It's hard to find the wind of change:
Factors associated with onshore windmill-attitudes and the green-on-green dilemma in a Norwegian context

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"It's surely our responsibility to do everything within our power to create a planet that provides a home not just for us, but for all life on Earth."

Sir David Attenborough, 2016

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Abstract

Studies examining factors affecting windmill-attitudes have been conducted since the 1980s. However, more studies is needed, also in a Norwegian context. Furthermore, the green-on-green dilemma that can arise regarding windmill-implementation seems to be complex, and needs more exploration. The aim of the following study was thus to investigate whether differences in demographics, mainly proximity and county, affects windmill-attitudes; to examine which of several factors that best predicts windmill-attitudes; to explore whether the green-on-green dilemma can yield different groups; and to explore whether these possible groups differ in terms of mean-scores for variables.

365 Norwegian youths were included in the study, answering a questionnaire measuring attitudes towards windmills and attitudes towards areal/species-protection, as well as variables of importance for windmill-attitudes and the green-on-green dilemma, and several demographic variables. The questions of interest were assessed using t-test, ANOVA, correlation, standard multiple regression, inspection of frequencies and MANOVA.

The results showed no significant differences in windmill-attitudes regarding proximity to windmills, but some significant differences in windmill-attitudes regarding different counties. For other demographics, there were small or no significant differences in windmill-attitudes. Anticipated noise and visual aesthetics, perceived planning- and building justice, and identification with nature were significant predictors for windmill-attitudes, in line with much previous research. The study identified four distinct groups within the green-on-green dilemma. These groups differed in mean-scores for several variables. Several explanations and interpretations are given for the results.

Even though the study found no significant differences in windmill-attitudes regarding proximity, the role of proximity should continue to be of interest. Studies is also needed in terms of more extensively mapping factors contributing to differences in windmill-attitudes across counties. Furthermore, the findings support the notion of simultaneously measuring several factors that might affect windmill-attitudes. Especially expectations about auditive and visual impacts, and perception of a just windmill-implementation process are important, and thus stress the importance of inclusion of locals early on and throughout the process. The findings also suggests that a dual-factor model might be applicable when exploring the green-on-green dilemma, to detect individuals that are in risk for being overlooked or misinterpreted. The complexity of the dilemma underlines the importance of considering both atmospheric and biospheric goals in windmill-implementation.

Keywords: windmill-attitudes, dual-factor model, green-on-green dilemma, anticipated noise and visual aesthetics, perceived planning- and building justice, identification with nature

Authors declaration

The thesis on hand was planned and conducted by myself in collaboration with my supervisor. All writing is done by myself, with some corrections and feedback from my supervisor throughout the process. All sources used are cited and referred to. The thesis has not been submitted before, however, parts of the introduction and literature-review is derived from my own project-description, submitted in the course “Project development and methodology” (PSY4521).

The ethical requirements of the Department of Psychology’s research committee at the University of Oslo was met.

Åshild Røen
Mai 2023

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What a year this has been – writing a master thesis. During the whole process I have learned a lot, and gained experience about how comprehensive conducting a study is; starting with an abstract idea to actually writing down a discussion-part, interpreting the results you have gained. There sure has been times of stress and some late-night working. Methodology speaking, this year can best be described with an U-shaped model: starting very high and positive, than a minor "crisis" and finally, when the thesis started to look like an actual thesis, the positive feelings started to rise again. However, despite some lows, conducting a study from scratch has been great, and made me even more sure about that a career within research is something I would like to pursue. I have also had a great "support team" around me, and there are several I want to send special thanks to.

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Table of contents

Introduction 1
Climate-crisis and the demand for green energy 1
Windmills: advantages and disadvantages 2
The green-on-green dilemma: atmospheric versus biospheric concerns 3
Factors affecting windmill-attitudes 5
Theoretical framing 10
The present study, research questions and hypothesis 11
Research questions and hypothesis 11
Methods 13
Sample 13
Procedure 14
Measures 15
Attitudes towards windmills 15
Attitudes towards areal/species-protection 15
Environmental beliefs 15
Perceived planning- and building justice 16
Perceived climate justice 17
Preferred ownership and use of electricity 17
Anticipated noise and visual aesthetics aspect 17
Demographics (independent variables) 18
Ethical considerations 18
Statistical analysis and procedures 18
Preliminary analyses 18
Main analyses 20

Results 22
Differences in windmill-attitudes for demographics 22
Proximity to windmills 22
County 22
Other demographics 23
Relationships between variables 24
Predictors for windmill-attitudes 26
Categorization of green-on-green groups 27
Mean-score differences between the four green-on-green groups 27
Discussion 30
Differences in windmill-attitudes 30
Predictors of windmill-attitudes 31
A multidimensional view on the green-on-green dilemma; categorization to groups 35
A multidimensional view on the green-on-green dilemma; group differences 37
Strengths and limitations 39
Implications and future directions 41
Conclusion 42
Bibliography 45
Appendix A: Consent form 61
Appendix B: Demographics 63
Appendix C: Identification with nature 66
Appendix D: Perceived environmental threat 68
Appendix E: Environmental self-identity 69
Appendix F: Perceived planning- and building justice 70
Appendix G: Perceived climate justice 71
Appendix H: Preferred ownership and use of electricity 72
Appendix I: Anticipated noise and visual aesthetics 73
Appendix J: Attitudes towards windmills 74
Appendix K: Attitudes towards areal/species-protection 75
Appendix L: Debriefing 76

Appendix M: Ethical approval 78
Appendix N: Overview of the samples sociodemographic characteristics 79
Appendix O: Exploratory analysis anticipated noise and visual aesthetics 82
Appendix P: Additional MANOVA counties 83
Appendix Q: Green-on-green groups, first cutoff point 85
Appendix R: Questionary English version 86

List of Abbreviations

α = Chronbachs alpha

ANOVA = Analysis of Variance

β = standardized regression coefficient

B = unstandardized regression coefficient

C.I. = Confidence interval

COP27 = Conference of the Parties, number 27

DFM = Dual Factor Model

EU = European Union

F = F-value

GHG-emissions = Greenhouse gas emissions

H1a = Hypothesis 1a

H1b = Hypothesis 1b

H2 = Hypothesis 2

H3 = Hypothesis 3

H4 = Hypothesis 4

IPBES = Intergovernmental science-policy Platform on Biodiversity and Ecosystem Services

IPCC = Intergovernmental Panel on Climate Change

LL = Lower Limit

M = Mean value

MANOVA = Multivariate Anaysis of Variance

N/n = Number of participants

η^2 = eta squared

η_p^2 = partial eta squared

NEP-scale = New Ecological Paradigm-scale

NIMBY-concept = Not In My Backyard-concept

NVE = Norwegian water resources and energy directorate

p = p-value

PIMBY-concept = Please In My Backyard-concept

r = the Pearson correlation coefficient

R^2 = R square, coefficient of determination

R^2_{adj} = Adjusted R square

RQ1a = Research question 1a

RQ1b = Research question 1b

RQ2 = Research question 2

RQ3 = Research question 3

RQ4 = Research question 4

SD = Standard Deviation

UL = Upper Limit

UN = United Nations

UNFCCC = United Nations Framework Climate Change Conference

VBN-theory = Value Belief Norm-theory

VIF = Variance Inflation Factor

List of Tables and Figures

Table 1	*Descriptive statistics and correlations for study variables*	p. 25
Table 2	*Standard multiple regressions for windmill-attitudes*	p. 26-27
Table 3	*Interest groups yielded from the green-on-green dilemma*	p. 27
Table 4	*Mean levels of dependent variables by four green-on-green groups*	p. 29
Table 5	*Overview of the samples sociodemographic characteristics*	Appendix N
Table 6	*Exploratory analysis anticipated noise and visual aesthetics*	Appendix O
Table 7	*Additional MANOVA counties*	Appendix P
Table 8	*Green-on-green groups, first cutoff point*	Appendix Q

Introduction

Climate-crisis and the demand for green energy

Polar icecaps melting, increasing heat, droughts, forest fires, rising ocean and more extreme floods. Such scenarios may sound like plots from dystopian movies, but they are all real consequences of the climate crisis. – Consequences that are happening and will continue to expand if we don't take action and change our ways of living. According to United Nation (UN)-experts, human-induced climate change is the "largest, most pervasive threat to the natural environment and societies the world has ever experienced" (United Nations, 2022). It is time to get real; humans are the ones to blame for the climate crisis – and we must solve it.

