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Review

Developing a Theoretical Framework to Explain the Social Acceptability of Wind Energy

Sigurd Hilmo Lundheim [1,*], Giuseppe Pellegrini-Masini [2], Christian A. Klöckner [3] and Stefan Geiss [1]

[1] Department of Sociology and Political Science, Norwegian University of Science and Technology, P.O. Box 8900, NO-7491 Trondheim, Norway; stefan.geiss@ntnu.no
[2] Department of Teacher Education, Norwegian University of Science and Technology, NO-7491 Trondheim, Norway; giuseppe.p.masini@ntnu.no
[3] Department of Psychology, Norwegian University of Science and Technology, NO-7491 Trondheim, Norway; christian.klockner@ntnu.no
* Correspondence: sigurd.h.lundheim@ntnu.no

Abstract: The social acceptability of wind farms has been researched for several decades now, with the first research tracing back to the 1980s. This paper aims to deliver a literature review within the structural framework proposed by the paper of variables influencing the acceptability of wind farms. The large amount of research published on the social acceptability of wind farms requires an effort to identify and categorise variables to deliver a holistic understanding of opposition and support to wind energy. We classify the variables into three main categories: first, 'psychological variables', including perceived benefits and costs, emotions, and attitudes; second, 'contextual variables', including community energy schemes and media influence; and finally, third, 'personal resources', including income or wealth, place of residence, and relevant knowledge in relation to the wind farm. In agreement with other scholars, we argue that NIMBYism (not in my backyard) is an outdated and simplistic explanation for opposition to wind farms. Instead, we provide a theoretical framework to explain the acceptability of wind energy and show how these variables might influence both acceptance and opposition.

Keywords: wind energy; social acceptability; NIMBY; literature review; social acceptance; renewable energy; media; bounded rationality; theoretical framework

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1. Introduction

Due to the ever more stringent carbon emission reduction targets adopted internationally [1] wind energy, among other renewables, has become one of the fastest-growing energy sources in recent years. This is often attributed to its suitability in achieving carbon-free electricity generation (excluding embodied emissions) and its low and declining costs, which are now, in many instances, cheaper than those of the cheapest fossil fuels and among the cheapest of all renewables [2]. However, wind energy, particularly onshore, often meets substantial local resistance [3]. To exemplify what resistance can look like, we will use one of the biggest cases of resistance in Norway, which was against a suggested wind farm in the Frøya municipality. Before that, we need to define what resistance is. The general rule is that resistance is performed by groups or individuals in a relatively weaker position that want or need to subvert an authority acting on the resistance [4]. Resistance in this area has covered social media campaigns, protests, and lobbying [5]. This leads to a lot of media attention and political pressure, which further influence the development of more wind energy. It has also led to social problems in areas with wind energy development where relatives with differing viewpoints are not talking to each other [6]. This illustrates the need for research and securing socially acceptable development of wind energy.

Considering how the further deployment of renewable energy in general, and wind power in particular, is vital for the ongoing energy transition [7], this literature review

focuses on the social acceptability of wind farms. The new-installed wind power capacity per year in the EU has stagnated, and even decreased in recent years, which endangers reaching the climate goals set in European Green New Deal [8,9]. Growing resistance often explains this tendency, which makes understanding the processes behind acceptance and resistance important.

The social acceptability of wind energy is a crucial research area, even after many years since its inception, not only because of governments' emission-reduction targets and the opposition that local wind farms often cause, but also because of the ongoing debates on equitable outcomes of the energy transition [10]. In particular, some critical issues regarding achieving a just transition have been highlighted regarding expanding renewable energy. Moreover, these issues are intertwined with some of the most-discussed aspects of wind power acceptability: (a) the perception of a changing landscape due to new distributed energy developments, and (b) whether compensation for locally affected individuals would be needed and in which form this should be delivered [11,12].

Within the research area of social acceptability of wind energy, a large amount of literature has been published in the last ten years. Establishing an up-to-date overview of the field's state can help identify gaps in the knowledge that warrant further research efforts. Furthermore, this paper culminates in a theoretical framework giving an overview of the most critical factors influencing the acceptability of wind farms and how they interact. More specifically, it examines the viability of structuring and condensing the reviewed studies through a theoretical lens to arrive at a theoretical framework: to what degree can bounded rationality bundle research findings and improve our understanding of social acceptability of wind energy? Bounded rationality [13,14] is defined as the idea that real life is so complex that people cannot choose the optimal option, but they pick the most satisfactory option based on their preferences [13]. We believe that bounded rationality underlies a process of decision-making carried out by citizens, which determines their choice of accepting or resisting a given wind farm development proposed in their locale.

In the past, similar attempts at systematising the literature on wind energy's acceptability have been conducted [15]; nevertheless, the pace of scientific production on this topic is growing fast. The landscape of wind energy research is in constant change, leading to a need for new reviews and literature syntheses.

In the following sections, we will review the primary factors and processes that have been researched, grouping them in a classification originating in previous research [16–18] that has proven useful (we discuss this classification in the second paragraph of the discussion). Then, we extend this line of research by conceptualizing human nature in terms of bounded rationality. The purpose of this classification into psychological, contextual, and personal resources is to make the variables readily understandable to academics and practitioners. Further, this classification is also used to guide how we design our theoretical framework (Figure 1). Psychological variables can be impacted by communication and campaigning, and contextual and personal factors can also influence psychological variables. However, psychological variables also represent the perception of external factors. Contextual factors are areas where policymaking and business practices can make a difference, but also where socio-political (e.g., the laws and regulations in a country) and physical (e.g., the topology of a region and its potential for wind energy) differences between cases are described. Personal resources regard individuals' abilities (e.g., knowledge, education, and finances), and can define subgroups that may differ in their needs and benefit-to-loss ratios and for which specific policy measures or specific campaign strategies are needed. In the final section, this categorisation will be integrated into a novel proposed theoretical framework where different variables are combined into a comprehensive theoretical framework. This framework aims to support researchers and policymakers in future research designs and help them to design effective policies facilitating social acceptability and equitable policy outcomes.

