbid MEUs and secure the land at higher prices:

“The fact is that there are some auctions where you have to have great doubts at the end whether the winner is really a winner in this auction or maybe a loser in the end, because the rents are sometimes so high that you can’t really see how this is economically feasible [...]. Our people, we can’t offer that. So sometimes it’s a little bit difficult at that point.” (M2_CEO #01:24:22–1#)

As a result, municipalities are frequently sidelined in the race for wind energy development. However, despite smaller budgets, municipalities are not necessarily disadvantaged in competing for wind energy sites. In fact, the long-standing presence and local stability of MEUs can be a key asset. According to the head of the MEU’s renewable energy department, while some landowners prioritize high offers from competitors, others prefer the reliability of MEUs with their deep roots in the

region, which allows them to build trust and long-term relationships with landowners. Their local presence, often spanning decades, serves as a strong selling point, even against wealthier rivals. Still, he acknowledged that in some cases, financial power alone can tip the scales, making land acquisition impossible (M2_RE #01:00:09–9#).

Another issue, as discussed by the personnel manager of M2, is the challenge of navigating the question of how “public” a public company should be, particularly in fast-paced, competitive environments, such as the rush to secure land parcels. He points out that land acquisition for wind energy projects often happens behind closed doors, especially when competition involves only a few private or public actors. Success depends on swift action and skilled negotiation. Public involvement poses a dilemma: announcing a project too early can drive up lease prices, but delaying can lead to criticism over a lack of transparency (M2_HR #01:04:58–5#). MEUs fear that if they communicate their plans for a wind energy project “too early”, i.e. before having signed contracts for land leases, they will attract competing offers for the land parcels in question. Thus, planning for wind projects and where to build them is done behind closed doors. The race for land acquisitions therefore raises pivotal questions regarding transparency and public involvement for MEUs. Their strategic decisions to withhold plans from the public, aimed at avoiding escalated land prices, cast shadows over procedural justice and community participation in wind energy planning processes.

6.4. Opportunities and barriers to profit from wind energy projects without relevant property

In regions where MEUs do not exist, the question of public investment and participation in renewable energy does not arise in the same way. In such areas, municipalities and citizens either need to establish their own citizen energy projects, such as cooperatives, or rely on private companies to provide opportunities for participation in the energy transition, as there are no nationwide rules for public participation in wind energy projects. Land ownership becomes a crucial factor in generating revenue from wind energy, particularly in the absence of MEUs, but it also bears potential for local conflicts around the question of who should benefit from wind energy projects. When land parcels are privately owned, local conflicts often arise between residents who gain rents from wind farms and those left empty-handed due to not owning (suitable) land. This dynamic can create a ‘social powder keg’ at the local level, as M3’s mayor explains that in some cases, landowners with multiple turbines on their property now (passively) earn six-figure annual rents, while nearby residents on unemployment benefits simply face higher electricity costs.

“And that is a huge explosive that is really not socially acceptable at all. And that’s why we as a municipality - and that’s our goal, so to speak, [...] that we as municipalities try to create a balance. And we can only achieve this balance if we also have revenue opportunities.” (M3_M #00:17:35–8#)

His municipality is located in the state of Brandenburg, which used to be part of the former German Democratic Republic (GDR). Here, where much of the agricultural land was privatized after German reunification, municipalities own little to no land suitable for wind energy, despite Brandenburg being the state with the second-highest wind energy production in Germany (Deutsche WindGuard, 2025, p. 8). As M3 has no

MEU but is home to multiple wind parks (that are largely built on private land), the mayor outlines several avenues through which the municipality can financially benefit from local wind energy projects. These include the Levy Act (German “Abgabegesetz”), if the state has implemented one; the Renewable Energies Sources Act (German “EEG”); and business taxes. In Brandenburg, the Levy Act requires that operators of wind turbines commissioned after December 31, 2019, pay a special annual levy of 10,000€ per wind turbine to municipalities within a 3-km radius of the turbine site (§1(1) BbgWindAbgG; §2 (2) BbgWindAbgG; §3 (1) BbgWindAbgG).⁴

Although the mayor of M3 welcomes the implementation of such a law, he criticizes the fact that it only applies to turbines built after 2019. In regions like his, where wind turbine expansion began years before that, the local authority gains little or no financial benefit from existing projects. He explains:

“we have 111 turbines and we don’t get a cent for them. That, and of course the fields are full already. In other words, the only way to profit from this is through repowering. So this law came into force in 2019 and everyone said: Wow, that’s great, super, now the big money is coming in, but not a cent has arrived yet. Now the first new turbines have been built, and they will actually bring some money into the municipal coffers next year. But it’s not much.” (M3_M #00:17:35–8#)

In addition to state-specific regulations, §6 of the German Renewable Energy Sources Act (EEG) stipulates that wind energy operators should provide financial support to municipalities affected by the construction of their energy plants (§6(1) EEG). Municipalities within a 2.5-km radius of a wind turbine may receive 0.2 cents per kilowatt-hour for turbines with a capacity of over 1000 kW (§6 (2) EEG). However, this directive is optional rather than mandatory.

A third way municipalities benefit financially from wind energy projects is through business taxes. While this can be a steady income source, it’s also unpredictable. M3’s mayor noted that payments often arrive late and depend on the timing of operators’ investments. In one case, the municipality received a 600,000€ payment, only to have to repay it with interest after tax office adjustments. This example underscores the risks municipalities face when relying on business tax payments: while these payments can be a valuable source of income, they also come with financial uncertainty.

In addition to the bureaucratic effort that these legislations entail and which often overwhelm the volunteers at local councils in small municipalities (M3_M #00:37:57–5#), public acceptance in M3 is an issue, as, despite the region housing over a hundred wind turbines, local residents face some of the highest electricity prices in Germany (M3_M #00:04:51–3#). This is because the expansion of renewable energies also requires additional investment in the grids. Grid fees, which account for around a third of the price of household electricity, are therefore particularly high in the north and north-east of Germany, i.e. in the windy regions (Vogel et al., 2024, p. 11). For the local population, this means that although their region contributes significantly to the expansion target for renewable energies in Germany, they also pay particularly high electricity costs for this very reason.

While there is a local energy provider entirely focused on renewable energy, the company is fully privately owned. This is not seen as negative by the mayor, as the company is a major employer in an otherwise

⁴ Other German states have similar regulations. For example, Mecklenburg-Western Pomerania’s ‘Citizen and Municipal Participation Act’ (BüGembeteilG M-V), which came into force in 2016, mandates that wind farm developers offer at least 20 per cent shares in their projects to local residents and municipalities within a 5-km radius of turbines (§ 4 and §5 BüGembeteilG M-V). Similar laws are also in place in North Rhine-Westphalia, Thuringia, Saxony, Lower Saxony and Saarland. However, the specifics - such as the distance and the type of participation - are left to the discretion of each federal state.

economically weak area. In interviews with a project manager from the energy company and the former district council chair, both emphasized that although the company is privately owned, it identifies as a local actor committed to strengthening the regional economy and advancing renewable energy and power-to-heat initiatives. Unlike MEUs, it is not obligated to reinvest profits into local infrastructure. However, the mayor noted that in an effort to expand wind energy in the area (and gain acceptance for them), the company often voluntarily funds municipal projects, such as road renovations—creating a degree of dependency. One example, shared by M3's mayor, involved a major local shareholder funding sidewalk and streetlight upgrades in his own neighborhood, prompting criticism from some residents who saw it as favoritism, given wider infrastructure neglect. In financially struggling M3, such improvements often result less from democratic decisions and more from negotiated agreements with the private company, highlighting a mutual but imbalanced dependency.

7. Discussion

The concept of property chains illustrates that, in the process of wind energy production, various property subjects and objects are interconnected: To “harvest” the energy of the wind, appropriate technologies in the form of wind turbines are needed. To build wind turbines, securing suitable land is essential. Finally, to use the energy and deliver it to consumers, networks and energy providers are required (for which land and other resources are once again needed). Ownership of these resources shapes both the relationships between the owners within this chain, such as the relationship between landowners and technology owners, and the relationship between owners and local non-owners. Actors who have sufficient financial resources and/or own suitable land can significantly benefit from local wind projects, either through high lease payments or direct participation in the profits generated from wind turbines. At the same time, however, this also reinforces local inequalities: those who cannot participate in this way in the energy transition only bear the burdens of wind energy, such as drop shadows, noise pollution, and so on. Municipalities can create a certain balance here: Especially when wind energy projects are not built on private land but rather on municipal property and/or when wind energy turbines are run by the municipality via MEUs, profits can be used to cross-finance other infrastructure projects, such as roads, public transportation, swimming pools and libraries. Thus, the profits from local wind energy projects do not flow to private individuals but, ideally, benefit the entire community.