Luckily – over the last years, there has been an increasing focus on the threats of climate change, and what can be done to slow down global warming. Especially the Paris Agreement from 2015 was influential, with a global framework of limiting global warming to well below 2°C, ideally to 1,5°C, in order to avoid severe climate change. In December 2020 the European Union (EU) submitted an updated climate plan, where it was stated that "the EU and its Member States, acting jointly, are committed to a binding target of a net domestic reduction of at least 55 % in greenhouse gas emissions by 2030 compared to 1990" (European Commission, n.d.). Norway is one of the countries that contributes to a reduction target – per now this target is set to 50 % (Climate Action Tracker, n.d.).

The idea behind a reduction-target is clever in many ways. It hopefully will make industry-leading countries realize that action has to be taken now. Many European countries, with Norway in the lead (Fossum, 2021), focus on enhancing the use of electrical vehicles in order to reduce emissions. Other approaches can be to reduce travelling, eat less meat and consume less in general (e.g. Thogersen, 2018; Wassmann et al., 2023).

Another focus is the shift in energy, towards green- or renewable energy. Several countries have generated energy mainly through the burning of fossil fuels. However, this activity is the single largest driver of climate change, responsible for 86 % of carbon dioxide emissions over the past 10 years (Canadell et al., 2021; Asselt & Green, 2023). An energy-shift is hence needed when it comes to the reduction of CO_2 in the atmosphere, combined with other approaches – both individual and collective.

Wind-power is one of the sources to green, renewable energy. Per 21.04.23, there was 65 windfarms in Norway (NVE, 2023). Several international studies have been conducted in order to identify factors that could affect windmill-attitudes, however, in a Norwegian context, knowledge about public attitudes toward wind power development is limited

(Kaltenborn et al., 2022). Separate aspects of the Norwegian wind power situation have been addressed in several studies, such as the role of planning processes (e.g. Blindheim, 2013, 2015), community acceptance (Dotterud Leiren et al., 2020), political orientation (Karlstrøm & Ryghaug, 2014) community perspectives and local participation (Thygesen & Agarwal, 2014) and impacts of cultural heritage (Jerpåsen & Larsen, 2011); but there is still a need for Norwegian studies examining several of these factors simultaneously on a more national level.

Thus, the current study seeks to narrow this research gap, by examining factors that might affect attitudes towards onshore windmills among Norwegian youths. Building on Devine-Wright's (2005) notion about comparing more aspects at the same time, the current study includes several factors simultaneously, in order to examine which are the strongest predictors for windmill-attitudes. Furthermore, the current study also seeks to explore, by the integration of a dual factor model; the complexity of the green-on-green dilemma that can arise in windmill-implementation. It is important to point out that this study don't frame negative attitudes as something to overcome, and thus avoid a positivist research lens. A positivist research lens in windmill-studies could reduce the quality of research and prevent meaningful understandings (Rand & Hoen, 2017, p. 23).

Windmills: advantages and disadvantages

Knowledge about advantages and disadvantages for windmills can be of importance in understanding different attitudes. Thus, a brief overview of the main pros and cons will now be outlined.

The most prominent advantage of wind-power is that it gives emissions-free energy; "without creating or emitting to the atmosphere any greenhouse gases, smog-generating pollutants, airborne toxic substances such as mercury, or acid-rain precursors" (Charron, 2005, p. 6). Among other advantages, is that the planning- and building process of wind-power installation creates jobs, it is cost-effective – in fact it is one of the lowest-priced energy sources available today, and it fits well in many different landscapes (Charron, 2005).

This, however, brings us to one of the disadvantages; the fact that windmills can be perceived as a disruption in the landscape. They are easily integrated in many landscape-types – but can be found distracting, both in terms of noise and visual impacts. Another disadvantage is that even though wind is an endless power supply, it is an intermittent energy source – and must therefore – as Charron (2005, p. 6) states "be used in conjunction with other power sources such as thermal, hydroelectric or nuclear". Charron also points out that windfarms can modify local climate; this is only the case for very large windfarms. Finally –

a disadvantage broader than the human sensory aspect, is the fact that the building of windmills affects, disturbs and in the worst case destroys habitats and wildlife. The fact that wind-power on one hand is a great, renewable energy source, whilst on the other hand the installation of the turbines is a threat towards biodiversity, is often referred to as a green-on-green dilemma (Warren et al., 2005). This will be further elaborated in the following section.

The green-on-green dilemma: atmospheric versus biospheric concerns

Warren et al. (2005) captures the core of the green-on-green dilemma in the notion "some environmentalists advocate windfarms because of their "clean energy" credentials, while others oppose them because of their landscape impacts" (p. 854). More specifically, the green-on-green dilemma arises as a conflict regarding "reduction in emissions of greenhouse gases from energy development and consumption versus the prevention of environmental impacts associated with renewable energy development, including habitat loss, fragmentation, etc." (Burch et al., 2020, p. 2). When building windmill-parks as a source to renewable energy, we ensure that emissions are reduced – and thus slow down global warming. GHG-emission reduction is necessary for protecting biodiversity. At the same time, this intervention itself threatens biodiversity – and biodiversity, as the life of our planet, is important to protect, also since it actually helps to reduce the extent of climate change. United Nations panel related to reduction of climate change; Intergovernmental Panel on Climate Change (IPCC,) and the panel related to protection of biodiversity; Intergovernmental science-policy Platform on Biodiversity and Ecosystem Services (IPBES) emphasize the importance of both atmospheric and biospheric concerns and goals.

The dilemma creates a conflict of interest (e.g. Firestone et al., 2009; Neri et al., 2019; Warren et al., 2005) and raises several questions – for example: What are people willing to sacrifice? And what is "best" to sacrifice? Jackson (2011) asked whether a hierarchy between biodiversity and climate change policies (i.e. renewable energy-proposes) ever can be justified (p. 1205) – and suggested more consideration by national authorities when implementing renewable energy technologies that might have serious impact on biodiversity.

Warren and his colleagues predicted in the 2005-article that the green-on-green aspect in wind-energy politics will be prominent in the future environmental debates; "society has gone green (at least in its rhetoric), but what kind of greenness do we want?"(p. 854). A few years earlier, Pasqualetti et al. came with a somewhat similar statement:

> It is a question of how to best balance the nature we want with the energy we need. […] the debate reflects the ongoing conflict between convenience and cost, livelihood and landscape, nature and need (2002, p. 3, 15).

