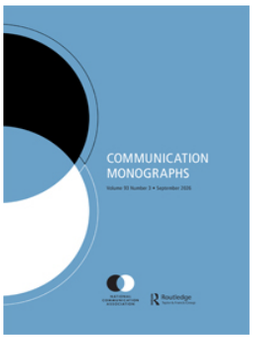

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Understanding citizens' responses to imagined future and existing onshore wind farms: Toward a model of environmental change communication

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ABSTRACT

This study explores citizens' anticipations of wind turbines that may be installed in their vicinity and the experiences of those living near existing turbines – reflecting different stages of the installation process. Findings from a German online survey ($N = 2664$) reveal that citizens experience considerable uncertainty regarding the impacts of wind farms, both prior to and after construction. Across several dimensions, including ecological and economic effects, experiences with existing wind farms are less negative than expectations of those anticipating future installations. An exception concerns the perceived fairness of the installation process. These results are integrated into a preliminary model of environmental change communication, which draws on insights from organizational transformation research to better understand the dynamics and outcomes of installation-related discourses.

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Wind power; energy transition; change communication; dialogue; uncertainty; resistance to change

Around the globe, conflicts over environmental issues regularly emerge within local and regional publics (e.g., Brummans et al., 2008). With the growing urgency to combat climate change, the deployment of onshore wind turbines has increasingly triggered new instances of such conflicts. Although public acceptance of wind energy policy is relatively high in many countries at a general level, local installation projects often face strong opposition from neighboring communities, activists, or regional political groups (Schwenkenbecher, 2017). A substantial body of social and communication science research has examined resistance to – or (low) acceptance of – wind energy projects and has identified a wide range of motivations and factors that drive local stakeholders' open objections or inhibit their silent consent (e.g., Huijts et al., 2012; Lundheim et al., 2022). Much prior research has addressed only implicitly the perspective that adding wind turbines to the environments in which people live represents a departure from the status quo – that is, a form of change. In organizational communication research, stakeholders' initial skepticism toward change is well documented (e.g.,

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Krogh, 2018). Despite significant differences, both organizational and environmental change projects share the characteristic that they are far more likely to succeed when dialogical communication efforts foster stakeholders' readiness for change (Elving, 2005; Enevoldsen & Sovacool, 2016).

The present study, therefore, extends existing research by integrating insights from strategic management on the successful implementation of (organizational) change. Previous work in this area has long recognized communication as a fundamental determinant of how organizational change is understood, interpreted, and ultimately managed by those affected (Harikkala-Laihinen, 2022; Li et al., 2021; Mathur et al., 2023; Pinna et al., 2025; Ramos-Maçães & Román-Portas, 2022). Extending this line of inquiry, the present work adopts a change communication perspective to advance the understanding of local wind power controversies, as residents and stakeholders are likely to experience planned wind turbine installations as the onset of a change process affecting the spatial, ecological, social, and cultural environments in which they live (Pasqualetti, 2011). Drawing on this perspective, we offer new empirical and conceptual insights into local negotiations and discourses surrounding onshore wind power projects. Research in change management emphasizes that change always begets uncertainty – an aversive state that often undermines the willingness to embrace the transition (e.g., Clampitt et al., 2000; Matsunaga, 2025). Similarly, persons affected by planned wind farms are likely to experience uncertainty, which may, in turn, motivate disagreement with the projects. Building on these considerations, the theoretical goal of our study is to transfer the knowledge gained in the field of organizational change management to the planning and installation process of wind turbines and to develop an initial *model of environmental change communication* (MECC). The model complements existing explanations of local wind power acceptance and informs innovative strategies to foster community engagement with wind power projects and similar ecological infrastructure construction. In doing so, our conceptualization relates to both stakeholder theory and more deliberative models of change communication (Benn, 2007; Lewis, 2007). In the proposed model, we emphasize, first, the importance of addressing different stakeholders and acknowledging their uncertainties and concerns, and second, the integration of participatory and deliberative elements into change communication to actively involve various affected groups in the process.

We build the model draft on findings from a quantitative online survey conducted in Germany ($N = 2664$), which explores citizens' anticipations of onshore wind turbines that may be installed in their vicinity and the actual experiences of those already living near existing turbines. This comparison reflects different phases of the change process, providing initial insights into the communication requirements and strategies needed at different stages of wind power projects.

Literature review

Effectively managing change: Adopting perspectives from corporate contexts

How people respond to announced change has been extensively studied in organizational management and in research on change communication (e.g., Elving, 2005; Husain, 2013). However, this work has received little attention in environmental communication

scholarship, even though the installation of wind turbines near communities constitutes a significant form of environmental and landscape change – one that may elicit response patterns analogous to those observed in organizational contexts. Specifically, "community resistance" has been discussed as an obstacle to both organizational change (Levay, 2010) and wind power development (Maleki-Dizaji et al., 2020). Therefore, integrating perspectives from change communication research offers substantial potential for advancing our understanding of public reactions to renewable energy infrastructure. First, although different models conceptualize the change process in varying numbers of steps (Errida & Lotfi, 2021), three overarching phases are commonly identified. The first phase occurs prior to the change and involves preparing the system and those who are affected for the upcoming transformation ("unfreezing"). The second phase, "transition," denotes the actual movement toward the desired future state. Finally, the third phase takes place after the change has been implemented and is characterized by the establishment of new routines and behaviors ("refreezing"; Lewin, 1947). Second, in both organizational contexts and the case of wind turbine installations, the overarching objective of project proponents is the effective implementation of change. In corporate settings, this refers to reaching a state in which individuals (employees) have successfully adapted to the transformation. While organizational leaders can impose corporate change against the will of other stakeholders, wind farm development, by contrast, is a type of social change that – in democratic societies – can only unfold through participatory and negotiated processes. Such deliberation may also result in decisions against the construction of wind turbines, which are likewise democratically legitimate. Nevertheless, to successfully advance the energy transition and effectively address climate change, the expansion of renewable energy sources remains necessary and, from a normative perspective, desirable. In this respect, successful change processes in organizations differ fundamentally from societal and democratic processes of collective will formation. However, both organizational and environmental change projects share the attribute that they are much more likely to succeed if preparatory and accompanying communication efforts achieve stakeholders' readiness for change, that is, stakeholders' willingness to adapt and productively engage with the intended innovation (Bertsch et al., 2016; Elving, 2005). Conceptually, readiness for change can be understood as a continuum encompassing both resistance to and support for change, with resistance located at one end and full readiness at the other (Elving, 2005). Accordingly, readiness for change has been characterized as a continuous attribute (Mathur et al., 2023) that can assume both negative and positive values.

