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At the Heart of a Sustainable Energy Transition

The Public Acceptability of Energy Projects

PUBLIC ACCEPTABILITY IS AT THE HEART of changing the energy system toward a more sustainable way of energy production and use. Without public acceptability and support for changes, a sustainable energy transition is unlikely to be viable. We argue that public acceptability is often addressed too late and should be incorporated into the planning process from the start. Moreover, engineers, policy makers, and project developers tend to misjudge the complexity and causes of public resistance, trying to find the magic bullet to “solve” the lack of public acceptability. Such attempts are likely to be ineffective, or even counterproductive, if they fail to address people’s key concerns surrounding energy projects. There is not a one-size-fits-all solution: public acceptability is a dynamic process that depends on the context, the specific project at stake, and the parties involved.

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The United Nations-led regulatory framework for environmental projects established by the Aarhus Convention emphasizes that citizens have a right to be informed about and comment on environmental decisions and that their comments will be taken into account in decision making. Public engagement and support are crucial for realizing sustainable energy projects that are necessary steps toward the Paris Agreement's goal of keeping the increase in global average temperature to well below 2 °C and aim to limit the increase to 1.5 °C. Reducing air pollution, enhancing public health, and conserving water and food are also central motivations for a cleaner energy system. Energy projects will not be viable unless people adopt and adequately use the related infrastructure and technology, change their behavior to adjust to the (renewable) energy supply, reduce overall energy demand, and accept policies surrounding a sustainable energy transition. Yet many proposed sustainable energy projects are met with fierce public opposition, especially from communities where these projects are to be deployed (Figure 1). To secure democratic decision making and promote wide public support for a sustainable energy transition, it is essential to understand what drives public acceptability of energy projects and how this knowledge can be integrated into project development from the start and during implementation phases.

Public acceptability is a broad concept that refers to people's general evaluation of energy projects, i.e., the extent to which they favor or disfavor a particular energy project. It manifests itself in people's opinions as well as their (intended) actions toward energy projects and can be accompanied by emotional responses to these projects. Possible public responses include active resistance, apathy, uncertainty, passive acceptance, support, and embracement. However, public acceptability typically receives attention from project developers and decision makers only when it challenges a specific project (e.g., because people protest) or when there is a strong

fear that this may happen. This reflects a somewhat narrow instrumental approach to acceptability, usually aimed at legitimizing already developed energy projects. Instead, we advocate an alternative approach that views public acceptability as a necessary and valuable building block for the quality of the project, informing whether and how these projects should be changed or if new projects need to be developed differently.

Misguided, inaccurate, and simplified assumptions about public acceptability often lead to ineffective policies that fail to enhance public support but, rather, inflame conflict between authorities and developers, on the one side, and the public, on the other side. We elaborate four such common simplifications and misunderstandings: 1) public acceptability is merely a not-in-my-back-yard (NIMBY) response and can be affected positively by 2) financial incentives, 3) providing information to people, and 4) the lapse of time. Ad hoc and countereffective solutions are often implemented based on these misunderstandings. These are often one-size-fits-all solutions failing to take into account that similar energy projects may be evaluated differently by different communities and individuals. To remedy this, we propose to analyze projects from the very beginning of their development in terms of key factors and processes that underlie public acceptability. We discuss alternative, often more promising, ways to address public acceptability that take these factors and processes into account. Finally, we end with some concluding remarks on how to better incorporate public acceptability in practice and research.

Common Misunderstandings About Public Acceptability

Public Acceptability Is Merely a NIMBY Response

People who object to energy projects are commonly labeled as NIMBYs by the media, policy makers, and industry. NIMBY is an easily used and widely understood concept, but it is rich in problems as well. It presumes that those who object have certain negative characteristics, such as being selfish and motivated only by personal gain, irrational and overly emotional, ignorant about the scientific or engineering aspects of energy projects, and parochial (i.e., more interested in local impacts than national or global benefits). The labeling as simply NIMBYs influences the way project developers and authorities tend to interact with the public about energy projects and how they attempt to tackle each of these pejorative assumptions: addressing selfishness by offering incentives (often labeled benefits packages), addressing ignorance by public awareness campaigns that focus on “the facts” (as experts understand them), and dealing with what they view as irrationality by avoiding public meetings with angry protestors. However, it is likely that these strategies will fail to increase public acceptability unless they address people's genuine concerns, as we will discuss.

figure 1. A protest against the building of a wind park in The Netherlands. The protesters say “no” to wind turbines but “yes” to solar panels. (©Dagblad van het Noorden/Maaike Wind, used with permission.)