Fig. 1 shows the property chain of wind energy production with the main property objects, land, wind turbines and energy utilities in bold.

The highlighted section around these property objects is the area in which municipalities have an influence on questions of energy justice. These are connected to the property subjects (technology owners, landowners, energy companies). Property structures the relationship between these subjects (indicated by arrows) and also influences questions of participation in planning and profit distribution, as shown in the small boxes.

It is important to note that one actor can be the property subject of all three property objects, i.e. a private company can own the energy utility, the wind turbines as well as the corresponding land parcels. When municipalities hold ownership of some or all of the key property objects, they can strengthen their municipal budgets and reinvest revenues in local infrastructure and essential public services. However, the interviews with mayors, MEU CEOs, and employees reveal that decisions on allocating funds, particularly for infrastructure and renewable energy, are heavily influenced by local mayors and city councils. While the absence of citizen interviews limits this study's ability to directly capture public perceptions of justice, such perspectives can somewhat be inferred from the institutional viewpoints represented. The interviews indicate that both MEUs and municipal leaders often approach renewable energy initiatives as top-down endeavors, with the public seen more as an audience to convince than as active participants. This aligns with findings by Karakislak and Schneider (2023), who point out that mayors and local councils play an important role in the local acceptance of wind energy projects, especially when they have a clear vision and can effectively communicate how wind energy projects can benefit the municipality. This appears to be the case in M1 and M2 in Baden-Württemberg, where collaboration between mayors and MEU CEOs has fostered high acceptance of wind projects. At the same time, these representatives tend to reflect the political and social orientations of their communities. In environmentally engaged municipalities, therefore, fostering support for sustainability-oriented investments is generally less contentious. In municipalities that suffer from severe underfunding and thus prioritize immediate economic gains, renewable energy projects most likely receive less backing. It is also worth noting that urban residents are rarely directly impacted by wind energy projects. The burdens of these are mainly carried by rural residents, who feel, as Kerker et al. (2024, p. 6) find, that there is an “imbalance between energy production and consumption” and thus an “unjust distribution of resources between urban and rural residents”.

Importantly, as can be deduced from the data, a successful communication about visions and benefits of wind energy projects can only succeed if municipalities own certain property objects – land and MEUs – and thus have a say in wind energy projects. Especially in the eastern German states, many municipalities however do not have their own

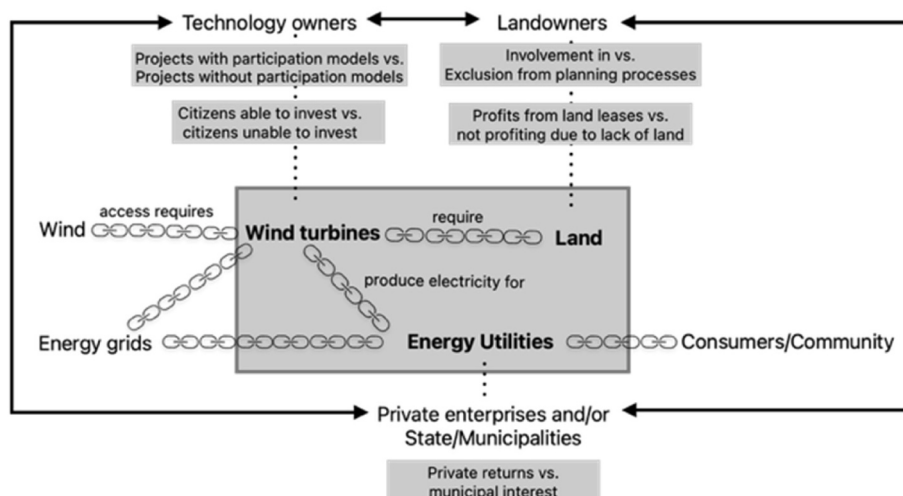


Fig. 1. Property chain of wind energy production.

public energy providers, as many state-run enterprises from the former GDR were privatized or shut down after reunification. It was only from 1993 onwards that the establishment of MEUs became possible in East Germany (Schmidt, 2022, p. 254). However, some municipalities chose to forgo their own energy supply and instead contracted private companies to handle it.