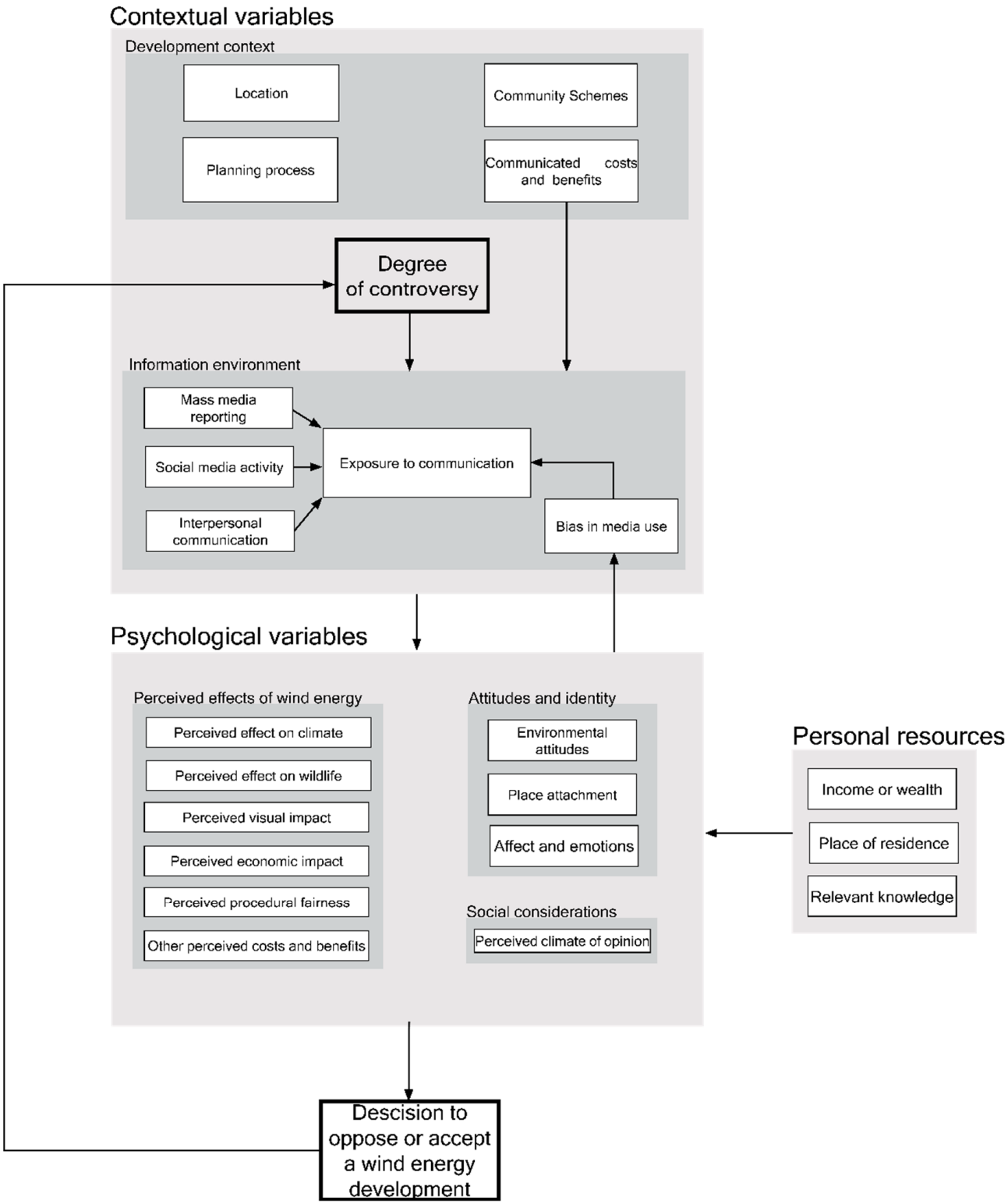

Figure 1. Theoretical framework of the social acceptability of wind energy. Contextual variables feed into the degree of controversy, which feeds into the information environment, and the information environment feeds into psychological variables. Personal resources also feed into the section with psychological variables. Here, the information is processed by the individual. An evaluation of the costs and benefits is performed, resulting in either opposing or accepting wind energy, which leads to a larger or smaller degree of controversy.

1.1. Social Acceptance

In this first section of the paper, social acceptance is introduced, focusing on the dimension of community acceptance [19]. Further, we distinguish from acceptance and define the related concept of social acceptability.

Wüstenhagen et al. [19] hold that social acceptance consists of three distinct dimensions: socio-political acceptance, market acceptance, and community acceptance. Socio-political acceptance comprises three key aspects: public acceptance of technologies and policies, key stakeholders, and policymakers. According to Wüstenhagen et al. [19] a strong focus on research into socio-political acceptance has created some issues for the implementation of wind energy. These issues stem from the fact that early research reported broad general support for wind energy; this gave the impression that there were no challenges concerning the social acceptance of local wind energy projects. Toke et al. [20] instead pointed to landscape conservation and the strength of "landscape protection organisations", highlighting the challenge they pose for local wind energy projects, thus indicating that there might be issues with socio-political acceptance in the form of organised resistance, despite socio-political acceptance in society at large. However, the broad socio-political acceptance of the technology and its deployment policies is an essential first step that, if missing, can prevent any further implementation. In Norway, for example, missing socio-political acceptance for nuclear energy led to no uptake of the technology [21]. In addition, socio-political acceptance can influence larger energy companies and their production investment choices. In turn, these same companies can influence political decisions once they become major stakeholders of a rising technological industry.

The second component, market acceptance, is defined as the process in which the market (a metaphor for the interplay between supply and demand, regulating pricing and production through negotiation and anticipation) adopts an innovation [19]. The process of building market acceptance can be analysed through the lens of the diffusion of innovation theory [22]. Market acceptance is not only relevant for consumers, but also for investors. Social acceptance of wind energy within power companies could primarily be affected by market acceptance, because higher market acceptance could pressure them into working on or working with wind energy technology.

The final component, community acceptance, considers the acceptance of siting decisions [19]. Related to community acceptance is the idea of "not in my back yard" (NIMBY) as a way of explaining the divergence between socio-political acceptance, which is typically high, and community acceptance, which can vary between low and high on a case-to-case basis. NIMBY is the idea that people generally support renewable energy projects, but often do not support specific projects in their local area. NIMBY has faced some critique, with research arguing that it represents a simplistic view of wind farms' opposition [16,23,24]. Evidence has emerged showing that being directly affected by a wind energy project could decrease opposition. This phenomenon is known as inverse NIMBY [25]. Inverse NIMBY suggests that there is no unconditional NIMBYism that occurs in all contexts. According to Wolsink [23], community acceptance seems to follow a U-shaped curve over time: Acceptance starts high, then gradually drops to a lower degree of acceptance before increasing again as the project's construction concludes. The lowest point of acceptance is typically reached in the siting phase. The reason for this could be that, in the siting phase, the construction becomes concrete, salient, and consequential. It could be argued that each project eventually triggers some cognitive dissonance with place attachment values as beliefs about negative impacts on the local community emerge or move into the foreground [16]. Place attachment will be explored further in a later section, but, briefly put, it is the emotional connection people have with the place they live in [26]. As previously mentioned, the feeling of wind turbines being far away in both space and time might lower engagement because of the perceived distance. However, when projects reach the siting phase, these perceived distances might shrink, and people become engaged with potential problems and disadvantages, lowering acceptance. The high initial acceptance levels may stem from the positive general image of wind energy. Community acceptance could certainly influence

the degree of resistance, i.e., lower community acceptance leads to more opposition to wind energy [19]. While usually starting at the local level and based on specific projects, several oppositional movements may join forces, and resistance movements at the national level may emerge [27].

1.2. Social Acceptability

Another closely related term to social acceptance is social acceptability. These are sometimes used interchangeably in common parlance, but we believe they are two distinct expressions. Our understanding is that social acceptability means "the quality of being satisfactory and able to be agreed to or approved of" [28]; it is a precondition for agreeing to something, but does not automatically create acceptance (a necessary, but not satisfactory, condition). It is a useful term because it refers to considerations regarding whether an object is suitable to be accepted, even before it has materialised, which is the case for planned or in planning wind farms that, nevertheless, have not been built yet. The paper by Wüstenhagen et al. [19] can be interpreted as talking about social acceptability. The different variables considered in our paper mainly belong to the community acceptability dimension. For something to be acceptable, it must conform to the different acceptability criteria, which may vary between individuals and change over time. There could be several factors affecting both social acceptance and social acceptability. These factors will be looked at closer in the main body of the review. Specifically, it could be argued that, whenever we talk of the social acceptance of a wind farm project before its construction, the term of social acceptability appears more pertinent, because it regards a forthcoming development that a local community can only imagine and speculate about. Therefore, the discussions surrounding this will be on whether it is generally acceptable or not. However, in principle, acceptability does not guarantee acceptance; it just means that acceptance is a possible outcome.

2. Methods

2.1. Inclusion Criteria

For this literature review, only papers investigating the different aspects influencing the social acceptance or social acceptability of wind energy are considered for inclusion. Therefore, papers were excluded if they did not address the topic of social acceptability or social acceptance (which can take different forms: e.g., public opinion, oppositional behaviour, and oppositional movements) or did not investigate wind energy (alone or in addition to other types, for example [29]).