Both Pasqualetti, Warren and their respective colleagues were quite spot on with their questions/predictions. In Norway's case, there is for example currently a heavy debate around the windmill park Fosen in Trøndelag – and one of the main arguments against the installation, is that it disturbs and destroys reindeers grazing areas (e.g. Norum et al., 2023).

Several studies mention the adverse consequences windmills have for habitats and biodiversity, and thus the conflict that arises (e.g. Arnett et al., 2016; Dürr, 2022; Loss et al., 2013; Voigt et al., 2015). However, only a few studies have to date sought to examine this green-on-green dilemma more in depth. Some exceptions are Burch et al., 2020 and Voigt et al., 2019.

The study conducted by Burch et al. (2020) "sought to understand how environmentally conscious individuals interpret tension between sustainability goals; clean energy and biodiversity conservation" (p. 4). The results were interesting. For example, all the participants cared very much about both biodiversity conservation and renewable energy – with a slightly higher percentage caring for biodiversity. A majority said that they felt renewable energy impacted wildlife and wildlife conservation positively – however, one third felt the impact was mainly negative (p. 7). One of the most striking results was, when asked "whether they'd be more or less willing to support wind energy development given certain trade-offs between biodiversity conservation and other impacts of wind energy development" (p. 10), most of the respondents would be less supportive if development had a negative impact on biodiversity in any of the trade-offs presented. However, many of them would be supportive of development if it did not impact biodiversity, "even if it resulted in negative impacts on the integrity of the landscape or resulted in higher energy prices" (p. 10).

In contrast, a study by Voigt et al. (2019) among several stakeholders, showed that wind energy representatives judged energy generated from wind-turbines as more important and urgent compared to protection of biodiversity. However, most of the other participants wanted an ecologically sustainable energy transition, with equal consideration to preservation and renewable energy production.

The "traditional" view on the green-on-green dilemma seems to be rather unidimensional, with biodiversity-conservation in one end and implementation of windmills in order to reduce GHG-emissions at the other end (e.g. Firestone et al., 2009; Neri et al.,

2019; Warren et al., 2005). However, the findings above by Burch et al. (2020) and Voigt et al. (2019), indicates that the green-on-green dilemma are more complex. The dilemma requires simultaneously examination of attitudes related directly to wind energy and of general attitudes regarding energy and the environment (Swofford & Slattery, 2010, p. 2509). Thus, the present study sought to examine a more multidimensional view on the green-on-green dilemma, by application of a dual factor model – inspired by the dual factor model of mental health (Greenspoon & Saklofske, 2001). This is further elaborated under the theory-section.

Factors affecting windmill-attitudes

In addition to exploring the green-on-green dilemma, the present study sought to examine factors that are likely to affect windmill-attitudes. Already in the 1980s, factors affecting attitudes towards windmills was a theme among researchers – for instance in Sweeden (Carlman, 1982), in the Netherlands (Wolsink & van de Wardt, 1989) and in the US (Thayer, 1988). One of the most used explanations for why some show more negative attitudes towards wind power, has been the concept of "Not In My Backyard"; NIMBY (e.g. Deegan, 2002; Jobert, 1998). However, the NIMBY-concept have been increasingly criticized in terms of being too simplistic to explain reasons for negative attitudes (Devine-Wright, 2005; Guan & Zepp, 2020, p. 2; Petrova, 2013; Swofford & Slattery, 2010; Wolsink, 2006). Interestingly, the counterpart to NIMBY; "Please In My Backyard" (PIMBY), have also been identified. This emerges for instance when wind-turbines are seen as a source of income (Jobert et al., 2007, p. 2752).

The research mentioned below, have studied the influence of a range of factors that can affect windmill attitudes, alone or simultaneously, factors such as environmental beliefs, perceived planning- and building justice, perceived/anticipated noise and visual aesthetics, perceived preferences for ownership and use of electricity, and different demographic variables. All these factors, and an additional factor related to climate justice, are of interest in the current study.

Environmental beliefs. Environmental beliefs can be defined as "a system of attitudes and beliefs that determine people's environmental behavior" (Gray & Wiegel, 1985). In the current study, environmental beliefs will be used as an overall term, including three scales; identification with nature, perceived environmental threat and environmental self-identity – as previous environmental psychology research shows that even though these scales converge into a single, higher factor, their separate measures contribute to unique variance (e. g. Clayton et al., 2021; Jia et al., 2015).

Previous studies on the association between environmental beliefs and windmill-attitudes have yielded inconsistent results. Some studies have found a weak or negligible effect of environmental beliefs on windmill-attitudes (e.g. Hoen et al., 2019; Olson-Hazboun et al., 2016). For the studies finding that environmental beliefs significantly affect attitudes towards windmills, the direction of this relationship is unclear. Some studies find that people with higher environmental beliefs are more likely to be more positive towards wind-power than the average (ex. Ek, 2004; Larson & Krannich, 2016; Mulvaney et al., 2013), while others find the opposite (ex. Jacquet, 2012; Fergen & Jacquet, 2016). And there are studies that simultaneously show that environmental beliefs influence both positive and negative attitudes towards wind-energy (ex. Bidwell, 2013; Swofford & Slattery, 2010; Warren & Birnie, 2009).

Larsen and Krannich (2016) found differences in the impact of environmental beliefs on a general versus local level; pro-environmental identity predicts a positive attitude towards renewable energy, but this influence of environmental beliefs disappears when the same individuals are asked about level of support for development of a nearby windmill-park. As Olson-Hazboun (2016) writes: «Clearly, there is more to understand in terms of the relationship between environmental beliefs (including climate change opinions) and renewable energy attitudes" (p. 168).

Perception of planning- and building justice. A "democratic deficit" is often prominent in wind-energy planning and building (Hindmarsh & Matthews, 2008; Olson-Hazboun, 2016) – meaning that locals are quite uninformed about the whole construction-work, and not given the opportunity to be engaged in the planning and siting processes. This "democratic deficit" touches upon dimensions of procedural justice and fairness (Olson-Hazboun, 2016; Phadke, 2013; Ottinger, 2013). Several studies have examined the quality of communication with the public (ex. Krohn & Damborg, 1999; O'Bryant, 2002) and public participation in the planning process for windmill-parks (ex. Wolsink, 2006; Zoll, 2001; Firestone et al., 2018; Hoen et al., 2019) – and a perceived lack of fairness tends to contribute to conflicts and increased negative windmill-attitudes (ex. Gross, 2006; Jacquet, 2015; Pasqualetti, 2011; Phadke, 2011; Leitch, 2010; Bohn & Lant, 2009; Eltham et al, 2008; Wolsink, 2007).

A case of perceived planning- and building injustice can be illustrated with a case from Norway, 2019. The ministry of petroleum and energy at the time, asked the Norwegian Water Resources and Energy Directorate (NVE) to develop a national strategy for future onshore wind power development – in order to reduce the existing conflict level on where to

implement windmills. NVE proposed a map of the most suitable areas for windmill-implementation, 13 in total. However, this did not reduce the conflict level, if anything it increased it. The locals in these 13 proposed areas had not been included in the discussion at all – and as Lundberg and Richardson (2021) notes: "After a broad consultation process with 240 inputs from local and regional authorities and non-governmental organizations, the government decided not to proceed with the strategy" (p. 183). As a result, the government in June 2020 did propose inclusion of locals in the license-process. There was also an emphasis on environmental consequences and neighbor's perceptions. This clearly reflects the importance of a good, inclusive planning- and building process.