Public acceptability is a broad concept that refers to people's general evaluation of energy projects, i.e., the extent to which they favor or disfavor a particular energy project.

Financial Incentives Will Increase Public Acceptability

It is commonly assumed that if people are compensated financially for the possible risks and costs of energy projects, they will accept these projects. This idea is supported by the fact that if you ask people directly what motivates them most, they often mention finances, such as the price of energy technology or their energy bill. Financial incentives can indeed have positive effects on public acceptability, especially when large investments are needed. For example, high up-front costs for energy technology (e.g., solar panels and heat pumps) may reduce the likelihood that the technology will be adopted, while tax rebates, subsidies, and feed-in tariffs that reduce the initial up-front costs and/or the subsequent costs for the energy use can increase public acceptance of such technologies. However, financial incentives do not always have the expected effect on public acceptability, particularly when the amount is small and it is uncertain whether people will benefit at all. Even more importantly, issues other than financial costs and benefits may drive public acceptability. Interestingly, when measured indirectly, financial incentives are not always the main motivation (see also van der Werff et al. in this issue).

Effects on Personal Comfort, Well-Being, and Health

People may be concerned about, for example, noise from wind turbines, the visual impact of high-voltage power lines, or noise and local pollution from bioenergy power plants. Regardless of whether or not such risks are factually true, or even if the chances of any of these risks occurring are very small, such concerns should be taken seriously as they can vividly influence public acceptability.

Signaling Value

Renewable energy projects and energy-efficient technologies such as electric vehicles tend to be more acceptable when people perceive them as signaling something positive about themselves, for example, if they have a positive symbolic function (see also Jans et al. in this issue). People may be proud to be part of renewable initiatives and enjoy making a public commitment to sustainability. For example, in Japan, the names of community members who contributed to a wind park are placed on the wind turbines. Providing financial incentives could potentially impede the signaling value as, if there is money to be earned, it may reduce the opportunity for people to see themselves, and to be seen, as doing the right thing.

Environmental and Societal Consequences

The more people believe that certain energy projects provide benefits to society and the environment, such as public safety and a reliable and sustainable energy supply, the more they may support these projects. There is empirical evidence suggesting that, in comparison with financial arguments, public health and environmental arguments more strongly influence public acceptability. Collective benefits for society at large, as well as for the local community where an energy project is to be sited, can influence acceptability. Research has shown that individuals who strongly self-identify with their country are more supportive of energy infrastructure projects that are labeled as nationally significant and are more trusting of national energy institutions such as grid companies. Providing financial incentives can crowd out intrinsic motivation driven by societal and environmental concerns, and people will cease to act sustainably when the incentives are no longer large enough or when they are taken away.

Fair Distribution of Costs and Benefits

Besides the different types of costs and benefits per se, how the positive and negative consequences are distributed among people, either broadly speaking or within a community, is important for the public acceptability of energy projects. Financial incentives could potentially be a good strategy to compensate the groups that are most disadvantaged by energy projects (e.g., those living in the vicinity of a power plant). At the same time, care should be taken so that such compensations are not perceived as bribes, for example, when people think that developers should address the potential societal and environmental risks and benefits of energy projects rather than providing compensation aimed at only increasing support for these projects. In sum, financial incentives can be effective in influencing public acceptability of energy projects, particularly when large investment costs are at stake. However, financial incentives should be used with care, considering other possible concerns that may drive public acceptability.

Education and Information Can Enhance Public Acceptability

One-way communication from project developers and politicians to the public is usually based on the assumption that people are ignorant or unaware of the benefits of energy projects. Hence, it is assumed that information on the (financial) benefits of the projects will increase people's knowledge

Energy projects have implications for four types of values: biospheric, altruistic, egoistic, and hedonic.

and subsequently increase public acceptability. This reasoning is rooted in the classical economic argument that there is a knowledge gap, which should be overcome by providing people with more information. Information is indeed important when people have (yet) little knowledge or hold misperceptions about energy projects, but this is not always the case. Many objectors are not ignorant at all and may emphasize concerns and uncertainties not shared by the experts. Furthermore, knowing about a project or understanding its aims and benefits does not necessarily mean that people will accept it. The communicated benefits may not address people's key concerns; people may disagree that the benefits outweigh the related costs and risks; they may oppose the way the costs, risks, and benefits are distributed; or they may not be convinced by the information provided. It is important that they trust the responsible parties, the decision-making process, or the technology involved.