Readiness for change implied by wind power construction

Many studies on public responses to planned wind farm projects focus on the level of support for or acceptance of renewable energy sources. Much of this work highlights the gap between citizens' general endorsement of renewable energy at the national level and local communities' frequent resistance to turbine installations (e.g., Bell et al., 2005; Jones & Richard Eiser, 2010; also referred to as the "Not In My Backyard-Phenomenon," NIMBY). Explanations of this local resistance relate to the collective action problem, wherein residents bear the costs of wind power installation, but derive little direct benefit from it (see Wolsink, 2000, for illustration and criticism). Citizens

may anticipate such costs, i.e., impacts of onshore windfarms across various dimensions, including economic disadvantages (e.g., declining real estate values), ecological damage to natural soil, water, or air quality, to flora and fauna, and negative impacts on residents' health or quality of life (e.g., Dällenbach & Wüstenhagen, 2022; Eltham et al., 2008; Ki et al., 2022). Alternative approaches to explaining local resistance to wind turbines have focused on citizens' individual values, particularly the affective ties they have to their local area, landscape, and community. Various studies have shown that such locality-based social identities can increase opposition to wind projects, especially when these projects are perceived as disruptive to the local environment or community (Devine-Wright, 2009; Devine-Wright & Howes, 2010). More recent research has moved away from the self-interest focus of early NIMBY discourses (e.g., Rand & Hoen, 2017) and has adopted nuanced, multi-factor models explaining (local) objections to wind farm projects (Huijts et al., 2012; Lundheim et al., 2022). Additionally, perceived equity and fairness in planning processes have been identified to account for local stakeholders' evaluations of wind energy projects (Gross, 2007; Liebe et al., 2017). Parts of the NIMBY phenomenon, therefore, appear to stem from insufficient community participation during the early stages of project development (Langer et al., 2017; see also Lundheim et al., 2022).

This brief review of existing research reveals that past studies have explored numerous dimensions of local residents' reactions to proposed wind turbine installations, with a strong emphasis on aspects specific – if not unique – to wind power. As outlined above, one particularly evident yet seemingly underresearched dimension of wind farm projects is that they introduce change for local stakeholders (Le Maitre et al., 2024). As such, these projects share similarities with other forms of local change, such as the installation of large infrastructure (e.g., highways, power plants) or industrial complexes (Boholm & Löfstedt, 2004). In any of these cases, local residents are likely to anticipate significant alterations to their familiar surroundings, including changes to the natural and built environment, road access, leisure activities, and other aspects of daily life. From a change communication perspective, such concerns appear to be motivated by a desire to avoid deviations from the status quo and uncertainties associated with transition processes (Elving, 2005; Le Maitre et al., 2024). Precisely these ramifications of change have been a central focus of the organizational change communication literature; accordingly, much can be learned by applying this perspective to local residents' responses to wind turbine installations.

Addressing locals' uncertainties in wind turbine projects

Management scholars emphasize that announcing change often induces uncertainty, defined as "an individual's inability to predict something accurately" (Milliken, 1987, p. 136). Employees may struggle to envision the aim, the process of change, as well as their post-change future and feel a diminished sense of security regarding their familiar status quo (e.g., Allen et al., 2007; Bordia et al., 2004). Uncertainty, in turn, is frequently experienced as an aversive and stressful state that people seek to avoid or resolve, making resistance to change more likely (Carleton, 2016). It is important to note that uncertainty is a mental state, meaning a subjective and cognitive experience of feeling insufficiently informed about or unable to assess a given situation, i.e., "the subjective experience of

ignorance [= lack of knowledge]" (Anderson et al., 2019, p. 2; see also Bordia et al., 2004). Against this background, effective management of uncertainty is fundamental in times of change, and communication plays a key role in enabling individuals to navigate feelings of ambiguity and insecurity (Brashers, 2001). In organizational settings, scholars argue that transparent and continuous communication about the rationale for change, the steps involved in the process, and the expected consequences is essential for reducing uncertainty and thus resistance and fostering employees' willingness to engage with the transition (Elving, 2005). Communication has thus been widely recognized as a central mechanism for facilitating successful change implementation (Clampitt et al., 2000; DiFonzo & Bordia, 1998), and poorly managed change communication often leads to rumors and increased resistance (Husain, 2013).

Regarding change communication, two primary communication objectives can be distinguished: information and community building (Elving, 2005; Husain, 2013). Participatory communication formats are of particular importance in the context of change processes, as they enable stakeholders to articulate their concerns and apprehensions. Additionally, research indicates involvement in the implementation of change projects increases the likelihood that such initiatives are perceived as beneficial and has been shown to foster acceptance of and openness toward change (Coyle-Shapiro, 1999; Tao et al., 2018). Equally important and connected to both communication objectives is careful, trust-promoting communication throughout the change process. Resistance to change, therefore, should be reframed because of a lack of trust and inadequate communication. Communication is required at all stages of the change process, and the communication strategy should be aligned with the overarching phases of change and the corresponding information needs at each stage (Klein, 1996). During the "unfreezing stage," resistance can be more effectively mitigated when communication strategies are designed to anticipate and address initial concerns. In the movement stage, rising levels of uncertainty and the emergence of rumors necessitate the provision of detailed, accurate, and timely information. Finally, during the "refreezing stage," communication supports the consolidation of change by reinforcing new structures and processes and by addressing remaining questions (Klein, 1996). These stage-specific functions of change communication can be applied to the planning, construction, and operation of wind farms in interactions with local residents. The planning stage of a wind power project resembles the "unfreezing phase" in organizational change, while the construction and operation stages mirror the "movement" and "refreezing" phases in the organizational context.

A growing body of research has examined how familiarity, knowledge, and direct experience with nearby wind turbines shape public acceptance of wind energy and new wind power developments (see Le Maitre et al., 2024). Mostly based on recalled pre-construction attitudes, these studies suggest that acceptance often follows a U-shaped pattern: overall, initial support for wind energy tends to decline when residents are confronted with plans for turbines in their immediate vicinity, but increases again once the turbines are constructed and become part of everyday experience (Le Maitre et al., 2024; Wolsink, 2007). One indication of increasing familiarity is reduced concern about acoustic and visual intrusion compared with pre-installation expectations, or that wind turbines are no longer noticed in everyday life (Eltham et al., 2008; Kontogianni et al., 2014; Wheeler, 2017). However, increasing acceptance also depends on

several other factors, such as whether residents perceive the wind farm as necessary and consistent with their expectations regarding impacts, as well as distributive and procedural fairness (Eltham et al., 2008; Le Maitre et al., 2024; Wolsink, 2007). Accordingly, residents' attitudes emerge from a nuanced interplay of concerns, resulting in heterogeneous patterns of acceptance rather than a single, uniform trajectory (Wilson & Dyke, 2016). In this context, the planning phase has emerged as a critical stage for long-term acceptance, as uncertainty and reluctance to accept changes to the status quo may translate into resistance or heightened concerns about proposed wind energy projects (Dällenbach & Wüstenhagen, 2022; Wolsink, 2007).