Perception of climate justice. Climate justice can be defined as "how the impacts of climate change will be felt differently by different groups and how some people and places will be more vulnerable than others to these impacts" (Joseph Rowntree Foundation, 2014, p. 2). It can include distribution of both costs and benefits (Joseph Rowntree Foundation, 2014; Jenkins, 2018, p. 118). The UNs climate change conference (UNFCCC) in 2022, the conference of the parties, number 27 (COP27), addressed the climate justice-issue, and established an "historic deal to create a new fund, in which countries responsible for high carbon emission will compensate vulnerable countries suffering from climate impacts" (Wyns, 2023).

There are much written about climate justice (ex. Schlosberg & Collins, 2014; Gardiner, 2011; Shue, 2014) – and with COP27, the focus on it is growing. However, there is a need for research that relates perception of climate justice to attitudes towards windmills.

Preferred ownership and use of electricity. Perceived economic impacts of windmill-projects can influence windmill-attitudes (e. g. Rand & Hoen, 2017; Staupe-Delgado & Coombes, 2020). There is a variety of such perceived impacts, this thesis focuses on two; preferred ownership and preferred use of electricity generated from the windmills. Blindheim (2013) argues that Norway has some of the best wind resources in Europe – and the current prime-minister in Norway, Jonas Gahr Støre, emphasized in his speech delivered at the UNs climate change conference in Glasgow that "Norway is positioned to take a lead in developing ocean-based solutions such as offshore wind" (Støre, 2021). There have also been stated that Norway could act as a "green battery" for Europe (Gullberg, 2013; Moe et al., 2021).

Wind-power projects promoted by local or regional companies have been found to increase windmill-attitudes more than when projects are promoted by national or international companies (ex. Ek & Persson, 2014; Liebe et al., 2017; Pasqualetti, 2011; Petrova, 2013).

Tabi and Wustenhagen (2017) found that people viewed international investors as more likely to "take the money and run" than companies from the local or regional community (Grinde, 2019, p. 13). As Staupe-Delgado and Coombes (2020) also point out: "many do not foresee any environmental benefit from the wind power, with many residents upset in their belief that the decision is motivated primarily by financial interests" (p. 8).

According to Leiren and Linnerud (2019), research shows that attitudes toward wind power are more positive if the energy is used nationally – and contributes to industrial development, than if it is exported abroad. Even "export" of generated energy within the country, can elicit concern (e.g. Baxter et al., 2013; Groth & Vogt, 2014) and increase negative attitudes toward windmills (Liebe et al., 2017).

Anticipated noise and visual aesthetics. According to Jobert et al. (2007) "one of the most obvious and most often examined reasons for opposition is the visual impact of wind-turbines" (p. 2751-2752). Windmills are often built in rural areas – and some sees this as a transition from "romantic and unspoilt nature" to an "industrial space with artificial, mechanical and urban character" (e.g. Bosley & Bosley, 1988; Bush & Hoagland, 2016; Gipe, 1993; Jacuqet & Stedman, 2013; Kim & Chung, 2019; Ólafsdóttir & Sæþórsdóttir, 2019; Pasqualetti et al., 2002; Westerlund, 2020). However, a study by Gebraslassie (2020), found that communities perceived no damage of scenic beauty after windmill-park installations. Other studies have even found that windmills sometimes are perceived as aesthetically pleasant – in terms of creating a "postcard-like" landscape (Kongprasit et al., 2017; Rand & Hoen, 2017; Firestone et al., 2018). Thus, there seem to be no universal perception of windmills in a landscape (Rand & Hoen, 2017). On this basis, studies have suggested that the visual aesthetics-component is influenced mainly by perceptions of how the windmills fit within the landscape (e.g. Firestone et al., 2018; Hoen et al., 2019; Ki et al., 2022; Molnarova et al., 2012; Scherhaufer et al., 2017; Wolsink, 2000) and by cultural and subcultural evaluations (see Nielsen, 2002; Tveit, 2009; Tveit, Sang, & Hagerhall, 2019, p. 50; Van den Berg et al., 1998; Warren et al., 2005; Warren & Birnie, 2009).

Previous studies have also reported that actual perceived annoyance induced by wind turbine noise are associated with more negative attitudes towards windmills (e.g. Baxter et al., 2013; Fast et al., 2016; Firestone et al., 2015; Haac et al., 2019; Pedersen & Persson Waye, 2007). The current study seeks to examine whether anticipated noise from windmills affects the attitudes, and are thus more similar to the studies conducted by Warren et al. (2005) and Eltham et al. (2007). The same applies for visual aesthetics. In addition, the current study focuses on anticipated noise and anticipated visual aesthetics as a whole, given that a

combination of these could lead to a stronger attitude-formation (e.g. Pedersen & Waye, 2006; Pedersen & Larsman, 2008; Klæboe & Sundfør, 2013).

Demographics.

Proximity to windmills. A proximity hypothesis have been suggested; "the closer residents are to an unwanted facility, the more likely they are to oppose it" (Dear, 1992, p. 291). Several studies have explored this hypothesis. However, the results are highly inconsistent. For instance: Simon (1996) found that windmills are less accepted in areas without windmill-parks. Andersen (1997) and Krohn and Damborg (1999), among others, found that distance to the nearest windmill-turbine did not affect attitudes towards windmills at all. Studies such as Hoen et al. (2019) and Warren et al. (2005) found a positive correlation between proximity to a windmill-park and attitudes. Thayer and Freeman (1987) found a negative correlation between proximity to a windmill-park and attitudes – same did Swofford and Slattery (2010) and Dugstad et al. (2020). The validity of the proximity-hypothesis, along with if and how proximity and exposure to windmills affects windmill-attitudes, is thus still unclear.

Norwegian counties. Norway can broadly be divided in five counties; Nord Norge, Trøndelag, Østlandet, Sørlandet and Vestlandet. In 2019, Norwegians attitudes towards development of wind power was collected through Norsk medborgerpanel. For attitudes towards development of on-shore wind power, participants from Østlandet was the most positive. Participants from Sørlandet was the most negative, followed by Vestlandet and Trøndelag. For Nord Norge, the amount of participants with positive attitudes was equal to participants with negative attitudes (Gregersen & Tvinnereim, 2019). However, given that studies on wind power in a Norwegian context to date is limited (Kaltenborn et al., 2022), detailed knowledge on how counties in Norway might differ in windmill-attitudes and why, is missing.

Other demographics. In addition to proximity to windmills and county, the current study included seven other demographic variables – in order to get a more holistic picture of how different characteristics could affect windmill-attitudes. The seven additional variables were; gender, age, place of living (urban versus rural area), educational level, educational background, occupation and income. Previous research has reported inconsistent results regarding these variables (e.g. Batley et al, 2001; Bidwell 2013; Collins et al, 1998; Ek 2004; Hoen et al., 2019; Johansson & Laike, 2007; Ladenburg 2009; Liljenfeldt and Petterson, 2017; Roe et al, 2001; van der Horst and Toke, 2010; Zarnikau, 2003).