One-way communication often occurs and can represent low public engagement in energy projects, making it likely that people will feel that their concerns are not sufficiently considered. This impedes public acceptability. If people have an opportunity to express their opinion, for example, in public hearings, but their voices eventually have little-to-no impact on decision making, their attitudes toward a project will not become more positive and may even become more negative. This is most likely when the rationale for engaging the public is purely *instrumental*, namely, trying to increase the public acceptance and legitimacy of a proposed project without having to change the project. Public engagement will much more likely lead to better and more acceptable projects when the rationale behind it is *normative* and *substantive*, striving for democratic decision making and willingness to integrate lay knowledge and diverse societal values and interests in project development and implementation. To this end, the highest level of public engagement, public participation—which involves a two-way exchange of information, with the possibility of transforming opinions on both sides—is the most recommended form. It implies that developers and the public together discuss the development and implementation of energy projects, reaching for solutions that adequately account for the multiple values and interests of different stakeholders. By definition, public participation requires that people are engaged from the early stages of project development and implementation,

when they can still exert influence on decision making rather than being faced with already fine-tuned energy projects. Public participation is the cornerstone of the Aarhus Convention and emphasized in national environmental policies. For example, in The Netherlands, in an ongoing reform of environmental law, the importance of public participation for the quality of environmental projects and their acceptability by civil society is increasingly stressed. Yet many questions remain about how such participation should be organized: when to engage the public (e.g., when sketching sustainability visions or planning specific projects); whom to invite and who will actually participate; which form of participation to choose and how much time, effort, and knowledge should it require from participants; and how to reach an effective and socially acceptable consensus.

Public Acceptability Will Increase with Time

There is a general notion that, by nature, people often resist change, which can result in public resistance to any type of change. An intuitive approach to overcome this general resistance to change is to simply go ahead with a project, despite public resistance. Such a “decide-announce-defend” approach relies on the assumption that once all changes are made and energy projects are up and running, the public will automatically get used to them and eventually accept them. Indeed, there are examples where public acceptability increased after energy projects or policies were implemented, particularly when people experienced the benefits. However, in other cases, energy projects had to be reversed or changed because public resistance remained persistent. Examples include carbon capture and storage in The Netherlands and the building of hydropower dams in Patagonia, Chile; in both cases, the authorities initially approved the projects but eventually had to stop them because of the lack of public support. In Chile, this took eight years of persistent opposition from citizens, community groups, and national and international nongovernmental organizations.

One possible reason changes do not get accepted is that people do not feel sufficiently engaged and represented in decision making, for example, when only one-way communication takes place and public input has little to no impact on decision making, as discussed previously. Public participation and engagement early in the siting process can help prevent cancellation or changes later in the process, when substantial investments have already been made.

Caution should be taken in how public acceptability is assessed, for example, whether it refers to people merely not resisting the project that is already there (e.g., because the damage is done and resisting is pointless) or actively supporting the project and thinking positively about it (see the broad definition of public acceptability previously mentioned). In a study in the United Kingdom, 97 participants reported that they accept high-voltage power lines but that they do not support them (Figure 2). A sustainable energy transition can only realize its full potential when people accept and properly use the related energy sources, infrastructure, and technology; make the necessary behavioral changes (e.g., match their energy use to the supply of renewable energy, reduce energy use, etc.); and accept the related policies. Such a broad spectrum of changes is more likely when people strongly support energy projects, rather than when they only passively tolerate them.