2.2. Literature Identification

This paper aims to give an overview of the literature and is based on an initial synthesis of the literature presented in [16]. The research produced in the field has grown exponentially in recent years. The additional papers included in this article were identified through the keywords in Table 1, searching two databases: Scopus and Google Scholar. We found 897 papers only looking at the last 10 years, from 2011–2021, in Scopus when including all search terms. We avoided excluding relevant papers in the first search round using relatively broad search terms. In addition, several relevant papers were found by using the reference list in already included papers.

Table 1. Search strings used to identify potentially relevant articles in Google Scholar and Scopus.

Components of Search String	Function
("Wind energy" or "Renewable Energy" or "Energy Transition")	Ensure that the paper deals with wind energy
and	
("Opposition" or "Attitudes" or "Psychology" or "Affect" or "Social Media" or "Acceptability" or "Social Acceptance" or "Public Opinion")	Ensure that the paper deals with social acceptance or social acceptability
(1-iteration snowball search based on reference list in the articles identified by the search string)	

2.3. Screening for Inclusion

The screening process started by assessing the titles of the papers. The papers with the most relevant or promising titles were included for further analysis. Then, the abstracts were read to further evaluate the papers' relevance; after that, the introduction and conclusion were carefully considered. This led to an explicit "include" or "not include" decision in most cases. However, this was a dynamic process, as we aimed to create a theoretical framework. We often went back to data collection to identify more relevant papers when we found an area of theoretical interest. In some ambiguous cases, other parts of the paper were also analysed. In addition to using keywords, promising leads in reference lists were also examined. However, only one iteration of snowballing was performed. The reason for this was to avoid overlooking papers in the first stage or papers that do not have exact matching keywords. Examining the reference list gave us a handful of relevant papers that would have been otherwise excluded.

3. Literature Review—Factors Influencing Acceptability of Wind Energy

Based on the literature, we paid attention to three different sets of characteristics influencing social acceptance or social acceptability of wind energy: psychological variables, contextual variables, and personal resources [16,17]. These three sets of variables will be a core element of the framework we present in our literature review discussion. This theoretical framework gives an overview of the most critical factors influencing the acceptability of wind farms and may guide future data collection and study design. As an addendum, we found more papers than were included. However, the reason for the literature review was to underpin the different variables that composed our framework.

3.1. Psychological Variables

3.1.1. Affect and Emotions

The following section discusses how affect and emotions influence the acceptance and acceptability of wind energy, and the importance of negative vs. positive representations is given special attention.

Research has shown that renewable energy projects can cause strong emotional reactions that influence social acceptability [30]. An important line of research is devoted to the role of affect in attitude formation [31]. The connection between affect and attitudes is explained by the dual processing theory of decision making [32]. According to this theory, the emotional response that wind energy could elicit would be an important component of attitude formation. In a recent paper focusing on "affective imagery", Cousse et al. [31] explored the influence of emotions on attitude formation concerning wind energy. "Affective imagery", was not used by Cousse et al. [31], describe images meant to elicit emotion (as one could infer based on the terminology), but designated a methodology to study immediate mental responses, such as thoughts and emotional evaluation (the affective content). The specific method employs word association to find positive and negative associations created by an object of interest [31]. The paper also examines the relationship between affective imagery and opposition.

Cousse et al.'s [31], main finding is the difference in how concrete the negative images vs. the positive images are. The negative images related to wind energy, such as landscape destruction, noise, and wildlife loss, are less abstract than the positive ones, such as the environment and ecology ("elements related to the environment and the ecology, e.g., Environmentally friendly, ecological"), power production, and wind [31]. The authors point out that this could lead to lower salience of the benefits of wind energy compared to the negative outcomes. Furthermore, Cousse et al. [31], showed the differences between those who strongly oppose wind energy and those who are mildly opposed. This indicates the need for a segmentation of the target groups for interventions. Those who are mild opponents have associations and affective evaluations similar to those in the indifferent group, while the strongly opposed display a unique set of associations. Affect and emotions

can also be tied to procedural justice, as Russell and Firestone [33], claimed that a negative emotional response may indicate that individuals have perceived the process as unfair.

3.1.2. Trust

Procedural justice appears to be related to trust [15,34], which, in itself, is a variable suitable to influence social acceptability. For example, several authors have indicated that trust towards the developers of a wind farm influences the level of its acceptability [15,17,20,34–38].

Pellegrini-Masini [16] found, in a survey of residents living in proximity to four proposed wind farms in Scotland, that trust towards the proponents of the wind farm was one of the key variables influencing the residents' opinion on the development; furthermore, the same finding emerged from a qualitative study researching the case of Westmill, arguably the first community-owned co-operative wind farm in the United Kingdom. Similar empirical findings emerged from several qualitative and quantitative studies in the United Kingdom, the Netherlands, and North America [15,36–38].

3.1.3. Place Attachment

This section summarizes how the concept of place attachment is defined in the literature and discusses place attachment's role in shaping the social acceptability of wind energy. There is some disagreement regarding the definition of "place attachment". While all authors agree that it encompasses a physical component (the place itself and its features), some also include social and psychological components that are linked to the place itself.

Bonaiuto et al. [26] (p. 636) defined place attachment as "the affective relation or the emotional bonds that people have with places where they live". Hidalgo and Hernández [39] point to both a physical and a social attachment (e.g., one's social networks and "knowing one's way around" in one's "place"). Devine-Wright [40] adopted the same position, as seen in a study on the social acceptability of wind farms. Devine-Wright [40] and Scannell and Gifford [41] considered "place" as both the physical location and the different meanings that people have attached to said location. This sentiment was further echoed by Devine-Wright and Clayton [42] in a special issue on place, identity, and environmental behaviour. The physical component includes factors such as the physical attributes of a place or resources used to perform certain behaviours. Another part of place attachment is the meanings attributed to different landscape features. These could lead to a location becoming a part of a person's self-concept [43].

Devine-Wright [40] presented a framework for understanding the role of place attachment in opposition to wind farms. The framework consists of five different phases: becoming aware (1), interpreting (2), evaluating (3), coping (4), and acting (5). These phases represent the psychological process that residents go through. Devine-Wright and Howes [38] tested this framework. They found that strong place attachment does not always lead to opposition. Instead, the important factor is how the people interpret the changes. However, recent research has found evidence for Devine-Wright [44] and against Devine-Wright and Wiersma [45] the influence of place attachment on acceptance. The unclear role of place attachment concerning wind energy indicates that more research must be conducted on this topic.

3.1.4. Perceived Local Costs and Benefits

This section deals with the importance of perceived local costs and benefits as factors influencing the social acceptability of wind energy. Moreover, the economic viability is also discussed.

Examples of perceived local costs and benefits are the local economic impact of the wind farm, the visual impact, the perceived auditory impact, and the perceived impact on the health of the local population [16].

According to scholars [16,46,47], one of the primary factors for opposition and acceptance are the perceived local benefits and costs that result from a proposed wind farm. Further, Carley et al. [47] believed that the perceptions related to benefits and drawbacks

could explain "not in my back yard"-related attitudes. Scholars [16,48] found that the perceived distribution of benefits was an important factor in the acceptance of local wind energy projects. Specifically, individuals will assess whether the benefits are limited to specific groups or at a collective level that the individual is not necessarily a part of. For instance, the lower emissions of climate gases compared to other technologies benefit the individual or the community on a more general and abstract level. A perceived unfair distribution of economic benefits has been found to damage community well-being. According to Hall et al. [48], this is because the unfair distribution creates a divide between those who end up as "winners" and those ending up as "losers" from the development process. This will be covered in greater detail in the section on procedural justice.