Theoretical framing

Even though, several studies have sought to understand windmill-attitudes, and multiple predictors have been identified, there is lack of explanatory theoretical frameworks to investigate and explain windmill attitudes (Devine-Wright, 2005; Giordono et al., 2018; Mørk, 2021). Only a few of several theories within the field of environmental psychology have been applied within windmill-attitude studies, with varying results (e.g. Johanson & Laike, 2007; L.Read et al., 2013). Due to lack of successfully explaining the full windmill-attitude picture, critical questions have been raised about the usefulness of the traditional behavioral intention theories in this research (see Peattie, 2010; Claudy et al., 2013). In addition, Devine-Wright (2005) emphasizes the importance of simultaneously including several factors when examining windmill-attitudes, to identify the relative importance of each of the factors. This is something traditional frameworks might fall short of. Bidwell (2013) integrated the value-belief-norm (VBN) theory into a model of general attitudes towards wind energy development. The VBN theory was originally established by Stern et al. (2000) in order to explain how a chain of values, beliefs and norms influence environmental behavior. Beliefs, both environmental beliefs and beliefs about windmill-effects and fairness, were a central part of the present study. However, these beliefs were only studied regarding direct relationship to windmill-attitudes, not via (possible) underlying values. The current study also sought to broaden the aspect of environmental beliefs, as it has been suggested that the New Ecological Paradigm (NEP) scale, used in VBN theory, "reflect a general, perhaps more global environmental perspective" (Bidwell, 2013, p. 197). Thus, the current study included two additional perspectives to the environmental beliefs, see the section Environmental beliefs for more. The importance of examining several possible predictors simultaneously (Devine-Wright, 2004, 2005; Firestone et al., 2009; Bidwell, 2013), led to the inclusion of multiple predictor-variables in this study, partly inspired by Bidwell's research (2013).

In addition, a wider use of procedural justice theory was applied in the current study. Procedural justice theory concerns "the perceived fairness of the procedures and decision-making processes used before and during the implementation of environmental policies" (Schuitema & Bergstad, 2019, p. 302; Walker, 2009). Public involvement, the ability to express opinions freely (Gross, 2007), and consistency of decision-making procedures over time, can be seen as key-determinants for perceived fairness. Regarding public involvement, it is only effective if people's views are taken into serious consideration (Schuitema & Bergstad, 2019, p. 303). Perceived lack of procedural justice can affect even people with

initial positive or neutral attitudes towards a wind energy project to regard the outcome as illegitimate (Gross, 2007; Lienhoop, 2018).

Furthermore, a dual factor model was integrated when exploring the green-on-green dilemma, inspired by the dual factor model (DFM) of mental health (Greenspoon & Saklofske, 2001). The DFM of mental health integrates psychopathology (PTH) and subjective well-being (SWB) into a continuum and provides an adjustment to the traditional unidimensional mental health view (Xiao et al., 2021). Based on the two dimensions (PTH and SWB) of mental health, Greenspoon & Saklofske divided and identified mental health into four categories; "positive mental health" (high SWB, low PTH), "vulnerable" (low SWB, low PTH), "symptomatic but content" (high SWB, high PTH) and "troubled" (low SWB, high PTH). The current study sought, based on an alternative DFM, to integrate attitudes towards windmills and attitudes towards areal/species-protection into a continuum – and thus provide an alternative to a unidimensional view of the green-on-green dilemma. It was expected that the integration of the two dimensions would yield four different categories/groups – with the same combinations as the groups for mental health: high/high, low/low, high/low, low/high.

The present study, research questions and hypothesis

There is, as mentioned, to date limited knowledge about attitudes toward wind power development in Norway (Kaltenborn et al., 2022). There is a need for more studies, both international and in the Norwegian context, studies that include several factors that might affect windmill-attitudes simultaneously (see Devine-Wright, 2005). Furthermore, the green-on-green dilemma seems to be more complex than a unidimensional view suggests. The present study addresses these research gaps by 1) investigating whether differences in demographics, mainly proximity and county, affects windmill-attitudes, 2) examining which of several factors that best predicts windmill-attitudes, 3) explore whether the green-on-green dilemma is multidimensional rather than unidimensional and can yield four different groups, and 4) explore whether these possible groups differ in terms of mean-scores for variables.

Research questions and hypothesis

The present study has several research questions. The first research question, divided in 1a and 1b, is related to the demographics. 1a is related to the proximity-hypothesis:

RQ1a: "Is there a significant difference between proximity to windmills and mean-score on windmill-attitudes?" 1b is related to different Norwegian counties:

RQ1b: "Is there a significant difference between Norwegian counties and mean-score on windmill-attitudes, and if so; is there a significant difference between counties and mean-scores on factors related to windmill-attitudes?"

The current study assumes that both differences in proximity and county will contribute to significant different mean-scores for windmill-attitudes, but considering previous inconsistent findings on whether proximity contributes to more positive or more negative attitudes, and the lack of studies regarding different windmill-attitudes for different Norwegian counties, the following hypothesis do not expect a specific pattern.

H1. a) There is a significant difference between proximity to windmills and windmill-attitudes.

H1. b) There is a significant difference between Norwegian counties and windmill-attitudes, and there is a significant difference between counties and mean-scores on factors related to windmill-attitudes.

Several other demographic variables will be checked in order to give a fuller picture, but no specific research-questions and hypothesis are related to these.

The second research question is related to the importance of inclusion of several factors that could affect windmill-attitudes simultaneously (e.g. Bidwell, 2013; Devine-Wright 2005; Firestone et al., 2009), and is therefore as follows:

RQ2: "What relation does identification with nature, perceived environmental threat, environmental self-identity, perceived planning- and building justice, perceived climate justice, preferences for ownership and use of electricity, and anticipated noise and visual aesthetics, have with windmill-attitudes?"

Based on previous research examining some of these factors simultaneously (e.g. Hoen et al., 2019; Ki et al., 2022), the current study assume that all the factors will be significant predictors for windmill-attitudes, but given few or inconsistent findings for several of the factors, no specific pattern was expected. Thus, the hypothesis are as followed.

H2) Identification with nature, perceived environmental threat, environmental self-identity, perceived planning- and building justice, perceived climate justice, preferences for ownership and use of electricity, and anticipated noise and visual aesthetics are significant predictors for windmill-attitudes.

The third research question is related to the introduced dual factor model, and thus the suggestion of a more multidimensional view on the green-on-green dilemma:

RQ3: "Will different levels of attitudes for windmills and attitudes for areal/species-protection form four distinct groups in the green-on-green dilemma?"

In line with the groups yielded from the dual factor model of mental health, the current study assumes that these four groups will be identified also in the green-on-green dilemma context, and the following hypothesis was developed.

H3) Different levels of windmill-attitudes and areal/species-protection-attitudes will form four distinct groups in the green-on-green conflict.

The fourth research question is related to whether the possible four groups differ in mean-scores for variables. These variables are the same as the assumed predictor-variables in **RQ2/H2**. The research question is as followed:

RQ4: "Will the four suggested green-on-green groups significantly differ in mean-scores for identification with nature, perceived environmental threat, environmental self-identity, perceived planning- and building justice, perceived climate justice, preferences for ownership and use of electricity, and anticipated noise and visual aesthetics?"

Based on studies within the dual factor model for mental health indicating that the four mental health groups differ significantly on several variables (e.g. Antaramian et al., 2010; Franken et al., 2013; Greenspon & Saklofske, 2001; Suldo & Shaffer, 2008) it was expected that the green-on-green groups would significantly differ in mean-scores for the variables listed above. Thus, the hypothesis is as stated below:

H4: The four suggested green-on-green groups will significantly differ in mean-scores for identification with nature, perceived environmental threat, environmental self-identity, perceived planning- and building justice, perceived climate justice, preferences for ownership and use of electricity, and anticipated noise and visual aesthetics.