A similar trend is apparent when it comes to land ownership. As Eichenauer and Gailing (2022) point out, municipalities in East Germany face significant barriers to participating in wind energy projects, primarily due to their limited ownership of land. This lack of land-ownership severely limits the ability of municipalities to influence land use decisions and negotiate in wind energy projects. As a result, the financial benefits, including lease income, typically flow out of the local community, often to investors based in West Germany (ibid.). Where municipalities do not own land, they must compete for the limited number of suitable wind sites, where they are often no longer competitive due to high leasing offers from private investors. Instead, they are dependent on the goodwill of landowners, who must choose between substantial rental income and the lower-risk option of working with MEUs. Where municipalities do not own energy utilities and thus cannot directly profit from local wind energy projects, they have only a limited capacity to contribute to local value generation from wind energy through business tax, the German Renewable Energy Sources Act and state specific Levy Acts. Income from these, however, may be volatile. They may also more likely be dependent on private companies who can offer investments in local infrastructures. In the case of M3, however, some local residents viewed the selective investments in renewing sidewalks and street lighting as bribery. Similarly, Müller and Morton (2021, p. 71) find that the mandatory fee for new wind turbines is viewed by some local people “as an attempt to buy consent”.

The unequal relationship between those who own certain property objects within property chains and those who do not is thus not only a locally confined issue but also a disparity between East and West Germany. Due to a lack of municipal land and MEUs, municipalities in the East are much less able to use wind energy projects to improve dilapidated infrastructures and invest in new projects. In contrast, the already wealthier West of Germany can invest in municipalities through land leases or its own energy projects. This has further implications for energy justice: Strong municipal infrastructures not only enhance cities and communities as economic locations, but they also make them more attractive to potential newcomers. In rural areas, the challenge of sustaining a certain level of infrastructure density becomes more difficult as population density decreases (Reichert-Schick, 2015, p. 76). At the same time, there is a growing lack of political will to support the economic and infrastructural development of rural and peripheral areas, leading to the closure of certain essential services, such as public transportation, schools, and libraries, to delays or even a failure to implement infrastructures, such as reliable communication services (Reichert-Schick, 2015, p. 77). If, especially in eastern Germany, rural municipalities could benefit from wind energy projects, these issues could possibly be mitigated.

However, the data also indicates that, despite MEUs self-depiction as citizen energy, municipalities do not automatically contribute to more procedural, recognition or distributional justice. As outlined by at least one interview partner, citizens usually only learn about planned wind energy projects after land has been secured and projects have been planned out, which leaves them confronted with a *fait accompli*. At the same time, MEUs can implement wind energy projects without the approval from the elected city council, if they do not build them on municipal land. This may be beneficial for advancing the energy transition in Germany, but, as mentioned above, as mayors and local councils play an important part in the success of renewable energy project implementation, it may also strengthen local opposition to wind energy projects, especially when energy utilities do not manage to convincingly communicate the benefits of renewable energies to their citizens. Although local infrastructures can be strengthened through

municipal wind energy projects, it is unclear to what extent local citizens are aware of this effect and whether they know who owns the nearby wind turbines and who ultimately benefits from them. The success of MEUs in citizen communication was not assessed in this study. Additionally, it was not explored whether local acceptance of wind energy increases when the turbines are publicly versus privately owned.

In terms of the distributional effects, although the municipal budget could be allocated to address dilapidated infrastructure and essential services, as noted above, there are no strict rules governing how the municipality has to spend its funds. Thus, prestige projects, such as “concert halls or spa complexes” (M2_M #00:05:13-2#), may be prioritized over investments in initiatives like expanding public transportation networks, which could benefit a broader segment of the local population.