Synthesis and research questions

By detailing the commonalities between change processes within organizations and the installation of onshore wind turbines, we have highlighted the conceptual utility of change communication research for analyzing local residents' readiness regarding wind energy infrastructure projects. From this perspective, the proposal, preparation, and installation of wind farms constitute a change for local residents that may evoke various forms of uncertainty and, in turn, reduce their readiness for change (Le Maitre et al., 2024). To provide an initial empirical foundation for the development of a conceptual, change-focused model of environmental communication, this study explores the views of citizens who are situated at different stages of local wind farm installation. Specifically, we investigate uncertainties and issue attitudes of citizens with no prior experience of local wind turbines (mirroring the "unfreezing" phase of change processes) and citizens who already live near a wind farm (a situation resembling the "refreezing" phase of change processes). Thus, by examining these two groups, we capture different points in the change process and aim to explore and better understand the stage-specific uncertainties and anticipations of citizens affected by wind farm installations. This stage-focused comparison allows us to substantiate the MECC and, in turn, provides an initial empirical foundation for the future design of communication strategies. The research focus is, therefore, not on intra-individual change during a single installation process. Rather, the group comparison highlights the importance of differentiating phases in change processes (Lewin, 1947), which may give rise to specific uncertainties and patterns of concern among stakeholders. Additionally, comparing the pre- and post-installation groups allows us to identify misconceptions or exaggerated fears held by citizens prior to wind power construction that may no longer concern residents after a wind farm has been built, which is valuable for designing targeted communication strategies. Insights from this comparison can inform whether future communication efforts should focus on correcting misconceptions, emphasizing benefits, or addressing specific concerns, depending on the progress of given wind farm constructions. Adopting the perspective from organizational communication, the uncertainties that citizens perceive before (and after) wind farm installations are key to understanding residents' attitudes and responses (Allen et al., 2007).

Building on past research in wind power communication, residents' uncertainties are examined in terms of dimensionality. Specifically, we compare citizens' reasoning and uncertainty regarding wind farm effects on the economy, ecology, health, and procedural fairness in planning and installation (Ki et al., 2022; see previous sections).

RQ1a-d. How pronounced is the uncertainty regarding the (a) economy, (b) ecology, (c) health, and (d) procedural fairness dimensions among citizens considering the consequences of future local wind farms and those with experience living near existing local wind farms?

In addition to uncertainty, citizens' readiness for change (Elving, 2005) will also depend on their beliefs about the consequences of a planned local wind farm. Expectations play a key role in explaining acceptance of installation processes (Lundheim et al., 2022), like how employees' expectations have been found to influence their responses to organizational change (e.g., Krogh, 2018).

RQ2a-d. To what extent do citizens' expectations regarding the effects of future wind farms in their vicinity on (a) economy, (b) ecology, (c) health, and (d) procedural fairness differ from the experiences of those living near existing wind farms?

In organizational change management, employees' compliance has been found to depend on trust in change managers (Elving, 2005). Similarly, in the context of wind farm projects, public authorities responsible for installation and safety monitoring are key entities requiring citizens' trust (Fast & Mabee, 2015). Therefore, we also examined the level of trust that citizens have in these authorities prior to a local installation process and compared it with the trust levels of residents after the installation.

RQ3. To what extent does trust in the responsible authorities differ between those who anticipate future local turbine installation and those who have experience with nearby installed wind farms?

Finally, expectations regarding future wind farms and evaluations of existing installations will affect citizens' overall willingness to accept (additional) turbine constructions in their local environment (Eltham et al., 2008; Le Maitre et al., 2024; Li et al., 2021). Therefore, the present exploration also compares the anticipated acceptance with those who have already experience with wind parks in their vicinity.

RQ4. To what extent does acceptance of local wind power development differ between those who anticipate future local turbine installation and those who have experience with nearby installed wind farms?

Method

Empirical research context: Onshore wind power in Germany

A survey of German residents was conducted to address the research questions. Germany began developing supportive regulations for onshore wind power in the 1990s and has experienced substantial industry growth since then (IRENA, 2013). Local projects are typically initiated by commercial developers, who collaborate with regional authorities within a defined legal framework for participatory planning. This process can be divided into three phases: (1) site identification, (2) permitting and detailed planning, and (3) construction and operation. Phase 1 varies greatly in duration and is often completed by local authorities before an actual installation project is proposed. On average, Phase 2 takes four to five years, while Phase 3 typically lasts three to six months (German Wind Power Association, 2022; WPD, 2025).

Site identification

Only around 2% of Germany's total land area is available for the construction of wind turbines, as other areas are excluded due to nature or landscape protection regulations or because they are used for agriculture, forestry, settlements, or transport infrastructure. Decisions about where wind turbines may be built are made at the state and municipal levels. Regional plans designate priority areas for wind energy development. A detailed site analysis examines minimum setback distances from residential areas and transport routes, as well as proximity to nature and landscape conservation areas, bodies of water, military bases, airports, and protected historical buildings. If a site is deemed suitable, a more refined analysis follows, including an assessment of local wind conditions based on calculations using reference values or on-site measurements. At the same time, legally required minimum distances to certain areas (e.g., residential zones) must be observed.

Permitting and planning

In this phase, various expert assessments are conducted. For example, studies examine whether sufficient wind resources are available at the selected sites; emission assessments ensure that nearby residents are not adversely affected by noise or shadow flicker; and potential impacts on nature conservation are evaluated. Final permission to construct is granted by the responsible authorities based on an extensive review of documentation, including expert assessments, participation outcomes, and compliance with formal requirements.

Construction and operation

Once permits have been granted, detailed planning and the actual construction process begin. For operating companies, regular expert reviews of the stability and safety of each turbine are mandatory and enforced by the responsible authorities (German Wind Power Association, 2025); however, no administrative obligations to keep local citizens informed (e.g., about environmental impacts) have been imposed.

As part of the first two stages, information events and public participation formats are usually conducted, although the degree of involvement of affected citizens varies greatly – ranging from mere information provision to genuine participation and even financial involvement in a specific wind farm. Local resistance is common, and the planning process is often delayed, for example, by protests from nature conservation groups. Against this background, Germany and its residents provide an informative context for addressing the research questions. Onshore wind power is both relevant and expanding in the country, and local conflicts over new installation projects are common, partly because Germany is densely populated and land resources are often scarce.

Procedure of data collection

From 10 to 26 January 2023, a quantitative online survey was conducted via the "Payback Panel." The PAYBACK company invites selected participants of Germany's leading loyalty programme for grocery customers into a market research panel. From this pool of approximately 180,000 people, samples can be drawn who earn points by participating in surveys. A key advantage of this panel is that participants are recruited offline from

PAYBACK's extensive customer base, which reaches 75% of households nationwide. The panel adheres to strict quality and data protection standards. Participation was voluntary, fully anonymous, and respondents could withdraw at any time (Payback GmbH, 2024). The sample drawn for the present study was constructed to ensure a balanced distribution regarding experience with wind turbines. To this end, an even representation of citizens from regions with a high concentration of wind turbines (Schleswig-Holstein and Lower Saxony) and regions with a low concentration (Bavaria and Baden-Württemberg; source: Bundesverband Windenergie, 2023) was achieved by means of quotas. Residents of large cities (100,000+ inhabitants) were excluded due to their inevitable distance from any wind turbines. Beyond these requirements, the sampling aimed for maximizing demographic heterogeneity (age, gender, education) without setting defined quotas. Initially, 2818 respondents completed the survey. To maintain data quality, responses with a completion time below half of the median ($Mdn = 629$ s) were excluded. The median completion time in the final dataset was 644 seconds (approximately 11 min). This resulted in a total of 2664 valid responses, distributed as follows: 26% from Lower Saxony, 22% from Schleswig-Holstein, 26% from Bavaria, and 26% from Baden-Württemberg. Respondents had an average age of 49 years ($SD = 15.18$), with 49% identifying as male. Formal education was distributed as follows: Secondary/intermediate school-leaving certificate, entrance qualification for a technical college = "intermediate education:" 36%, lower variable values = "lower education:" 9%, higher variable values = "higher education:" 36%; N/A: 20%.