Methods

Sample

The current study is an independent project with original data collection. The study was conducted in Norway, with the recruitment-process lasting from the 25th of February to the 27th of March 2023. An age-range from 18 to 35 was selected, as people within this age group are "primed to be a critical force for the energy transition" (Tresise & Watts, 2021), for example by bringing up new ideas on how to make this transition the best.

In order to ensure representativity in the best possible way, the data collection-process was focused on recruiting participants across a variety of fields of study and professions, and from different parts of Norway. This was obtained by recruiting through social media, mainly Facebook, where a link to the questionary was presented in several different student- and

profession-groups located from Stavanger to Tromsø. Additionally, some participants were also recruited via a biology-course at Hetland videregående skole in Stavanger, and others via a psychology course (PSY1100) at the University of Oslo, where participation in the study gave course credit. Finally, some participants were recruited via snowballing-technique.

In total, the data collection yielded 829 responses. However, 445 participants were excluded based on incomplete survey responses, with very low response rates (between 2 and 40 %), and 19 participants were excluded due to not meeting the inclusion criteria. The inclusion criteria were: 1) reporting an age between 18 and 35 years, and 2) living in Norway. The final sample thus consisted of 365 participants (N = 365), with an average age-score of 25.3 years. 242 (66.3 %) identified as female, 113 (31.0 %) identified as male and 4 (1.1 %) identified as other. Six participants (1.6 %) did not indicate gender. A full overview of the samples sociodemographic characteristics is presented in Table 5 in Appendix N.

Procedure

Data was collected through an anonymous questionnaire (Appendix B-K) using Qualtrics (https://www.qualtrics.com/), a secure digital platform for creating and sending out surveys, provided by the University of Oslo. As stated in "Project and sample", as many as 445 participants had incomplete survey responses. These responses were mainly due to that the "What should be done with incomplete survey responses"-option in Qualtrics was not ticked off for the "Delete"-button. When this button is not ticked off for, all responses that are not fulfilled will automatically be sent in as a valid response a week after the respondent opened and started the questionnaire.

The first page of the questionnaire displayed the informed consent (Appendix A), presenting information about the study and the purpose of the study. The latter was presented in a vague and masked manner, to avoid the risk of response-bias. The participants could tick off for whether they wanted to participate in the study (yes) or not (no). In the current study, no participants were ticked off for no, so non were excluded from the analysis on this basis. In order to make it easier for the participants to understand and answer the questions, the whole questionnaire was presented in Norwegian. All scales originally written in English, were translated. In Appendix the questionnaire is presented in Norwegian (Appendix B-K) and in English (Appendix R).

The questionnaire consisted of nine scales; one measuring windmill-attitudes (Appendix J), one measuring areal/species-protection (Appendix K) and seven measuring different variables of importance for windmill-attitudes and the green-on-green dilemma (Appendix C-I). The scales for attitudes towards windmills, attitudes towards areal/species-

protection, perceived planning- and building justice, preferred ownership and use of electricity, and anticipated noise and visual aesthetics were designed for the current study. Data on several demographic variables were also collected (Appendix B). The next section provides a detailed description of the different measures.

Measures

Attitudes towards windmills

This scale consisted of five statements related to aspects of wind-energy. Two of the items were taken from a study by Groothius et al. (2008). All the five statements were measured on a 5-point Likert-scale, from *strongly disagre*e (1) to *strongly agree* (5). The lowest possible score was 5, and highest possible score 25, were higher score indicated more positive windmill-attitudes. For the current sample, this scale showed high reliability (α = .87). Windmill-attitudes worked as the dependent variable for the t-test's, the analysis of variance (ANOVA) and the standard multiple regression. For the multivariate analysis of variance (MANOVA), scores on attitudes towards windmills and areal/species-protection was merged to a single, independent variable.

Attitudes towards areal/species-protection

The scale consisted of five items, with statements such as "I have higher well-being when I'm out in the wild nature compared to when I'm in more urbane/build areas"; "I am in general worried about biodiversity-loss". All the statements were measured on a Likert-scale from *strongly disagree* (1) to *strongly agree* (5) – meaning that lowest and highest possible score was respectively 5 and 25. Higher score indicated higher interest of areal/species-protection. The scale showed high reliability for the current sample (α = .80). As stated above, scores for this scale and scores for windmill-attitudes were merged and used as the independent variable in the MANOVA-analysis representing the four green-on-green-groups.

Environmental beliefs

As presented in the introduction, the current study presents environmental beliefs as a collective term including three factors; identification with nature, perceived environmental treat and environmental self-identity. For the current sample, the scale-reliability was high when all these three factors were merged into one single scale (α = .89). This supports the choice of setting environmental beliefs as a collective term. However, in order to examine each of the factor's unique contribution, they were measured and analyzed separately.

Identification with nature. Identification with nature was measured with Schmitt et al.'s (2019) adaptation of Cameron's (2004) well-established measure of collective identity.

Schmitt et al. slightly changed the statements from the collective-identity scale, so that it would reflect nature-identity (e.g., "I feel strong ties to other parts of nature"). The adapted scale consisted of in total 12 items, measured on a 7-point Likert-scale from *strongly disagree* (1) to *strongly agree* (7). Half of the items were reversed, to ensure that higher score predicted stronger identification with nature. The scale-reliability for this scale was high within the current sample ($\alpha = .87$). This was an independent variable for regression, and a dependent variable for MANOVA.

Perceived environmental threat. Perceived environmental threat was measured with Schmitt et al.'s (2019) adaptation of the NEP-scale (Dunlap et al., 2000). This adaptation consisted of four of the original 15 items measured on a 7-point Likert-scale (1 = *strongly disagree*, 7 = *strongly agree*). One of the items was reversed, so that higher score predicted more perceived environmental threat. The scale showed high reliability for the current sample ($\alpha = .81$). This was an independent variable for regression, and a dependent variable for MANOVA.

Environmental self-identity. In order to measure environmental self-identity, a scale developed by van der Werff et al. (2013) was used. This scale was also used by Schmitt et al. (2019). The scale consisted of three items (e.g. "Acting environmentally friendly is an important part of who I am"), measured on a 7-point Likert-scale from *strongly disagree* (1) to *strongly agree* (7). Higher scores indicated stronger environmental self-identity. The scale-reliability within the current sample was high ($\alpha = .87$). This was an independent variable for regression, and a dependent variable for MANOVA.

Perceived planning- and building justice

The respondents were instructed to answer the statements based on the planning- and building process of a windmill-park nearby their home, or their general perception of windmill-planning and building in Norway. The scale consisted of four statements – all measured on a Likert-scale, reflecting being informed and included throughout the whole process. The Likert-scale ranged from *strongly disagree* (1) to *strongly agree* (5). The lowest possible score was 5, highest possible score 25 – were higher score indicated more perceived justice in the planning- and building process. The scale-reliability within the current sample was high ($\alpha = .89$). This was an independent variable for regression, and a dependent variable for MANOVA.

Perceived climate justice

Attitudes towards climate justice was measured with a scale created by Anjum & Aziz (2022). The original scale consisted of 5 items, all measured on a 5-point Likert-Scale (1 = *never*, 5 = *always*). Higher score reflected higher concerns for climate justice. When measuring the scale-reliability with all the five items, the alpha was low (α = .46). "Scale if item deleted" showed that alpha would increase if item three (see Appendix G) was deleted. Therefore, this item was removed from the final scale. The reliability for the 4-items scale was at a low to acceptable level (α = .56). This was an independent variable for regression, and a dependent variable for MANOVA.