One Size Fits All

Misperceptions about the public acceptability of energy projects can lead to thinking that there are one-size-fits-all solutions that can “fix” the lack of public support in many projects and among different people. However, localities where energy projects are to be sited can have distinct settlements, community structures, and meanings associated with them. Consequently, the same energy project can be seen as a disturbing development in one place and as enhancing the community in another. For example, placing large-scale energy infrastructure in rural or coastal areas without such facilities typically leads to social conflict, as communities attempt to protect local landscapes from unwanted “industrialization.” Siting such infrastructure in already-developed locations may be the solution but can bring other difficulties by overburdening certain communities with multiple forms of infrastructure (e.g., transportation and waste). It is essential to take the unique characteristics of local places and their meanings to local people into account in the development and implementation of energy projects. Next, there is no one-size-fits-all solution because people often differ in how they perceive and evaluate energy projects and what they find acceptable, as we discuss next.

People Don’t Agree on What Is Acceptable and What Is Not

Looking only at the energy projects themselves does not fully explain public acceptability, as there are often disagreements among people on whether, and how, certain energy projects should be implemented. Moreover, there is usually no consensus among the public about what is acceptable and what is not. It is, therefore, crucial to take individual factors into account as well to better understand public acceptability of energy projects.

Values define what people find important in their lives in general (see also Steg et al. in this issue). Energy projects have

implications for four types of values: biospheric (protecting nature and the environment), altruistic (safeguarding the well-being of others), egoistic (safeguarding personal resources such as wealth and status), and hedonic (seeking pleasure and comfort). People differ in how they prioritize these values and how acceptable they find different energy projects. People accept energy projects that, they think, support their core values, whereas they do not accept energy projects that, they think, threaten their core values. For example, research shows that the stronger their biospheric values, the more acceptable people find renewable energy sources and the less acceptable they find nuclear energy. By contrast, the stronger their egoistic values, the more acceptable they find nuclear energy and the less acceptable they find renewable energy sources. This is probably because people with strong biospheric values are concerned about possible environmental risks of nuclear energy (e.g., nuclear accidents and radioactive waste), while people with strong egoistic values are concerned about possible individual costs of renewable energy sources (e.g., financial costs and intermittency of energy supply).

People pay particular attention to information about energy projects most important for their core values. This could explain why information strategies may not always have the desired effects. For example, information about certain benefits of energy projects will most likely be attended to by people who value these benefits and already support the project (i.e., preaching to the converted). Conversely, people who do not value these benefits as much and/or are primarily concerned about other project consequences may disregard this information. Furthermore, people tend to evaluate many different characteristics of energy projects overly positively or negatively, depending on whether these projects support or threaten their values, respectively. As a result, people may give multiple arguments against (or in favor of) a project that supports their initial value-based position but, at the same time, are not very important to them in light of their values. Addressing such post-hoc arguments by providing information or even by changing the project will probably have little impact on public acceptability. To develop effective strategies that target the root causes of

	Not Support	Support	Total
Not Accept	151	1	152
Accept	97	337	434
Total	248	338	586

figure 2. The frequency of participants accepting and/or supporting high-voltage power lines at a general level in the United Kingdom. (Adapted from S. Batel, P. Devine-Wright, and T. Tangeland, “Social acceptance of low carbon energy and associated infrastructures: A critical discussion,” *Energy Policy*, vol. 58, 1–5, 2013.)

Public participation and engagement early in the siting process can help prevent cancellation or changes later in the process, when substantial investments have already been made.

public acceptability of energy projects, it is important to look at which values underlie people's acceptability judgements as well as their evaluations of the costs and benefits of energy projects. There is initial evidence to suggest that emphasizing the benefits of sustainable solutions for people's core values reduces their scepticism and increases their support for these solutions. At the same time, it is not possible to reframe any type of energy project as supporting any type of values. For example, research suggests that people with strong biospheric values are not readily convinced by the argument from industry and/or governments that nuclear energy and natural gas are relatively environmentally friendly.

Place Attachment

Energy projects that are large in scale bring fundamental changes to the character, including the visual appearance, of the localities where they are sited. As mentioned earlier, projects may be objected to if they are interpreted as industrializing the character of a place that is considered to be natural, such as a rural landscape or coastal view. Place attachment refers to the ways that certain valued places come to be associated with positive emotional bonds and become important aspects of people's identities. Research has shown that individuals with strong place attachments, particularly those with "active" place bonds who like to keep up with changes in the neighborhood, may view proposals to site energy projects as a threat to their identity, associated with negative emotions such as anxiety, fear, anger, shock, and frustration, leading to attempts to protect or defend their place from unwanted change. Analyzing the relationships between people's place attachment and how acceptable they find energy projects can help developers and policy makers better identify how these projects affect a specific locality.