Measures

The first survey questions categorized participants based on whether they had experience with onshore wind turbines in their proximity. Subsequent questions addressing the dimensions of RQ1 and RQ2 were worded according to this categorization: expectation-focused for participants without local turbine experience and experience-focused for those living nearby (details below). Questions on RQ3 and RQ4, additional items not reported here, and demographic questions were then presented to all participants. Upon completion, participants were thanked and debriefed, including a statement clarifying that the survey was not intended to influence opinions on wind power, along with references to credible sources on its advantages and disadvantages.[1]

Place of residence/proximity to a wind farm

To measure experience with existing wind turbines, respondents were asked to indicate whether they live near (within approximately a 5 km radius) and/or can see a wind turbine from their home (see Ki et al., 2022; Langer et al., 2017). Respondents who denied both questions were classified as having no direct experience with wind turbines and, therefore, could only be able to report their expectations about (imagined, future) wind farms in their vicinity. The former subgroup comprised of $n = 1555$ individuals (among them, $n = 715$ lived within 5 km and could see a turbine from their home; $n = 664$ lived within 5 km without turbine visibility, and 176 had a direct view of a wind turbine from their home, albeit from a greater distance than 5 km). The latter subgroup (citizens who lack lived experience with existing wind farms in their residential vicinity) comprised of $n = 1109$ individuals.

Level of uncertainty (RQ1)

To assess citizens' uncertainty, the frequency of "do not know" responses to the evaluation items described below was analyzed and compared between respondents who live near existing wind turbines and those who were asked to imagine future wind farm installation in their vicinity.

Expectations/experiences regarding economic aspects (RQ2)

Economic expectations about imagined future local wind farms and experiences with existing turbines in the proximity were measured using six self-developed items (inspired by Enevoldsen & Sovacool, 2016; Langer et al., 2017). Respondents were asked to rate their experiences or expectations regarding the economic impacts (e.g., strengthening/weakening of the local economy, increase/decrease in regional property prices, costs incurred/revenue generated for the municipality, and job losses/creation in the region, independence from imported energy and large electricity producers) on a 5-point Likert scale, ranging from 1 = does not apply at all to 5 = fully applies, augmented by a "don't know"/N/A option.

Expectations/experiences regarding soil, water, and air quality (RQ2)

Three aspects of future expectations and current experiences regarding ecological implications of local wind power were measured using single items and a 5-point Likert scale (again inspired by Enevoldsen and Sovacool (2016) and Langer et al. (2017). Respondents lacking experience with local wind turbines were asked whether they believed that a wind turbine in their vicinity would worsen (scale point 1) or improve (scale point 5) soil, water, and air quality (i.e., anticipated effects). Participants who already lived close to operating wind turbines were asked whether these turbines had already worsened (1) or improved (5) these aspects (experienced effects). Additionally, respondents had the option to select "don't know"/"no response."

Expectations/experiences regarding wildlife (RQ2)

Furthermore, three ecological aspects were assessed using single items (following Enevoldsen & Sovacool, 2016; Langer et al., 2017), asking respondents whether they had experienced or would expect a threat to local wildlife (such as endangerment of birds, disturbance of animals while eating, or disruption of animals during breeding or raising their young). These items were measured on a 5-point Likert scale, ranging from 1 = no threat to wildlife to 5 = high threat to wildlife, with the options "don't know"/"no response" also available.

Expectations/experiences regarding health and quality of life (RQ2)

Seven aspects of expected or experienced impacts on health and quality of life were measured using single items on a 5-point Likert scale (e.g., regarding disturbing noise, damage to the landscape/scenery, or reduced sleep quality). A score of 1 indicated no perceived negative impact, while a score of 5 represented a significant perceived negative impact. Respondents also had the option to select "don't know"/"no response." Like the previous item lists, these questions were verbalized in a similar fashion to measures by Enevoldsen and Sovacool (2016) as well as Langer et al. (2017).

Expectations/experiences regarding (procedural) fairness (RQ2)

Four aspects of the perception of fairness and expectations regarding (procedural) fairness in the construction of a wind turbine were measured using single items on a 5-point Likert scale (1 = does not apply at all, 5 = fully applies, with an option for "don't know/no response"). The newly developed items read: "The negative aspects (e.g., costs) were/should be fairly distributed between citizens and businesses," "the benefits resulting from the wind turbine near my residence are/would be fairly shared between citizens and businesses," "local decision-makers acted/should act fairly during the planning of the wind turbine," "the interests of citizens were/should be considered in the planning and construction of the wind turbine" (inspired by Langer et al., 2017).

Trust in responsible authorities (RQ3)

Trust in responsible authorities was measured focusing on three elements with single items. Respondents were asked to indicate their level of agreement with the following self-developed statements on a 5-point Likert scale (1 = "strongly disagree," 5 = "strongly agree"): I trust that the state and the responsible governmental authorities … (1) ensure that wind turbines are built safely, (2) make responsible decisions about whether and where a wind turbine should be built, and (3) conduct safety checks to ensure proper functioning.

Acceptance of wind turbines (RQ4)

The level of support for local wind energy was measured using one item ("I am positive about the further construction of wind turbines in my district") rated on a 5-point Likert scale (ranging from 1 = "strongly disagree" to 5 = "strongly agree"; following Emmerich et al., 2020; Huijts et al., 2012) ($M = 3.83$, $SD = 1.27$).

Preparation, analysis, and quality of data

Due to the exploratory research goal, the items designed to measure different aspects of one dimension were not compressed into conventional scales to preserve as much empirical detail as possible. Instead, findings are reported item by item. To enable an informative comparison between the anticipations of citizens who do not (yet) live near wind turbines and the experiences of citizens living close to existing turbines (RQ2 and RQ3), we relied on response data derived from slightly differently worded items. For example, respondents without experience of local wind farms, who reported their anticipations regarding potential future installations, were presented with the item on ecological impact: "A wind turbine in my vicinity would endanger wild animals that would be irritated while eating." Respondents living near existing wind farms, who reported their experiences, received the corresponding item: "The wind turbine in my vicinity endangers wild animals that are being irritated while eating." Strict measurement equivalence cannot be assumed for two reasons. First, although the items are semantically similar and dimensionally aligned, they refer to different entities – anticipations ("what-if" views) versus experiences ("what-is" perceptions). Second, the items were answered by different individuals rather than in a within-subject design. This constellation deviates from both classic experimental designs (identical items answered by different individuals) and intercultural survey designs, where different

items are intended to measure the same construct and measurement equivalence can be tested (Kühne, 2013). Consequently, comparing item or scale means across the two groups would imply unwarranted confidence in measurement equivalence. We, therefore, adopted a robust and simple analytical approach: instead of comparing mean scores or applying multivariate procedures, we analyzed each item in terms of the frequency of the two highest and the two lowest response categories (for five-point scales: scores 4 and 5 vs. 1 and 2).