Preferred ownership and use of electricity

Preferred ownership and use of electricity were merged together in one scale instead of two separates, since these two aspects often highly interact; respondents favoring local ownership also favors local use of electricity (Leiren & Linnerud, 2019). The scale consisted of 8 items, 4 of which reflected ownership and 4 of which reflected use of electricity. All eight statements were rated on a 5-point Likert-scale from *strongly disagree* (1) to *strongly agree* (5). However, the items related to "international ownership/use of electricity" and "ownership/use of electricity doesn't affect me" were reversed, so a higher score reflected support for more local ownership/use of electricity. For the current sample, the scale showed an acceptable to high level of reliability (α = .76). This was an independent variable for regression, and a dependent variable for MANOVA.

Anticipated noise and visual aesthetics aspect

This scale contained three items, one measuring anticipated noise and two measuring anticipated visual aesthetics. All items were rated on a 5-point Likert-scale (1 = *strongly disagree*, 5 = *strongly agree*). The items in the scale could be divided into two separate categories, in order to separate the auditive and visual aspects. An exploratory analysis (Appendix O) showed that both of the aspects significantly affected windmill-attitudes in a negative direction. However, this study focused on the noise and visual aesthetics as a whole, and therefore the items was merged into only one scale. Higher scores reflect higher perceptions of windmills as noisy and visually unpleasant. The scale showed acceptable to high reliability for the current sample (α = .79). This was an independent variable for regression, and a dependent variable for MANOVA.

Demographics (independent variables)

Proximity to windmills. Proximity to windmills were measured by a multiple choice question, with five alternatives; 0-5 km, 5-10 km, 10-20 km, 20-50 km, and more than 50 km. The respondents could tick off only one alternative.

County: County were measured by a multiple choice question asking "Where in Norway do you live?", with five alternatives; Nord Norge, Trøndelag, Vestlandet, Østlandet and Sørlandet. The respondents could tick off only one alternative.

Other demographics. The respondents were asked to report several other demographic characteristics: age, gender, place of living (urban vs rural area), educational level, educational background, occupation and income. All the demographic questions were multiple choice, where the respondents could tick off only one alternative for each question. For more details on the different alternatives, see Appendix B and N. Respondents in the categories "other" (gender), and "unemployed" and "don't want to answer" (occupation) were excluded from the analyses, due to few respondents in each category. This was in total 9 participants. The alternatives for place of living were merged from four to two, as "big city" and "smaller city/countryside" better reflects Norwegian places of living.

Demographics is not listed as possible predictor-variables for windmill-attitudes, nor as possible variables that differ between the four groups in the green-on-green dilemma, since demographics is not a main focus.

Ethical considerations

The project was approved by the Research Ethics Committee at the University of Oslo (ref. nr. 2514142, see Appendix M). No risks were associated with this project. The participants were presented with an informed consent at the start of the questionnaire, and a debriefing (Appendix L) about the purpose of the study at the end of the questionnaire.

Statistical analysis and procedures

All statistical analysis and data-processing was conducted using International Buisness Machines (IBS) Statistical Package for the Social Sciences (SPSS) Statistics version 29.

Preliminary analyses

All missing values were coded to -1, and excluded from the analysis via "exclude cases pairwise". Descriptive analyses were run to assess whether the data confirmed the assumptions underpinning t-test, ANOVA, correlation, standard multiple regression and MANOVA. Some of these assumptions apply to all of these analysis, and will be presented before more specific assumptions for each of the analysis.

Normality-tests were conducted for all the dependent variables: attitudes for windmills, attitudes for areal/species-protection, identification with nature, perceived environmental threat, environmental self-identity, perceived planning- and building justice, perceived climate justice, preferred ownership and use of electricity, anticipated noise and visual aesthetics, and county. The Shapiro-Wilk test indicated that none of the scores where normally distributed, and skewness-values indicated that most of them where negatively skewed – but when looking at histograms and normal Q-Q plots, scores appeared to be reasonably distributed for some of the variables. However, absence of normality is quite common in the field of psychology; "many scales and measures used in the social sciences have scores that are skewed […], reflecting the underlying nature of the construct being measured" (Pallant, 2018, p. 64). Outliers were screened by looking at boxplots and comparing the 5 % trimmed means to the actual means. This was done for all variables. The boxplots showed that outliers were present for 10 of the variables, but the 5 % trimmed means of all these variables did not differ substantially from the actual means, so outliers were included in the analysis. Level of measurement and independence of observations were also met for all the analysis-methods.

For the t-test's and ANOVA's, homogeneity of variance were met for most of the measures, however, income and proximity to nearest windmill failed this test, so the Welch and Brown-Forsythe test were interpreted to ensure validity of results.

For both correlation and regression, linearity and homoscedasticity were assessed by scatterplots. Both assumptions were met. In addition, assumptions about absence of multicollinearity and singularity were checked for the regression-analysis. This assumption was met, with no correlation coefficients above .8, and no variance inflation factor (VIF) values above 10. Based on the same analysis, it was concluded that multicollinearity and singularity were absent also for the MANOVA-analysis.

For the MANOVA's, scatterplots confirmed the assumption of linearity. Multivariate outliers were checked using Mahalanobis distances. The critical value was 24.32. Of a total of 331 participants, four (ID 203, 73, 33, 26) had scores exceeding this (25.29, 25.38, 27.38, 28.30). However, since there were few cases with scores not high above the critical value, the participants were left in the data file without any changes. The homogeneity of variance-covariance matrices and homogeneity of variance was assessed by respectively Box's tests of equality of covariance matrices and Levene's tests. The Box's tests showed a Sig. value smaller than .001 ($p < .001$) for both the MANOVAs, hence the assumption of homogeneity of variance-covariance matrices was violated. Therefore, Pillai's Trace was used instead of

Wilks' Lambda when interpreting whether groups differed on a linear combination of the dependent variables. The Levene's tests showed significant values for two of the seven dependent variables for the MANOVA related to the green-on-green groups: perceived environmental treat and perceived planning- and building justice, and significant values for two of the seven dependent variables for the MANOVA related to the county-groups: perceived environmental threat and perceived climate justice. These variables were not treated with more conservative alpha-levels when determining univariate significance (Tabachnick and Fidell, 2013). Instead, the Bonferroni-adjustment was applied for all the variables in the univariate test's, in order to reduce the chance of a type 1 error (Pallant, 2018).

Main analyses

T-tests and ANOVA's. To explore whether there was a significant difference between proximity to windmills and windmill-attitudes, and between counties and windmill-attitudes; one-way between-groups ANOVA's with Tukey's post hoc test were run. For counties, an additional MANOVA (Appendix P) was run – this is further elaborated under the section MANOVA.

In addition, independent-samples t-tests were run for gender, occupation and place of living, and one-way between-groups ANOVA's were run for educational level, educational background and income. The windmill-attitude scale acted as dependent variable, and the demographics as independent variables. Eta squared (η^2), interpreted after Cohen's (1988) guidelines, was applied to indicate the effect size for both the t-tests and the ANOVAs. To test whether age was related to windmill-attitudes, a correlation analysis was conducted. This is elaborated in the next paragraph.