Trust

Energy projects are very complex, and people need to rely on responsible parties for the development and implementation of these projects. The extent to which people trust these parties can deeply influence the public's acceptance of them. People can be critical about the role of the government and large energy companies in the development and implementation of energy projects, which makes them reluctant to accept them. For example, people may not trust that responsible parties will sufficiently mitigate and adequately cope with the risks posed by energy projects. Trust is a use-

ful heuristic for people to evaluate the project and its implications; generally, the more people trust the regulators, the more acceptable they find the project. Trust in responsible parties can also influence how people respond to provided information to evaluate the costs and benefits of energy projects and whether they think that these costs and benefits are distributed fairly. Importantly, trust can influence and be influenced by how people perceive the decision-making process in an energy project.

Summary and Practical Implications

Public acceptability and its causes are often misunderstood and oversimplified by those responsible for the development and implementation of energy projects. Common misunderstandings about public acceptability can lead to post hoc one-size-fits-all solutions that are ineffective in increasing acceptability and may frustrate people by making them think they are not being taken seriously. Moreover, ill-designed solutions may unwittingly foster greater social conflict instead of reducing it. We argue that public acceptability is a complex construct that depends on the characteristics of energy projects, the qualities and meanings of places where projects are sited, and general psychological and social factors. Furthermore, public acceptability is dynamic and develops over time and can manifest itself in many different forms. Taking these complexities into account, we outline concrete steps for progress toward a sustainable energy transition.

- ✓ There is not a one-size-fits-all solution. Public acceptability is more than merely toleration or a lack of conflict or controversy. It is a complex construct with multidimensional layers of values that need to be considered over time. We defined four types of values that relate to energy decision making: biospheric, altruistic, egoistic, and hedonic. There are also many different communities and stakeholders in energy decision making that create a mosaic of many different concerns and perceptions of risks and benefits. For example, sense of place drives some concerns about changes to the landscape and seascape that reflect important aspects of people's identity. Equity is an issue that needs careful attention, so (financial) incentives need to be creative and take people's key concerns into account.
- ✓ Sustainable energy transition is a long-term process. Engagement strategies with interested and affected

People accept energy projects that, they think, support their core values, whereas they do not accept energy projects that, they think, threaten their core values.

communities are needed early on and throughout the life cycle phases of project development, implementation, and operations. Also, it is important to continue analyzing and monitoring public acceptability after the projects have been in place for insights into the dynamics and the achieved levels of public acceptability (e.g., tolerance and active support). These analyses become important lessons for future projects. Though commitments to public engagement do not guarantee rapid success, failure is virtually assured without an investment in the process.

- ✓ Two-way communication with opportunities for the public to influence decision making (i.e., public participation) is often rare but can be critical for success. Public participation should be organized in a way that ensures information exchange between developers and authorities, on the one side, and the public, on the other side, and that diverse societal values and interests are represented in decision making. This requires the consideration of public acceptability and its underlying factors and processes from the very beginning of project development and not only when the project faces strong public resistance. The required public hearing processes linked to environmental assessments are often not sufficient to understand the diversity of public concerns. There is extensive, evidenced analysis on how to facilitate public participation, but these approaches are not widely known or applied.
- ✓ Trust is a very critical factor in planning and siting processes. Efforts should be made to build trust, although this is not easy to do. Third parties or intermediaries can play a role in ensuring that the process incorporates local concerns beyond what can be discovered at public hearings. People need to recognize that their values and interests are taken seriously.
- ✓ A diverse project team is needed for developing and implementing energy projects, particularly people with relevant professional backgrounds who can engage with the public and assess its concerns. It is important that project developers, engineers, and policy makers come up with a more robust approach about key factors and processes that drive public acceptability. A more effective team approach may address these fac-

tors in information strategies and interventions aimed at changing projects or developing projects differently to increase public support. To develop this approach and incorporate aspects of public acceptability from the beginning, interdisciplinary collaborations among engineers, project developers, environmentalists, and a wide range of social scientists are needed.

For Further Reading

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