These methodological decisions have implications for data quality. First, the measures were created for this study and have not been formally validated. However, the item wording was aligned with published studies, which is sufficient for exploratory purposes but limits rigorous model testing. Second, the use of single-item measures allows for the coverage of a broad range of dimensions in citizens' perceptions, which suits the exploratory aims of the study but entails known reliability limitations (Allen et al., 2022). Most perception items, however, target relatively concrete evaluative objects (e.g., sleep quality), making single-item measures more viable than they would be for complex psychological constructs.

Results

The first research question (RQ1a–d) examines how pronounced perceived uncertainty is across four dimensions – (a) economic, (b) ecological, (c) health-related, and (d) procedural fairness – among citizens considering the potential consequences of future local wind farms. These perceptions represent local stakeholders' views at a pre-change stage. They are compared with those of citizens who have experience living near existing local wind farms (i.e., who have undergone the change imposed by turbine installation), with the aim of identifying differences in the level of uncertainty between the two groups across the four dimensions. Table 1 indicates that people tend to feel more uncertain about the more abstract aspects of wind farm effects that are difficult for laypersons to assess without additional data or expert reports, such as impacts on water, soil, or air quality. For aspects that are more directly experienced in people's immediate surroundings and/or more visible (e.g., effects on the landscape), the overall share of respondents indicating that they cannot answer the question is lower (RQ1). Interestingly, uncertainty about economic consequences and procedural fairness is higher among those already living near wind farms than among those who were anticipating them, whereas uncertainty regarding health-related effects is lower for experienced effects across almost all health aspects than for anticipated ones.

To address RQ2 – exploring citizens' expectations regarding the (a) economic, (b) ecological, (c) health-related, and (d) procedural fairness impacts of future local wind farms and the corresponding experiences of those already living near existing wind farms – we report the cross-tabulation described in the Methods section (Table 2).

Regarding the economic impact, anticipations of citizens without experience (pre-change situation) were generally more optimistic than the actual experiences reported by citizens living near existing wind farms (post-change situation). The share of respondents who assigned high scores to these items was substantially higher among those who thought about possible future local wind farms than among those assessing the impacts of turbines operating in their vicinity, while low agreement ratings were more frequent

Table 1. Average level of uncertainty concerning anticipated future versus existing wind farms.

	Individuals with expectations ($n = 1109$)	Individuals with experiences ($n = 1555$)
Economic aspects		
Strengthening of the local economy	28%	44%
Increase in regional property prices	29%	57%
Revenue generated for the municipality	26%	46%
Job creation in the region	41%	54%
Increase in independence from imported energy	9%	21%
Increase in independence from large energy producers	9%	21%
Ecological aspects		
Endangerment of birds	10%	15%
Disturbance of animals while eating	16%	17%
Disruption of animals during breeding or raising their young	13%	18%
Improve soil quality	59%	66%
Improve water quality	63%	68%
Improve air quality	56%	66%
Health and quality of life		
Disturbing noise	15%	4%
Damage to the landscape/scenery	3%	1%
Limits my mobility	5%	1%
Reduced sleep quality	21%	6%
Negative health effects due to electromagnetic radiation	16%	8%
Generates harmful infrasound	28%	27%
Makes me feel oppressed due to its size	5%	1%
(Procedural) fairness		
The negative aspects (e.g., costs) should be/were fairly distributed between citizens and businesses	13%	53%
The benefits resulting from the wind turbine near my residence would be/are fairly shared between citizens and businesses	9%	46%
Local decision-makers should act/acted fairly during the planning of the wind turbine	7%	43%
The interests of citizens should be/were considered in the planning and construction of the wind turbine	5%	34%

Note: Uncertainty levels are operationalized as the relative frequency of "do not know" responses to each item reported separately for respondents who do not (yet) live near wind farms ("expectations") and for respondents who have real-life experience with existing local wind farms ("experiences").

among respondents with lived experience, particularly with respect to aspects such as independence from imported energy and from large energy producers. An exception was observed for regional property prices: In both groups, only a very small share of respondents selected high ratings, while negative assessments were more pronounced among citizens not (yet) living close to wind farms. However, more than half of the respondents living close to wind turbines selected "do not know" for this item. The ecological dimension showed a pattern of lower perceived problems among citizens living near wind turbines compared to those without such experience. Perceptions of potential negative impacts on wildlife, such as bird endangerment or disturbances during feeding and breeding, were lower among respondents with lived experience. In contrast, perceived/anticipated improvements in soil, water, and air quality were broadly similar across both groups and did not reveal pronounced differences. Regarding health and quality-of-life impacts, citizens with direct experience of wind turbines reported notably fewer perceived problems compared to the anticipations held by those without experience. Frequencies of anticipatory responses expressing concerns were roughly twice as high as the frequencies of assessment responses from citizens with real-life experience of wind turbines. This is also reflected in the higher proportion of low

Table 2. Expectations vs. experiences regarding the impact of wind farms.

	Individuals with expectations (n = 1109)		Individuals with experiences (n = 1555)	
	High agreement	Low agreement	High agreement	Low agreement
Economic aspects				
Strengthening of the local economy	53%	6%	40%	3%
Increase in regional property prices	6%	55%	6%	24%
Revenue generated for the municipality	54%	14%	35%	10%
Job creation in the region	42%	4%	31%	2%
Increase in independence from imported energy	58%	16%	35%	27%
Increase in independence from large energy producers	55%	17%	30%	29%
Ecological aspects				
Endangerment of birds	43%	23%	28%	33%
Disturbance of animals while eating	25%	37%	15%	49%
Disruption of animals during breeding or raising their young	31%	31%	19%	44%
Improve soil quality	6%	12%	6%	8%
Improve water quality	6%	8%	5%	3%
Improve air quality	12%	9%	8%	4%
Health and quality of life				
Disturbing noise	28%	34%	15%	65%
Damage to the landscape/scenery	35%	40%	28%	50%
Limits my mobility	6%	79%	3%	91%
Reduced sleep quality	13%	52%	4%	84%
Negative health effects due to electromagnetic radiation	15%	53%	5%	78%
Generates harmful infrasound	12%	41%	7%	55%
Makes me feel oppressed due to its size	16%	67%	8%	82%
(Procedural) fairness				
The negative aspects (e.g., costs) should be/were fairly distributed between citizens and businesses	43%	22%	8%	22%
The benefits resulting from the wind turbine near my residence would be/are fairly shared between citizens and businesses	59%	13%	10%	27%
Local decision-makers should act/acted fairly during the planning of the wind turbine	66%	11%	21%	14%
The interests of citizens should be/were considered in the planning and construction of the wind turbine	62%	14%	17%	28%