3.1.5. Perceived Economic Costs and Benefits

The economic impact is vital for the social acceptance of wind energy developments [49]. It is held that economic impacts can influence residents or other individuals who have a stake in areas affected by the construction [16]. The perceived economic impact can, for example, relate to concerns about negative impacts on property values or the local tourism industry. On the other hand, some individuals might believe that the local development of wind energy brings positive economic benefits, such as jobs or tax income. A study by Zoellner et al. [50] found that the perceived economic estimations (estimated costs and benefits of respective renewable energy technology) were a strong predictor in all polls. An issue of the perceived economic impacts is that there is seemingly much uncertainty surrounding the information concerning the economic impact of renewable energies [50].

Agterbosch et al. [36] conducted a case study in the Netherlands that included several different cases. In the municipality of Zeewolde, they found that, if the community and developers shared economic interests, local opposition was reduced. This could indicate the importance of shared economic interests between developers and local communities. However, we believe that the challenge lies in creating an environment where a shared economic interest exists.

3.1.6. Environmental Attitudes

Many scholars consider environmental attitudes a key component in forming attitudes towards wind energy, leading to intense research on a diverse set of environmental attitudes. In this section, we focus on the importance of a variety of different environmental attitudes in the acceptability of wind energy. Special attention is paid to the importance of wildlife and the visual impact on the acceptability or acceptance of wind farms.

A feature of the wind energy debate is that both sides use environmental concern as an argument [25]. However, the perspective often differs between those who oppose wind energy and focus on the adverse environmental local effects of the installations, and those who support wind energy and focus instead on the global environmental benefits [15,25]. For example, in a study of residents living close to the Wolf Ridge wind farm in Texas, Swofford and Slattery [51] found that climate change concerns may influence support for wind power, albeit only to a limited extent. Burch et al. [52] found similar results studying environmentally conscious people living in Oklahoma, USA. The participants claimed that they would oppose the local wind energy development if it negatively impacted biodiversity.

Additionally, these individuals are willing to waive benefits such as economic growth and local energy production if a negative impact on biodiversity is avoided. These results indicate a trend that environmentally concerned individuals might only support wind energy if specific criteria are met, such as no loss of biodiversity, which may be hard to meet and easy to disprove. The global, non-local environmental benefits of switching to a renewable energy production system can hardly outweigh these concerns for some.

3.1.7. Effect on Wildlife

Human activity will always impact nature, and wind energy is not exempt from this fact. Thus, the perceived effect of wind energy on wildlife could be an important factor in acceptability.

The effects of wind power facilities on wildlife mainly focus on birdlife in the literature. The fact that fan blades can and do kill birds seems obvious and has given rise to opposition groups calling wind farms "bird shredders", but substantive data that allow a more sober assessment are rare, and the topic will remain contested. Sovacool [53] calculated the number of birds killed per kilowatt-hour across different power plant types (wind, nuclear, and fossil), and found that wind energy and nuclear energy had the lowest bird mortality rates of 0.3 and 0.4 deaths per gigawatt-hour, respectively. In comparison, fossil fuel power generation causes 5.2 deaths per gigawatt-hour. However, the perception is that bird mortality can be related to the overall acceptability of wind energy. A study by Larson and Krannich [54] found that those who show greater acceptability of wind and solar energy in their area also believe that these renewable technologies are not a danger to wildlife. Mulvaney et al. [55] found that, in an area with high acceptability towards wind power, only 23% agreed/strongly agreed that wind power was detrimental to birds or bats.

The effect of wind turbines on wildlife, and especially avian life, is often a pivotal point in anti-wind-energy messaging. For example, the initiative Windmills Kill [56] is dedicated to wind turbines' effect on local wildlife.

3.1.8. Visual Impact

The nature of harnessing wind energy necessitates towering structures to achieve the optimal circumstances for the turbines to be effective. This means that the structures are often visible over great distances.

An important talking point for individuals opposed to wind energy projects is the local visual impact, and this phenomenon has received substantial research attention [25,35]. Devine-Wright [24] (p. 127) found that the most-frequently reported issues surrounding wind farms were visual impact and noise. A survey of residents near a wind farm in Scotland showed that visual impact was the foremost negative and positive impact of wind farms [16]. This highlights the individuality in aesthetic judgments and the potential for instrumentalizing visual impact on either side of the support–oppose continuum.

Wolsink [57] found that visual impact had a greater influence on general attitudes and attitudes towards a local project. The same finding emerged from a study by Pellegrini-Masini [16] targeting residents living close to four proposed wind farms in Scotland; nevertheless, in this case, when the variable was included in an ordinal regression analysis, other variables, such as trust towards the developers, the wind farm's perceived harm to the health of the local community, locally perceived costs and benefits, and the perceived contribution of the wind farm against climate change, appeared all to have larger coefficients than the visual impact.

Several studies that have highlighted the relationship between the size of the wind farm (i.e., the number of turbines) and support were mentioned by Devine-Wright [58] (p. 127); they noted that there is a negative linear relationship between the size of the wind farm, turbine size, and support. This finding could lead to greater acceptability problems if the trend towards taller wind turbines continues [59].

Meyerhoff et al. [60] studied public perceptions of onshore wind energy projects; participants could choose different site sizes and distances from residential areas. The results indicated that the perceived attractiveness of the region did not influence perceptions; the same was also found for residential proximity or how often the turbines were encountered in the environment. Respondents, on average, preferred wind turbines to be further away from residential areas. In addition, wind turbines were expected by participants to harm biodiversity. The most surprising finding was that the height of wind turbines did not influence the respondents' choices. This is unexpected, as one would assume that the participants would prefer smaller turbines, based on previous research.

Betakova et al. [61] studied the importance of the number of visible wind turbines and their distance from the observers. First, they found that the closer a wind turbine was situated to the observer, the more unfavourable was the evaluation of the landscape. However, this was described as a "nearly linear" relationship. For example, at some distances (1.5 km in one landscape type and 7.5 km in another), there was a significant increase in the acceptability of wind energy (Figure 2 in [61]) in beyond the regular linear trend. Closer wind turbines were rated strongly negative in any landscape. However, this finding was contested by Langer et al. [62] (see the section named Vicinity of Residence to Wind Farm for a summary of the literature on proximity to wind turbines). Betakova et al. [61] found that the negative impact of wind turbines would diminish with increasing distance of the viewer at different rates in relation to the landscape type. For landscapes classified as more beautiful, the negative impact of wind turbines would diminish at around 10 km. In less attractive landscapes, the negative impact disappears at approximately 5 km. These results are based on one specific type of wind turbine: 105 m tall and rotor diameter of 90 m. The results might vary with different models [61]. More wind turbines in an area also led to a less favourable evaluation of that area. However, with more than 20 wind turbines in the area, the decrease in perceived pleasantness per additional turbine slowed down. There was no substantial difference in the evaluation between 20 and 25 wind turbines [61].

The visual impact of wind energy impacts the acceptability of wind farms. However, the literature has not reached a consensus on how a wind farm affects the attractiveness of the landscape. Betakova et al. [61] found that people generally prefer smaller clusters of wind turbines compared with larger clusters. However, there is no rule without exception. Lothian [63] found that, in landscapes of low scenic value, wind farms positively affect scenic value. Molnarova et al. [64] corroborated these findings to a certain degree, in that wind turbines are more acceptable in unattractive landscapes.