Hardly mentioned in the interviews was the energy grid. This may be because Germany’s electricity grids function as a natural monopoly, where grid operators perform a public function under strict state regulation—while still generating private profits. Since citizens and municipalities typically cannot influence the grid system directly, their participation in key decision-making processes, such as where the grid is expanded or how costs are allocated, is very limited. As the mayor of M3 highlighted, the costs of grid expansion are passed on to consumers through network fees, which disproportionately affects low-income and rural users (Vogel et al., 2024, pp. 13). To avoid a situation where profits are privatized while costs are socialized, some municipalities have explored remunicipalization, reclaiming ownership of their local grids. Hamburg’s 2014 buyback of its electricity grid serves as a notable example (Wegmann, 2021, pp. 53). However, a key precondition for such efforts is access to sufficient financial resources, which are especially scarce in many rural areas of eastern Germany.

8. Conclusion and policy implications

Using the property chains concept, this paper examined the role of municipalities in Germany’s wind energy expansion, focusing on power imbalances between property owners and non-owners. The analysis followed the hypothesis that municipalities with greater ownership along the property chain wield more influence over wind energy projects, allowing revenues to be reinvested into local infrastructure, thus serving all local citizens. Residents vote for local councils that ultimately decide on how the municipal budget is spent. Additionally, municipal utilities frequently offer citizen participation schemes for wind energy projects. This democratic potential of municipalities, so the hypothesis, also increases with greater ownership, leading to more procedural, recognition and distributive energy justice. The data suggests these hypotheses hold only partially true and therefore require refinement. While full municipal ownership grants strong leverage, actual reinvestment in essential infrastructure depends heavily on the political priorities of local mayors and councils. Additionally, municipal energy utilities (MEUs) can pursue wind projects independently, even without local support, particularly if they do not rely on municipal land. In such cases, while communities may benefit indirectly, perceived fairness, access and inclusion can be questioned. Transparency through proactive communication from MEUs is therefore crucial to maintaining public trust and legitimacy. In municipalities without land or MEU ownership, financial gains are generally limited to business taxes or levies. However, their lack of influence over project planning highlights stark ownership-based power imbalances. Here, private landowners or investors may profit passively, while others feel burdened by impacts they had no meaningful say in.

To avoid relying solely on exclusive citizen energy projects as the primary means of involving residents in wind energy development, there is a need to rethink municipal roles in energy planning. This could involve strengthening the integration of municipal input on land potentials into regional planning and mandating municipal and public participation in wind energy projects across all federal states. Bäumer

(2017) suggests following the example of German offshore wind energy, where the state grants concessions for project development. A comparable approach is conceivable for the municipal level: municipalities could designate suitable areas for wind energy in their land-use plans and issue concessions for their use. This would ensure that local wind projects contribute financially to municipal budgets, thereby reinforcing the link between local renewable energy development and public benefit. The Scottish *Land Reform Act* can also serve as a relevant example: it allows citizens to repurchase land from private landowners, even against the latter's will, if the intended land use serves the goal of sustainable development (Rudolph and Tolnov Clausen, 2021, p. 506). A legal basis for this has already been established: the German Basic Law stipulates that expropriation is permissible for the public good and in return for adequate compensation (§14 3 GG). Given that phasing out fossil fuels is an explicit goal of the federal government, and that reducing greenhouse gas emissions through renewable energy development serves the public good, it is conceivable that municipalities could repurchase private land to implement wind energy projects. In order to make these projects procedurally just, citizens could be given the opportunity to weigh in on decisions regarding land purchase and how profits from wind energy projects are invested, for example through citizens' assemblies or juries that are open to all residents by ensuring language access and time flexibility. Insights from new municipalism (e. g. Sareen and Waagsaether, 2023) offer additional guidance on how citizens can participate democratically in infrastructure decisions. However, such participation assumes municipal control over key assets.

The findings of this paper suggest several policy implications: Municipalities need ownership along the complete property chain to shape wind energy development. If the goal of making two percent of Germany's land area available for wind energy use is to be taken seriously, a precedent must be set for allowing municipalities to repurchase land for wind energy projects. However, as noted, ownership alone is insufficient. Transparent, democratic processes must be established to ensure revenues are equitably used for community benefit, this could be done by setting up citizen assemblies or juries, community trusts, or similar participation models. In areas where the transfer of relevant property to the municipality is only possible to a limited extent, alternative legal and policy frameworks, such as concessions and mandatory levies, should be explored to elevate their role in planning and ensure alignment with local needs.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Data availability

The data that has been used is confidential.

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