Note: High agreement: frequencies of the top two response categories (five-point scale; i.e., scores 4 and 5 combined). Low agreement: frequencies of the bottom two response categories (five-point scale; i.e., scores 1 and 2 combined). Responses are reported separately for respondents who do not (yet) live near wind farms ("expectations") and for respondents with real-life experience of existing local wind farms ("experiences").

agreement ratings (bottom two categories) of those living close to wind turbines. A different pattern emerged for the procedural fairness dimension. For individuals considering future wind farm developments, the questionnaire items reflected more normative expectations – emphasizing how procedural fairness "should be" achieved rather than how it "is likely to be" realized. (Procedural) Fairness was generally rated as particularly desirable by these respondents. In contrast, citizens who had witnessed local wind farm installations were asked about their actual experiences and reported much lower frequencies of high scores when assessing the (procedural) fairness they had perceived in practice. Notably, uncertainty (see Table 1) was particularly high among citizens living near wind farms for these items, with many participants indicating that they felt unable to evaluate the procedural fairness of past installation processes. Trust in the state and responsible governmental authorities (RQ3), measured using three items, showed no substantial differences in the frequency of high response scores – or in the bottom two scores – between respondents with and without experience with wind turbines (Table 3).

Table 3. Trust in responsible authorities.

	Individuals with expectations (n = 1109)		Individuals with experiences (n = 1555)	
	High agreement	Low agreement	High agreement	Low agreement
Trust that authorities ensure that wind turbines are built safely.	71%	11%	67%	13%
Trust that authorities make responsible decisions about whether and where a wind turbine should be built.	58%	20%	52%	24%
Trust that authorities conduct safety checks to ensure proper functioning.	71%	11%	67%	13%

Note: High agreement: frequencies of the top two response categories (five-point scale; i.e., scores 4 and 5 combined). Low agreement: frequencies of the bottom two response categories (five-point scale; i.e., scores 1 and 2 combined). Responses are reported separately for respondents who do not (yet) live near wind farms ("expectations") and for respondents with real-life experience of existing local wind farms ("experiences").

The comparison of the groups regarding their willingness to accept (further) wind power installations in their local environment (RQ4) revealed no systematic difference between those anticipating future local wind turbines and those with experience living near existing wind farms (Table 4).

Discussion

Interpretation of findings

What do we learn from exploring people's expectations of (unknown, future) local wind power installations and other people's experiences of (known, present) wind turbines in their proximity regarding public discourse and the dynamics of local acceptance of wind power? First, an analysis of levels of uncertainty before (anticipated) and after (experienced) wind farm construction (RQ1) revealed notable differences across dimensions. Most citizens exhibited low uncertainty regarding impact factors that materialize in daily life – such as effects on quality of life and health-related aspects – both before and after installation. However, uncertainty was more widely distributed in both groups when it came to more intangible dimensions, such as economic impacts and changes in air, water, and soil quality. Although these (potential) effects are frequently debated during installation processes (Lundheim et al., 2022), many citizens appear to struggle to assess them, both when anticipating a wind farm and when living near one. Such persistent uncertainties may stem from at least two factors: Either these dimensions are perceived as less personally relevant (thereby reducing the motivation to seek

Table 4. Local Acceptance.

	Individuals with expectations (n = 1109)		Individuals with experiences (n = 1555)	
	High agreement	Low agreement	High agreement	Low agreement
Acceptance of (further) wind power installations in the local environment	63%	16%	67%	14%

Note: High agreement: frequencies of the top two response categories (five-point scale; i.e., scores 4 and 5 combined). Low agreement: frequencies of the bottom two response categories (five-point scale; i.e., scores 1 and 2 combined). Responses are reported separately for respondents who do not (yet) live near wind farms ("expectations") and for respondents with real-life experience of existing local wind farms ("experiences").

out further information), or there is a lack of adequate information provided by wind power companies and/or local authorities.

In contrast, findings on perceived procedural fairness follow a different pattern. Notably, citizens living near existing wind farms were more likely to report uncertainty regarding procedural fairness than those anticipating a future installation. This result may indicate that many residents found the nearby installation process difficult to evaluate – either because opportunities for public participation were limited, because most citizens did not engage in the installation debate, or because they received insufficient information about the decision-making process. Alternatively, it is also possible that many citizens simply do not recall the details of the installation process. Regardless of which interpretation holds, this finding provides an important indication that local authorities and wind energy companies should invest greater effort in transparent communication and meaningful public engagement – not only before and during the installation process, but also well after a wind farm has been constructed. Second, post-installation evaluations of certain wind farm effects (RQ2) – specifically those related to wildlife, quality of life, and health – were found to be slightly less negative and less pronounced than pre-installation expectations. While ceteris paribus conditions for direct comparison cannot be assumed, this pattern may suggest that in a pre-change situation (i.e., when contemplating a future local wind farm), citizens tend to form relatively strong assumptions (e.g., anticipating severe disruptions to quality of life), potentially driven by uncertainty and a lack of empirical knowledge. Following a change (post-installation), local citizens may have either received more relevant information from wind farm proponents and/or gained personal experience, leading them to form less extreme evaluations. This interpretation is consistent with previous survey studies examining pre- and post-construction experiences of local wind farm stakeholders in other European countries (Eltham et al., 2008; Kontogianni et al., 2014; Le Maitre et al., 2024).

Beyond these observations, the apparent "disillusionment" with unmet economic expectations and the negative perceptions of procedural fairness among citizens with experience of existing wind farms are particularly noteworthy. The findings could reflect dissatisfaction with the installation process – perhaps stemming from a perceived lack of public participation, limited decision-making power, or economic benefits that failed to materialize as anticipated. Alternatively, the findings may capture a broader sense of frustration simply because the wind farm was built near residents, a reaction often associated with the NIMBY effect (Van der Horst, 2007). The negative retrospective evaluation of procedural fairness may further suggest that citizens (still) feel they were treated unfairly, particularly when comparing their situation to that of other regions that remain free of local wind power developments (Wolsink, 2000). Given the well-established role of economic benefits and perceived procedural fairness in shaping public acceptance of wind energy (Firestone et al., 2018; Lundheim et al., 2022), these findings underscore the importance of sustained engagement with local communities. To foster greater acceptance and mitigate lingering dissatisfaction, authorities may need to place stronger emphasis on long-term fairness considerations and maintain dialogue with stakeholders not only before, but also during and well beyond the initial construction phase.

Trust in responsible authorities (RQ3) and acceptance of further local wind power development (RQ4) were found to be quite similar among citizens in a pre-change

situation and those in a post-change context. These results may indicate that wind turbines constructed in the past do not substantially alienate citizens from their public administration or from the broader project of the green energy transition. However, a typical pattern also emerges here: support is high at a relatively abstract level, yet there is (justified) criticism of specific, concrete aspects, as well as expectations regarding how the process should ideally be implemented.