3.2. Contextual Variables

Contextual factors denote all variables related to the context of the development. Stern [18] (p. 417) defined "contextual forces" as follows: "These include interpersonal influences (e.g., persuasion, modelling); community expectations; advertising; government regulations; other legal and institutional factors (e.g., contract restrictions on occupants of rental housing); monetary incentives and costs; the physical difficulty of specific actions; capabilities and constraints provided by technology and the built environment (e.g., building design, availability of bicycle paths, solar energy technology); the availability of public policies to support behaviour (e.g., curb-side recycling programs); and various features of the broad social, economic, and political context (e.g., the price of oil, the sensitivity of government to public and interest group pressures, interest rates in financial markets)."

Examples of themes discussed in this section are procedural justice, participation in co-operatives, and media influence. The effect of these factors on the acceptability of wind power is hypothesized to be cognitively or affectively mediated through psychological variables (Figure 1). These factors could be categorized as attitudinal because of this. However, a distinction is made, as they concern material processes that occur in relation to the wind farm project; therefore, they are directly experienced by residents, rather than expected consequences of a wind farm, whose real impact will only be gauged by residents once it is built. Additionally, to some degree, contextual factors can be influenced by business or political decisions. Finally, their perception is subject to the social construction of reality through communication, e.g., in the media.

3.2.1. Procedural Justice

Procedural justice has long-standing recognition within the field of energy justice studies, where it is advocated as one of three tenets of energy justice [65] and argued to be rooted in formal equality [12]. It was defined as "a call for equitable procedures that engage all stakeholders in a non-discriminatory way" [65] (p. 2).

Several authors have called for a more inclusive decision-making process where the community is engaged and informed, thus creating a better sense of fairness and hopefully changing attitudes to be more positive towards a suggested wind farm [66–68]).

Gross [69] found that the interviewees in an Australian case study identified the pillars of procedural justice as essential factors. The pillars of procedural justice are the right of participation, access to information, and the lack of bias in the decision-maker [69] (p. 2729). Krohn and Damborg [70] found communication, dialogue and information to be necessary in preventing opposition to wind energy projects. These findings highlight the importance of specific features of procedural justice. We stress that procedural justice is subjective, and that the feeling of procedural injustice may also result from not being satisfied with the outcome. Still, research suggests that different procedural setups are related to perceptions of procedural justice in a systematic fashion.

Community benefits are closely tied to the perception of procedural justice. Research has shown that sound procedural justice is vital when implementing community benefits [71–73].

Walker and Baxter [73] found that perceived procedural justice levels were higher in Nova Scotia, where wind energy development focused on involving local communities, than in Ontario, which used a less community-focused siting process. The system in Nova Scotia gives profit to the locals and allows them to weigh in on the decision-making process. In Ontario, much of the opposition was related to the lack of procedural justice and opportunities to participate in the siting process. However, it seemed that Nova Scotians was more satisfied with the process and outcome than those living in Ontario. This indicates that procedural justice and a sense of fairness are important for reaching a satisfactory result [73].

A discourse analysis conducted by Cowell et al. [71] showed that, in their cases, community benefits are often compensations for the effects of local development of wind energy. Cowell et al. [71] brought up an important point—for community benefits to change acceptability, the community needs to have a greater say in the development process. For example, Velasco-Herrejon and Bauwens [72] investigated a case where local residents blocked an access road because they had no say in how community benefits were divided. This indicates that some procedural justice is better than none. However, there remains much work to achieve true procedural justice. Procedural justice could be an essential factor for creating broader acceptance of a planned wind farm. It could increase the project's perceived transparency and create a sense of ownership, instead of the project feeling foreign and being implemented for profit at the expense of the local inhabitants. Getting citizens inside the decision process and weighing the advantages and disadvantages can also substantially increase the level of informedness [74].

3.2.2. Community Ownership

The following section explains different models of community ownership and how they might increase the social acceptability of wind energy.

Several community ownership models can be traced in the literature [75]. One example of community ownership is the cooperative scheme. A Cooperative can be defined as: "independent, democratically controlled enterprises. They are owned and governed by their members, with the aim of meeting common social, economic and environmental needs." [76] (p. 9).

A cooperative wind farm could allow the community or individual residents to buy shares in a local wind farm [16]. Co-operative wind farms differ from other wind energy projects as they operate with an internal democratic process. This means that each member of the cooperative has one vote, regardless of the amount of individually owned shares [76]. The nature of a co-operative also means that it aims to better the local area's social and environmental conditions, not only the economic conditions.

Johansen and Emborg [77] studied the local effects of a Danish wind farm co-ownership scheme. They found that several different demographic factors matter in the willingness

to invest in a wind farm. Gender, age, and income were significant predictors of the willingness to invest. Therefore, willingness to invest could be seen as an indicator of acceptance. However, investing in the wind farm does not necessarily mean accepting the project, as there are cases of opponents investing in the wind farm [77]. In addition, several individuals were opposed to compensation schemes because they saw them as immoral. The reasoning behind this was that the schemes were not perceived to address the non-monetary problems related to wind farm siting [78]. The same issue was pointed out by Johansen and Emborg [77]. The financial benefits are not equal to the loss of quality of life caused by wind farm siting. In addition, both Johansen and Emborg [77] and Jørgensen et al. [78] pointed out that co-ownership schemes introduced to alleviate costs seem insufficient in making local residents accept wind farms. Jørgensen et al. [78] suggested that flexible schemes are needed to respond to critique more effectively from local communities. The flexibility should result from cooperation with locals to better fit the scheme with the needs of the location.

While wind farm co-operatives might increase the acceptability of wind farms, the evidence of this is limited. Some of the empirical studies have limitations: one researched members of co-operatives that were already in place at the time of the study [79]. Compared with the more delicate planning stage, these perceptions might have changed over time. Another study looked at the difference in attitudes towards wind energy between members of a co-operative and those who are not members. The study found that members of the co-operative had more positive attitudes towards wind energy than those who were not part of the co-operative [80]. Pellegrini-Masini [16] found, in a qualitative study of the Westmill case (Oxfordshire), that the co-operative scheme could aggravate the divide within the community if it was perceived to be a ploy to win over consent. This highlights the importance of trust towards the proponents of the scheme. This is in line with the findings of Haggett and Aitken [81]. They found that community ownership potential plays an important part in increasing wind energy development. Furthermore, in a quantitative survey of residents living close to four Scottish wind farm cases, the relevance of trust concerning co-operative schemes was confirmed by a relative majority of respondents (44%) that affirmed that they considered the co-operative a ploy to gain the consensus of local residents [16]. In the same study, a regression analysis showed that trust was the primary variable affecting the opinion of the co-operative scheme, followed by the economic revenue that this could generate for its members and the local community.

Co-operative ownerships are not the only type of ownership model. In general, community wind farms are owned by members of the local community. According to the authors, community-owned wind farms often reap more benefits in terms of increased trust and a more robust local identification with the wind farm project, which should increase social acceptance [82]. A study conducted by Envoldsen and Sovacool [83] found community ownership to be a factor that was associated with a greater level of social acceptance. De Luca et al. [84] found that the lack of policy allowing economic participation was detrimental to engagement and could create discontent, hurting community acceptance. However, Jørgensen et al. [78] studied the effects of two Danish compensation schemes (compensation for loss of property value and community ownership). The results indicated that neither of these schemes could sufficiently compensate for the non-monetary costs of local wind energy development. This result shows that community ownership is not always enough. This echoes the findings of Johansen and Emborg [77], where they found that monetary compensations were often not enough to alleviate other perceived non-monetary costs.

The findings related to the effects of different types of community ownership seem to be disputed. In some cases, they increase local acceptance, and in other cases, they do not sufficiently compensate for the non-monetary costs. However, comparative studies [68,85] found that having a community ownership scheme is associated with higher degrees of acceptance when compared with communities that do not have community ownership.