In sum, our findings show that both anticipating and living with local wind farms generate substantial uncertainty among citizens. Notably, uncertainty across most dimensions was more widespread among those in a post-change situation, despite their greater potential access to empirical information. Only aspects directly related to personal conditions (e.g., health) elicited less uncertainty after installation. By contrast, effects on air, water, and soil quality were consistently associated with high uncertainty, likely due to their low direct observability and the difficulty of assessing them without specialized knowledge. Beyond uncertainty, residents near existing wind farms reported particularly negative views of procedural fairness and economic benefits, whereas pre-change respondents largely expected positive outcomes in these areas. Finally, moderately positive levels of trust in authorities and acceptance of (additional) wind farm installations were observed in both pre- and post-change contexts.

Theoretical perspectives: Toward a model of environmental change communication

Adopting a change communication model

The present findings support our initial proposition that people are likely to respond to wind farm projects in ways like how employees react to organizational change (Krogh, 2018). Many individuals experience uncertainty and tend to anticipate transition costs or the risk of (negative) long-term consequences for their daily lives. Notably, substantial uncertainty was also observed among citizens in a post-installation context, suggesting that personal experience with the change – the arrival of wind farms – does not automatically reduce uncertainty. Moreover, citizens in a post-change situation reported predominantly negative evaluations of procedural fairness and economic benefits associated with existing wind farms. Taken together, these findings indicate that targeted communication and dialogue efforts throughout all phases of wind power installation – akin to those recommended in organizational change research – can play a crucial role in shaping local dynamics of acceptance and opposition (Maleki-Dizaji et al., 2020). We, therefore, propose developing conceptual links between environmental communication and organizational change communication to better understand local concerns regarding wind power and to enhance the design and implementation of participatory installation processes (Figure 1). Our starting point for this conceptual innovation is Elving's (2005) model of organizational change communication. This model emphasizes reducing the uncertainty experienced by employees affected by change, including concerns such as job security. Whether an organization can effectively address this uncertainty – so that most employees reach a state of readiness for change, a key prerequisite for successful implementation – depends on the quality of two types of communication activities: First, the provision of change-related information that addresses all critical dimensions of employees' uncertainty. Second, beyond informational support, the cultivation of

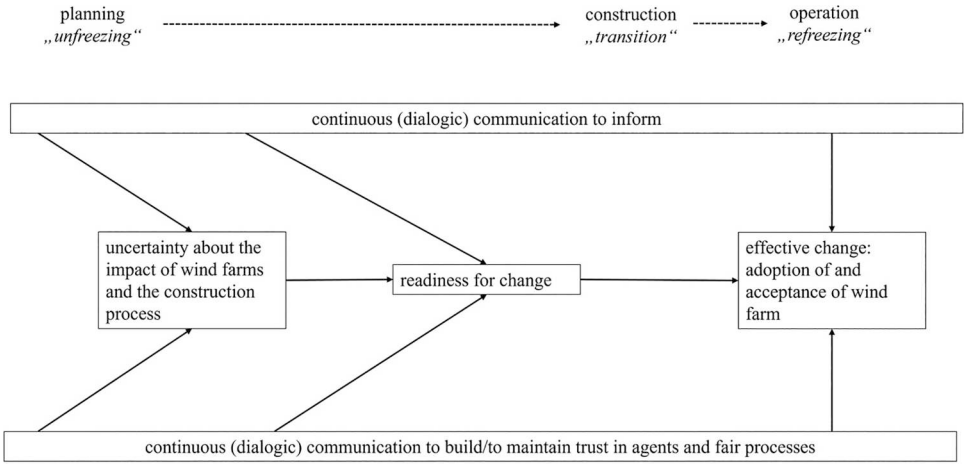

Figure 1. Model of Environmental Change Communication (MECC; all model components shown in boxes are conceptualized as continuous variables).

social bonds within the organization, or "creating a community," which helps ensure that change managers are perceived as benevolent and trustworthy. Transparency is a central element of this trust-building communication. It should be noted that Elving (2005) does not claim that readiness for change is determined solely by change communication. Individual factors, such as personality traits and attitudes, also play a role. Nonetheless, uncertainty – arising from insufficient information or a lack of trust in the agents and processes involved – represents a significant determinant that can, in principle, be influenced through targeted communication.

Accommodating the environmental communication context

Transferring this approach to the case of local wind power installation, it is predicted that local citizens will initially experience multidimensional uncertainty about the changes that a new wind farm will bring to their lives. This uncertainty will reduce their "readiness to change" (i.e., their willingness to adapt to planned wind turbines). The extent to which environmental change communication by wind power proponents or local authorities can reduce these uncertainties will strongly influence their readiness to embrace the change (i.e., their degree of agreement with the wind farm installation).

Following Elving (2005), two types of environmental change communication are likely to have the greatest impact on citizens' readiness for (wind power) change:

1. Providing information that addresses citizens' uncertainties, particularly those common among our surveyed pre-change respondents, such as projected economic consequences and less visible aspects, including effects on water, air, and soil quality, or infrasound emissions (Lundheim et al., 2022).
2. Investing in community building and trust – both trust in the agents involved in the project and trust in the procedural fairness of the installation process. This includes efforts to bridge discrepant framings of the change between wind power proponents

and local skeptics, to overcome fundamental antagonisms among stakeholders (Brummans et al., 2008; Fast & Mabee, 2015).

Regarding community building and trust communication, transparency and proactive information provision – sharing information before it is requested – have been identified as key factors in successful organizational change processes (Clampitt et al., 2000). Elving's (2005) emphasis on social bonds suggests that the effectiveness of environmental change communication also depends on overcoming the in-group/out-group dynamics experienced by citizens facing a wind farm project initiated by a distant or unfamiliar organization. People affected by the change are more likely to trust both the change agents and the decision-making process if they perceive the project as having social roots in, or meaningful connections to, their community. Participatory communication arrangements further support trust building, as providing dialogue and opportunities for engagement not only helps reduce uncertainties (see above) but also demonstrates the proponents' goodwill (Jami & Walsh, 2017). Environmental change communication – both to inform and to build trust – may have a particularly strong effect on citizens at a pre-change stage if it involves individuals from other areas who can share their lived experience, their adaptation to changes imposed by a wind farm, and their personal pre-/post-comparisons of expectations versus observations. Citizens in a post-change situation can thus function as credible and helpful sources in information-oriented change communication. Coleman and Stern (2018, p. 291) refer to such bridge-building actors as "boundary spanners." Regardless of whether experienced citizens participate in communication around new installation processes, addressing local residents' uncertainties is likely to influence readiness for change most effectively when it involves active listening and dialogue. Only participatory approaches can ensure that wind power proponents tailor the information they provide to the specific needs of local stakeholders (Clampitt et al., 2000; Langer et al., 2017).

Sustaining change communication after installation

The present findings further suggest that citizens' uncertainties do not necessarily disappear after a wind farm is completed, and that retrospective assessments of procedural fairness may remain negative. Viewing wind power installation as a long-term process of promoting change implies that citizen satisfaction with local wind farms depends on ongoing communication efforts (Buchanan et al., 2005) that extend beyond the construction phase. Post-construction initiatives – i.e., communication in the "refreezing stage" – such as continued information-sharing and trust-building efforts, can influence long-term local acceptance just as communication efforts during the pre-change ("unfreezing") phase can. Such post-change communication may, for instance, imply publishing data on the actual effects – or lack thereof – on air, water, and soil quality, signaling interest in citizens' post-change experiences and well-being, and establishing permanent communication structures. Accordingly, the present survey's findings suggest extending Elving's (2005) original model to account for change communication's impact beyond the pre-change phase and citizens' initial readiness for change. We propose that continued change communication can also shape long-term, post-installation acceptance of local wind power. Such post-change acceptance – what Elving terms "effective change" – is not only a strategic and normative goal in itself, but also shapes the

conditions for future wind power projects: The more citizens living near wind turbines report long-term satisfaction, the more their experiences will influence others facing new wind farm developments, particularly if they serve as credible voices in environmental change communication.

Limitations and research outlook

Several limitations should be considered when interpreting the present survey findings. First, the sample obtained via the online access panel cannot claim full generalizability to the entire German population, as it is not based on a random selection of all citizens. On the other hand, the Payback-panel used here is superior to many competing services, as participants are recruited for quota sampling from the very broad, offline-built base of Germany's largest customer loyalty programme. Nevertheless, replication studies using fully representative samples are warranted. Second, the questionnaire employed single-item measures to allow a broader range of dimensions to be covered. While this approach was suitable for the present exploratory purposes, well-known reliability and validity issues (e.g., Allen et al., 2022) should be considered when interpreting the results and in future studies. Third, the empirical assessment of citizens' trust in authorities in the context of wind farm installation (RQ3) relies on relatively vague wording, such as "safe turbine construction" and "responsible decision-making." Its validity may, therefore, be compromised by unknown variation in respondents' understanding of these items; accordingly, a more refined measure is recommended for follow-up research. Fourth, the group of citizens categorized as living in a "pre-change" situation – that is, those asked to consider a potential future local wind farm installation – likely includes both individuals who are aware that such a project has been announced in their vicinity ("'true pre-change") and those who are, either correctly or unknowingly, unaware of any local construction plans ("imagined pre-change"). These subgroups likely differ in the personal relevance of the survey questions and should be differentiated in future research, which was not possible with the current questionnaire. Fourth, the present study lacks technical and statistical comparability between the measures applied to the pre-change and post-change groups of respondents, for the reasons discussed in the methods section. While the robust mode of data analysis used – based on frequencies of high and low agreement scores – allows for preliminary conclusions, future studies employing similar designs, whether cross-sectional or longitudinal (see below), will require improvements in measurement to ensure comparability.

Beyond these empirical limitations, some conceptual challenges remain in further substantiating and ultimately testing the proposed preliminary model of environmental change communication. The present survey, which compared the expectations of citizens unfamiliar with local wind turbines to the experiences of those living near existing wind farms, does not capture an actual change *process* – specifically, the within-person or within-community dynamics triggered by the announcement and arrival of a new local wind farm. Advancing our understanding of citizens' readiness for and adaptation to wind farm construction will require more process-oriented, longitudinal research designs. Such a within-person comparison would help to better understand the transitional dynamics of citizens during wind farm installation periods, including whether pre-construction anticipations align with post-installation experiences and whether

accommodation and familiarization contribute to pre/post-change discrepancies (e.g., Wheeler, 2017). Future studies should explore in greater detail the dimensional differences in citizens' uncertainties and their impact on readiness for change or post-construction evaluations of local wind power. For example, uncertainty about less visible aspects, such as the presumed effects of wind turbines on water quality or wildlife, may differ in both personal relevance and reducibility through communication compared with uncertainties about more experiential aspects, such as health effects. Moreover, follow-up research should systematically analyze the (change) communication strategies employed by project proponents, as well as assess the quantity and quality of communication efforts that were missing but could have been beneficial (Lewis, 2007). By the same token, a change communication perspective enables further theoretical innovation, such as considering stakeholders' information seeking amid change processes that cause uncertainty (e.g., Kramer et al., 2019). Likewise, connecting the concept of opinion leadership to the model of environmental change communication could lead to improved explanatory power: Examining local residents who are most actively engaged in installation processes, vocally express concerns, or organize opposition can further enhance the understanding of wind power installation as a dynamic process of social change (Levay, 2010). Additionally, examining wind power installation through the lens of change communication creates opportunities for comparative research on public discourse and the acceptance of other major local developments, such as large infrastructure or industrial projects (Boholm & Löfstedt, 2004). Such comparisons can broaden the empirical understanding of community responses to change and help distinguish between general reactions to significant developments and those responses that are specific to wind turbine installations.

Ultimately, a refined theoretical-empirical perspective on wind farm "acceptance" – as both a process and an outcome of local change – offers valuable insights for supporting residents as they navigate the challenges of energy transition in their communities. At the same time, it can empower energy transition advocates to refine their communication strategies, optimizing information delivery, enhancing perceptions of procedural fairness, and fostering long-term public support for renewable energy infrastructure.

Note

1. Link to the questionnaire (original version in German): https://osf.io/s3mh6/?view_only=a34a179e0f7645d5b0bc72046f64134f.

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Disclosure statement

No potential conflict of interest was reported by the author(s).

Research ethics statement

The authors confirm that the empirical study presented in this manuscript has been conducted in accordance with the Declaration of Helsinki and the ethical guidelines of the American Psychological Association (APA). Specifically, the following steps were taken to warrant the principles of ethical research and to protect the personal rights of our participants:

Participants were informed about (1) the strictly scientific purpose of the research, (2) the expected duration and procedures, (3) their right to decline to participate and to withdraw from the research once participation has begun, (4) the confidentiality of their responses, and (5) whom to contact for debriefing or any questions concerning the study.

After reading the study description, including the aforementioned information, informed consent was provided by all participants by clicking the "start" button to access the online survey.

To protect the privacy of our participants, no personally identifiable information were stored together with the collected survey data.

The commercial market research company "PAYBACK GmbH" that collected the data is certified to operate in accordance with the German Data Protection Act (DSGVO) and is a member of the German Professional Association of German Market and Social Researchers (BVM).

According to the provisions for good scientific practice released by the German Research Foundation (DFG), approval of planned research by an ethics committee is required if a study imposes any risk on participants, imposes any physical or emotional burden on participants, and/or does not inform participants about the purpose and procedure of the study to a full extent (e.g., omission of study-related information or intentional deception over study goals for the purpose of ensuring naïve responses) (http://www.dfg.de/foerderung/faq/geistes_sozialwissenschaften/index.html). Hence, for studies that do not match any of these criteria, approval by an ethics committee is not mandatory for social science studies in Germany. The authors confirm that the work reported in this manuscript does not meet any of the mentioned criteria of the German Research Foundation. Consequently, an institutional ethics approval was not a requirement for conducting the present research.

Statement on use of generative artificial intelligence

In full compliance with the journal publisher's guidelines (https://taylorandfrancis.com/our-policies/ai-policy/), the authors declare that Generative Artificial Intelligence, specifically ChatGPT version 4.0, has been used to improve the language of selected sections of the manuscript. The authors did not make any use of ChatGPT or other AI tools beyond this purpose.

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