3.2.3. Media Influence

Mass media and, more recently, social networking services (SNS) are major players that can work in favour of opponents and supporters of wind energy. In this section, we summarize the role of media in influencing the acceptability of wind energy. Special attention is paid to the effects of framing.

Mass media provides the different actors with a forum. However, it also controls access to this forum (selecting issues, information units, arguments, and voices to be covered and the intensity of presentation). In this way, it intervenes in the debate with its professional news choices based on its appraisal of the news value of news stories [86] and possible partisan bias based on editorial lines or individual attitudes [87].

Mass media is not a monolithic actor, but each news organization depends on the approval of audiences, advertisers, other sources of financial support, and these sources are subject to competition with various alternative news services [88]. This means that certain news outlets will compete for the consumers' attention and advertisements. This could, in turn, influence how they report on wind energy developments.

The most important potential effects of the mass media on individual opinions are: (1) making individuals aware of the topic (be it wind energy in general or a specific wind energy project); (2) shifting the focus towards or away from a topic (*agenda setting*) [89], which may also motivate people to become politically active on the topic (*mobilization*) [90]; (3) conferring legitimacy to interest groups and actors by giving them a voice in the debate (*legitimacy conferral*) [91]; (4) providing factual information (some of which may be contested) to a large audience and make known arguments for and against policy options [92]; (5) provide cues about the distribution of "opinion camps" [93]: who is in the majority, who is in the minority, who is gaining ground, who is losing ground? These cues may not give an accurate impression, either deliberately or because of inaccurate reporting. However, they can affect the willingness to express one's opinion and to participate such that the camp that appears to be in a minority that is losing ground can become demobilized, feeding back into the media portrayal (*spiral of silence*) [94]; (6) framing effects, which we discuss in the subsection on framing in the media that also covers analyses of media content.

When taking a cursory glance at public debates, scientists are often overlooked in favour of politicians or stakeholders. It could be that scientists are not good enough at engaging the public [95]. In addition, scientists have believed that just correcting misinformation would be sufficient to convince the public to support renewable energy infrastructure (*deficit model*, [95]). Thus, citizens rely on politicians and PR officials when obtaining information about these difficult news stories [96]. Studying media coverage from 2008 to 2011, Pralle and Boscarino [29] found that almost 70% of all stories related to wind energy mention the nonmonetary costs connected to wind energy. The aesthetic impact of wind energy was the most often mentioned impact.

3.2.4. Framing in Media

Decision making, and the debate, is often influenced by the way information is presented. This is known as framing. From the perspective of psychology, framing is best understood as different ways in which information is presented [97] with a potential impact on how information is processed, and preferences are formed. The frames will focus on specific aspects and exclude or minimize other relevant aspects of the topic [29]. Wind energy has several advocacy frames that have remained relatively unchanged since the 1970s, such as "Wind as an inexhaustible energy source" and "Wind as a clean energy source". Resistance to wind energy has often been framed in the media in terms of "Resistance as NIMBYism" (NIMBY stands for Not in My Back Yard), a way to explain resistance in a simple (and possibly over-simplified) manner that challenges the legitimacy of the resistance [29].

Zukas [96] views the framing of wind energy as a competition between environmental, political, and industrial frame sponsors (i.e., actors that supply frames that the media cite [96]). According to Zukas [96], the environmental advocacy groups are not as prominent

in media as political and industrial actors, which resonates with a general problem for social movements to obtain media coverage [98]. Furthermore, the different positive and negative aspects are presented as competing frames to obtain optimal media coverage for their cause [96].

Studying the effects of framing on wind energy in Maine (US), Smith et al. [99] found concrete evidence of a bi-directional relationship between (a) the media coverage of wind energy and (b) policies related to wind energy that were proposed the following year. This finding goes against the previous conceptualizations (according to Smith et al. [99]) of the public and legislators as passive recipients. Instead, the relationship has been shown to be bidirectional in that policy and media coverage are mutually reinforcing [99]: Policy proposals and political procedures attract media attention, and media attention stimulates policymaking. In addition, an important finding is that this study was conducted in a time of economic struggle for the state of Maine. This led to framing wind energy as an economic good, rather than an ecological good with possibly adverse effects on the economy. Therefore, it pushed people to think of the development of wind energy and development in itself as a solution to economic problems, rather than as an economic threat [99].

3.2.5. Social Media

Social media is a relatively new player in the media landscape. It often consists of an open platform where different statements can be publicly shared, and the sharing is facilitated by the platforms themselves; they change and extend the way attitudes regarding wind energy are formed, with opportunity for citizen groups to reach a wide audience and form movements, particularly counter movements that oppose specific government policies [100], such as proposed wind power projects. These potentials lead to novel phenomena and dynamics in opinion formation about wind energy projects [101]. Researchers have started drawing on social media as a novel research site. Researchers both delve into the changes in opinion formation dynamics that social media creates [102] and use social media as a research tool where interpersonal interactions and spontaneous emotional or cognitive reactions leave digital traces that researchers can analyse, e.g., emotional responses to wind energy projects [103].

While acknowledging its novelty, the transformative nature of social media has limits and should not be overstated. Some of the most popular content on social media comes from actors that dominated the public sphere before the emergence of social media: traditional media and powerful institutions and organizations who promote and spread their content on social media. However, these actors must outcompete other content producers to remain dominant, and they have to cope with the existence of user comments and the threat of backlash, e.g., so-called "online firestorms" [104]. The media's role as an information "gatekeeper" is not removed, but relativized.

In addition, users fundamentally impact the spread of messages by using it and recommending it to other people in their social network. The platforms will draw on these usage and recommendation data and algorithmically determine what content is highlighted for which user. This tends to extend the variety of sources beyond traditional media repertoires and gives better chances to user-generated content (e.g., by protest groups) and to "alternative" rather than "mainstream" news. Users that repeatedly select content that reinforces their existing beliefs and that are in a homogeneous network of people with similar orientations can end up in a so-called "echo chamber", where they receive no or little exposure to content that challenges their existing beliefs [105]. For instance, opponents of a wind energy project that are organized in a group may receive intense exposure to content that argues against the wind energy project, while counterarguments are not visible or are immediately dismissed by the community, e.g., through negative comments. However, most people rely on multiple sources of information (within and beyond social media), have a diverse social network (within and beyond social media), and

have other motivations for information use than to just reinforce their existing beliefs, such that the emergence of echo chambers does not seem to be a widespread phenomenon.

Through these mechanisms, social media can ease the spread of information that the media ignores (e.g., compensating the media's usual preference for government sources and other "blind spots"). Concurrently, this facilitates the spread of misinformation that the media's professional routines would successfully sort out. In addition, research has shown that social media, in combination with populist rhetoric [106], is a very effective combination to mobilize groups of people against a common perceived enemy [107].

The protest against wind energy on social networks is usually tied to groups and pages related to specific wind turbine sites [101]. Studying how Facebook acts as a platform for mobilizing local resistance in Denmark, Borch et al. [108] used network analysis to assess whether users were active (activity defined as commenting or posting) in one or more forums. Out of the 581 users that fit their criteria, 81% were active in only one forum, and a few users were active in multiple resistance groups. Based on this, Borch et al. [108] concluded that most Facebook users who opposed Denmark's wind energy projects were locally engaged, rather than being general anti-wind-power activists.

Borch et al. [108] stressed that it is necessary for planning authorities and developers to not only engage with "old media", but also "new media", pointing out the need for additional insights into the new dynamics between social media, mainstream media, citizens, social movements, policymakers, and project developers.

3.3. Personal Resources

This section deals with different topics related to an individual's resources. Personal resources—specifically, knowledge about wind energy, income, education, and proximity to the proposed wind farm site—can also affect respondents' views of a wind farm.

3.3.1. Knowledge about Wind Energy

Klick and Smith [109] investigated American adults' level of knowledge about wind energy. They found that the sample lacked knowledge surrounding the different issues of wind power. Specifically, the sample lacked knowledge about the public benefits of wind power. Klick and Smith [109] believe that a higher knowledge level might alter public support. Other scholars have found knowledge to be an important predictor of pro-environmental behaviour [110,111]. Moreover, Bush and Hoagland [112] found that knowledge about air quality, climate, and wildlife could change opinions about a wind energy project. They also found that both sides (opponents and proponents) used different costs and benefits to persuade those who were uninformed. The differing knowledge claims could lead to uncertainties about the effects of the wind farm, thus leading to more conflict. Their study also looked at how much individuals believed that wind turbines would impact different aspects of the area, such as aesthetics, property value, marine mammals, and seabirds. They concluded that as people gained more knowledge, they moved closer to the scientists' point of view. This indicates that more knowledge leads to a more research-based point-of-view closer to the actual effects of wind energy development. On average, those with supportive views were more aligned with the scientists than the opponents as they gained more knowledge [112]. On the other hand, opponents relied on spreading information that would lead to uncertainty around wind energy development.

Nevertheless, the evidence reviewed by Rand and Hoen [15] appears to show otherwise, i.e., a lack of difference in wind energy knowledge between supporters and opponents of wind energy projects. Therefore, while several authors indicate a positive relationship between knowledge and support for wind projects, others do not, indicating the need to further research the role of personal knowledge in relation to acceptance and support of wind energy developments.

3.3.2. Income and Wealth

The development of wind energy is often planned in economically deprived areas. However, landscape value [113] is still an important factor in the siting of wind energy. Van der Horst [114] highlighted the differences between rural areas of higher landscape value, perceived as aesthetically pleasing and often within commuting distance of economically active areas, and rural areas that are remote or have low landscape value due to their industrial heritage. Low-landscape-value rural areas are more likely to be inhabited by less affluent or deprived residents, who may be used to industrial facilities and might, therefore, accept the presence of wind farms. They might also lack the resources to resist. On the other hand, wealthier individuals in high-value landscape areas could resist the development of wind farms to protect their emotional and economic investments [114] (p. 2709). In line with this, Van der Horst and Toke [115] highlighted that the different socioeconomic classes have different abilities to lobby against wind farm development. Firestone and Kempton [116] found that those who oppose wind farms often earn more than $200,000. On the other hand, residents in the income bracket of $150,000 to $199,000 were 20 times more likely to support a wind farm when compared with those in the above $200,000 income bracket. Those with lower income (<$35,000) were also more likely to support a wind farm; however, this relationship was not as robust.

Pellegrini-Masini [16] found, in a survey of four Scottish proposed wind farms, that respondents living in more deprived areas appeared to be more apathetic, i.e., indifferent, regarding the proposed wind farms, answering in large numbers that they "neither agree nor disagree" with the local proposed development. Further, the same survey found that the estimated income per family member was modestly correlated with the opinion regarding the locally proposed wind farm, with higher income being relatively less favourable (–0.111, $p \leq 0.014$, Kendall's tau correlation test).

Research conducted in Great Britain [117] showed that significant concentrations of wind energy installations can be found in the low-income areas of western Wales, Cornwall, Lincolnshire, north-east England, Lothian, and the Scottish Highlands. These are all areas classified as having below-average income. There are fewer such installations in the more affluent areas of southern England. However, there is not necessarily a cause-and-effect relationship between income or lack thereof and wind energy development. It could result from remote areas being windy, socially deprived, and less densely settled (reducing the number of affected persons). In comparison, affluent areas have less beneficial wind energy resources and less open land for wind turbine construction [117]. There appears to be some connection between income and social acceptability. However, it is not established if this is because of an intention to protect investments or to protect the local environment's non-monetary value [16]. Thus, these findings require more research.

3.3.3. Vicinity of Residence to the Wind Farm

Proximity has been shown to influence both opposition and support; support of and opposition to wind farms change during the construction process. Residents seem to display the least support before construction starts, and support increases after construction has been completed [25,113].

Langer et al. [61] found that the distance between an individual's residence and a wind turbine did not significantly affect the acceptance of wind energy in Germany. However, they found that, if participants said there were no wind turbines in their area, the acceptance of wind energy would be lower. This could imply that the idea of constructing wind turbines in the local area for the first time harms acceptance. In contrast, previous experience with wind farm construction in the area has a positive effect. This claim can be supported by previous research showing that, before construction begins, people who live closer to the development tend to be more hostile towards the project than individuals who live further away [16,25,69,118]. The same seems to be true for offshore wind energy. Additionally, Mika [119] found that distance was an important factor in urban landscapes. Most people in the urban areas of Helsinki are positive towards wind turbines in the

city. However, some characteristics of the wind farm affect the overall acceptance. Firstly, wind turbines visible from inhabited areas in the city were not a major issue. However, the inhabitants would like to have offshore wind energy further away from the shore so that the turbines are invisible. Secondly, wind energy near the city's world heritage site was shown to have lower acceptance. Finally, residents preferred to have onshore wind turbines located in areas with some industry, such as landfills or the city harbour. This study is important, because much of the research has been conducted on social acceptance in rural areas. However, with the rise of offshore wind energy, more wind farms could be placed off the coast of major residential areas. However, Burch et al. [52] found that 70% of environmentally conscious individuals in their study would support, to some extent, a hypothetical wind energy development near their place of residence. Environmentally conscious individuals hold strong environmental views that might change when facing a green-on-green conflict, such as wind energy [52]. However, it is important to note that these results concern a hypothetical windfarm development. The results might differ if this was related to a specific case of wind energy development. According to Warren et al. [25], there exists an "inverse NIMBY" effect. This means that people who live close to a wind farm might show stronger support for the wind farm than those who live further away. These results could be related to the findings of [23].

4. Discussion

This paper discusses several variables that can influence social acceptability. We have created a theoretical framework to visualize how these variables are interconnected and influence acceptance or opposition to wind energy (Figure 1). The framework accounts for the empirical findings that the literature review has gathered, organizing the factors and processes according to the theory, and adding components and processes the theory would suggest, but have not yet been empirically studied.

The theoretical framework (Figure 1) can serve as a core that can guide future data collection and study design, and provide a research agenda. Taking inspiration from Stern [23], three different sets of variables are theorized to influence wind energy acceptance and opposition: First, *psychological variables*, that is, the decision to either support or oppose it taken and acted on by individuals. Then, *contextual variables*, where the characteristics of the case manifest and can affect individual attitude formation, and many of the measures to increase acceptance can be implemented. Finally, *personal resources*, where the individuals' goals, priorities, and preferences originate, the background and standards against which attitude formation occurs.

Drawing on the bounded rationality, our model can make some important additions and specifications that have not been broadly recognized in the literature so far:

Our model theorizes the relationship between the three different categories mentioned in the previous sections (psychological variables, contextual variables, and personal resources). The predominant relationship between these factors is that contextual variables (contextual variables and the sub-set information environment) and personal resources serve as stimuli when individuals make sense of the case and form an opinion (psychological factors). However, there are also feedback loops where behavioural reactions can change context factors, e.g., when people start to protest visual impact and the plans are changed accordingly.

Second, our model requires theorizing about an undertheorized and understudied point: How the information about contextual factors enters the individual's processing. Much information comes from public communication in various channels (news media, advertisements, rallies, and protest conventions). However, the growing importance of semi-public communication in online social networks, interpersonal communication, and word-of-mouth should not be underestimated. It is essential to recognize that context characteristics do not have an immediate effect, but they must be perceived, often after being pointed out by purposeful communication. Additionally, the individual must recognise the

effect of personal resources. Again, purposeful communication can hint at specific needs, desires, and wishes that people may have without being explicitly aware of them.

4.1. Bounded Rationality

Bounded rationality is an alternative theory of decision making that moves away from the earlier theories of the so-called rational choice model [120]. The critique has focused mainly on the reductionist nature of the "homo-economicus" theory. Therefore, other alternative theories that consider humans' constraints when making decisions are becoming more favoured. Bounded rationality is the reduction of a too-complex reality to a reduced version where some decisional shortcuts are taken to make decisions rational within a more straightforward system—for example, reducing the complexity of decision making by reducing the number of components to attend and by simplifying the decision rules. Importantly, bounded rationality is still rational, but within a tweaked system [121]. We believe that bounded rationality is relevant to explain acceptability, because opposition or acceptance results from a decision-making process.

The crux of bounded rationality is that we, as decision-makers, have limitations on our rationality when deciding. Further, the limitations placed on us can often be outside our control, i.e., limited time available to make a decision or too-complex decisions that cannot be fully grasped cognitively [13,14]. The limitation best illustrated in the proposed framework (Figure 1) is the complexity of the evaluation. Further, bounded rationality could also impact the evaluation of several different variables in all three classifications. Jones [122] emphasised the importance of affect and emotions in bounded rationality. The construction of wind farms and opposition is not simply a one-to-one relationship between a stimulus and a response. It results from attention to different factors and a weighing of said factors. Thus, it could be of value to specifically look at the effects of bounded rationality when an individual decides to either oppose or accept wind energy developments.

Further, bounded rationality would also influence policymakers [122]. There could be a connection between the information environment and bounded rationality. As the information environment (media) will present different topics, it could influence the evaluation processes according to bounded rationality.

4.2. Framework

The framework presented in Figure 1 aims to identify factors that contribute to wind energy's social acceptance or opposition and relate these factors to each other. The framework consists of three different blocks or classes of variables: psychological, contextual, and personal resources. These three categories of variables are all believed or have been shown to influence the opposition to or acceptability of wind energy, as outlined in the previous sections.

The variables classified as psychological (see the section on psychological variables) are grouped into different subgroups: attitudes and identity, perceived effects of wind energy, and social considerations. We propose that the categories of contextual variables and personal resources indirectly impact acceptability, mediated through psychological variables. We assume this because psychological variables reflect the subjective evaluation of contextual and personal variables.

The contextual variables are split into two main groups, development context (see the section on procedural justice and community ownership) and information environment (media influence, framing in media, and social media). We hypothesize that variables in the information environment influence involvement and cost–benefit considerations in the decision-making process. As other scholars have pointed out [16,123], based on the initial perception of the situation, individuals will appraise whether to view the case as a low-cost or high-cost situation. This appraisal will lead to either superficial or intense information acquisition; depending on the strength of their pre-existing attitudes, their processing and selection of information will be infused with more or less confirmation

bias. The information environment does not simply neutrally "transmit" the objective contextual factors, but influences psychological processing by framing a message in a particular way, e.g., designed to elicit an emotional reaction or the perception of the effects of a wind farm. For instance, messages can shift the weight of the different aspects forming the final attitude (as in the media priming approach) [29]. The location of a wind farm (context) is also important, giving rise to perceptions of proximity and the component of place attachment entering decision-making.

Individuals may also conclude from the information they receive through the various information channels that the project has insufficient procedural fairness, impacting acceptability. This is based on procedural justice literature—an unfair process can lead to negative attitudes (see the section on procedural justice). Furthermore, different community schemes can influence the acceptability of wind power (see the section on community ownership). It is possible that community ownership or community benefits could lead to a higher degree of acceptability by increasing perceived fairness. The expected economic and environmental impacts are believed to influence the decision to accept or oppose a proposed wind farm. These expectations would be transmitted through different channels in the information environment (Figure 1). Furthermore, we also propose that the way contextual information is framed could trigger an identity or place attachment response. By framing the construction of a wind farm as a threat to the local community, feelings of place attachment could influence the acceptability of wind energy. Finally, the degree of negativity and controversy is thought to be one of the main driving forces behind the information environment related to wind farm development. The degree of controversy would influence mass media reporting, social media activity, and interpersonal communication.

Often, attitudes will also enter the decision-making process. However, their influence depends on and responds to the information provided by different actors, wind energy's position in the political and societal debate, and personal resources.

Personal resources (see the section on personal resources) are believed to affect wind energy in the following manner. First, we propose that an individual's income will influence their involvement in the wind farm. An individual with capital to invest might prefer a model where individuals can buy shares for personal profit. Individuals with more capital would also have more resources to oppose development, and they might also have higher self-efficacy when it comes to believing that the opposition will succeed. Place of residence is believed to affect involvement through the proximity to the wind farm, resulting in a higher level of opposition in the pre-construction phase. Based on the literature, knowledge about wind energy could influence individual attitudes towards a given wind energy development positively or negatively.

In Figure 1, we can see how the weighting and evaluation of costs and benefits result from all psychological variables, and how this culminates in the decision to oppose or accept wind energy. Here, we can use bounded rationality to explain the decision to either oppose or accept. The weighing of costs and benefits is related to bounded rationality, as we can only attend to and understand so much information. The decision to oppose or accept wind energy is a satisfactory result as deemed by the individual based on the different psychological variables, such as cost–benefit considerations or affect and emotions. Opposition or acceptance of wind energy are believed to influence the degree of negativity and controversy, thus creating a feedback loop.

5. Conclusions

The paper contributes to the research surrounding the social acceptability of wind energy by organizing the literature in a novel theoretical way. Based on the findings from the literature, the aim is to explain which factors can lead to either opposition to or acceptability of wind power. Further, we combine these factors into a coherent theoretical framework that suggests that contextual factors and personal resources influence acceptability, and this influence is mediated through different psychological phenomena (Figure 1). The theory of bounded rationality assists in explaining how the different variables are evaluated and

how decisions are taken. Another important takeaway from the theoretical framework is the effect of media. A lot of the information surrounding wind energy is filtered through different information channels. These channels will often frame the information in a specific manner to elicit the desired response. Social media's effect on resistance to wind energy and renewable energy, in general, is an exciting avenue for future research. Our model emphasises the importance of contextual factors in attitude formation [15,25] and trust [15,34], to mention some examples. Furthermore, it illustrates the need for research that considers a wide variety of variables in the same study. This review shows that several variables influence acceptability to varying degrees. This is in line with other reviews [16,46]. As we have shown, all variables presented could directly or indirectly influence the social acceptability of wind energy. This could indicate that solutions that do not address or consider all of these variables (and possibly others) might be suboptimal.

Future research could use theoretical frameworks as a starting point or as a guide when structuring the research or for testing such frameworks in a real-world setting. Social acceptability or opposition will continue to influence the construction of renewable energy infrastructure, thereby influencing policy. Having a good knowledge base about the factors that need to be considered could be the key to ensuring effective policies. Moreover, this would hopefully influence how policy is implemented, as we have shown that procedural justice is an important aspect to create social acceptability. Therefore, good policies could hopefully ensure that affected communities have a sense of justice, regardless of the outcomes. We also want to stress the importance of media influences in this conflict, mainly social media communication and its ability to frame messages to serve specific goals. It could be beneficial to focus on this research agenda. The variables presented in this paper are primarily concerned with community acceptance. However, future research could also benefit from investigating socio-political acceptance and market acceptance in relation to wind energy.

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