Correlation and standard multiple regression. All the scale variables, including age and the areal/species-protection scale, were included in a Pearson product-moment correlation (Pearson r) analysis, in order to examine relationships among variables. The Pearson correlation coefficients were used to interpret the direction of the relationships, whereas the strength of the relationships was interpreted after Cohen's (1988) suggestions.

After running the Pearson r, a standard multiple regression analysis was conducted to check which of the scale-variables that best predict windmill-attitudes. The windmill-attitude scale worked as the dependent variable, and scales for identification with nature, perceived environmental threat, environmental self-identity, perceived planning- and building justice, perceived climate justice, preferred ownership and use of electricity, and anticipated noise and visual aesthetics as independent. Age and the areal/species-protection scale was excluded from the regression analysis. Age because the interest concerning this variable is to see

whether it relates to windmill-attitudes, but not whether it predicts these attitudes – and areal/species-protection since this variable first is of relevance when dividing the sample into the different groups for the green-on-green dilemma, and when examining whether there are differences between these groups on scale-scores.

Green-on-green groups classification. Scores for the two scales measuring attitude for windmills and for areal/species-protection were used to identify the four green on green groups. To see the group-distributions, split file, based on the two binned variables, was used when running frequencies-tab.

Visual binning was used to separate the windmill-attitude variable and the areal/species-protection variable into respectively low and high windmill-attitudes and low and high areal/species-protection. Since no previous studies found have sought to categorize groups in the green-on-green dilemma, there were no guidelines for what values that should be used as cutoff point for low/high scores on windmill-attitudes and areal/species-protection. At first, the cutoff point was set at 12.5, since this was the middle-value of the total-score. This was done for both variables; scores between 5 and 12.5 indicated low attitudes and scores between 12.5 and 25 indicated high attitudes. However, when splitting the file and running frequencies with the two binned variables (appendix Q), only 7 respondents ended up in the low/low group and the low A (areal/species-protection)/high W (windmill-attitudes) group. The fact that so few respondents ended up in these two groups, raised the question about the validity of the cutoff point.

A new cutoff point was decided, this time by looking at the visual binning-window's representation of distribution of scores for the two variables. The cutoff point were set at 15 for both variables, as this value more correctly reflected the actual median of the scores for the present study. With this cutoff point, scores between 5 and 15 indicated low attitudes and scores between 15 and 25 indicated high attitudes. This cutoff point was deemed as the best applicable for the study.

MANOVA. Finally, a multivariate analysis of variance (MANOVA) was conducted in order to examine whether the four green-on-green groups differed in terms of scores on the seven Likert-scale variables; identification with nature, perceived environmental treat, environmental self-identity, perceived planning and building justice, perceived climate justice, preferred ownership and use of electricity, and anticipated noise and visual aesthetics. The binned windmill-attitudes variable and the binned areal/species-protection variable was merged into a single variable, consisting of the four categories: high/high, low/low, high/low,

low/high. This new variable acted as the independent variable. The seven Likert-scale variables were included as the dependent variables.

As mentioned above, an additional MANOVA was also conducted for counties, to examine whether there were significant differences between the five county-groups and mean-scores on factors related to windmill-attitudes. County acted as the independent variable, and the seven Likert-scale variables listed over, were included as the dependent variables.

Partial eta squared (η_p^2) was used to indicate the effect size of the results, interpreted after Cohen's (1988) generally accepted criteria. Tuckey post-hoc tests were applied for dependent variables that showed significant main effects, to identify where the significant differences lied. When running these tests, the alpha-level was adjusted using the Bonferroni adjustment, in order to reduce the risk of a Type 1 error.

MANOVA was preferred over several ANOVA's, as the MANOVA is more robust for explaining variance. MANOVA also "controls" or adjusts for the increased risk of a Type 1 error that arises when conducting a series of ANOVAs (Pallant, 2018).

Results

Differences in windmill-attitudes for demographics

Proximity to windmills

The one-way between-groups ANOVA showed a non-significant difference in windmill-attitude scores for the five proximity-groups: $F(4, 339) = 1.42$, $p = .23$. The difference in mean scores between the groups was of small effect, with eta squared = .01.

County

The one-way between-groups ANOVA showed a statistically significant difference at the $p < .05$ level in windmill-attitude scores for the five county-groups: $F(4, 345) = 11.57$, $p < .001$. The difference in mean scores between the groups was of medium effect, with eta squared = .12. Post-hoc comparisons (Tukey HSD test) indicated that only the mean score for Nord Norge ($M = 9.44$, $SD = 5.41$) was significantly different from all of the other groups, who all had higher means: Trøndelag ($M = 14.47$, $SD = 4.14$), Vestlandet ($M = 14.13$, $SD = 4.72$), Østlandet ($M = 15.40$, $SD = 4.63$) and Sørlandet ($M = 13.05$, $SD = 4.49$).

The MANOVA is presented in Appendix P. Overall, participants from Nord Norge scored significantly ($p < .001$) lower on perceived environmental threat ($M = 18.79$, $SD = 7.11$) than participants from Vestlandet ($M = 23.47$, $SD = 3.76$) and Østlandet ($M = 23.43$, SD

= 3.80). Participants from Nord Norge also scored significantly (p = .006) lower on perceived climate justice (M = 12.18, SD = 3.96) than participants from Trøndelag (M = 14.48, SD = 2.10), and significantly (p < .001) lower on perceived climate justice than participants from Vestlandet (M = 14.39, SD = 2.26) and Østlandet (M = 14.43, SD = 2.44). Finally, participants from Nord Norge scored significantly (p < .001) higher on anticipated noise and visual aesthetics (M = 11.89, SD = 3.54) than participants from Østlandet (M = 9.53, SD = 2.73).

Other demographics

Gender. The independent-samples t-test showed no significant difference in windmill-attitude scores for males (M = 13.54, SD = 5.58) and females (M = 14.51, SD = 4.63; t (179.31) = -1.58, p = .12, two-tailed). The magnitude of the differences in the means (mean difference = -.97, 95% *CI*: -2.18 to .24) was very small (eta squared = .007).

Place of living. The independent-samples t-test showed a significant difference in windmill-attitude scores for those in big cities (M = 14.91, SD = 4.64) and those in small cities/countryside (M = 12.91, SD = 5.25; t (239.28) = 3.59, p < .001, two-tailed), with those living in big cities showing more positive windmill-attitudes. The magnitude of the differences in the means (mean difference = 2.00, 95% *CI*: .91 to 3.11) was small (eta squared = .03).

Educational level. The one-way between-groups ANOVA showed a non-significant difference in windmill-attitude scores for the four educational level-groups: F(3, 346) = 1.10, p = .35. The difference in mean scores between the groups was of very small effect, with eta squared = .009.

Educational background. The one-way between-groups ANOVA showed a statistically significant difference at the p < .05 level in windmill-attitude scores for the five educational background-groups: F(4, 347) = 3.84, p = .005. The difference in mean scores between the groups was of small effect, with eta squared = .04. Post-hoc comparisons (Tukey HSD test) indicated that the mean scores for natural science (M = 12.83, SD = 4.53) and for technical studies (M = 12.19, SD = 6.01) was significantly different from health science (M = 15.63, SD = 4.61). Humaniora/social science (M = 14.64, SD = 4.87) and language/economy (M = 14.54, SD = 5.06) did not differ significantly from any of the other groups.

Occupation. The independent-samples t-test showed no significant difference in windmill-attitude scores for students (M = 14.56, SD = 4.65) and employees (M = 13.42, SD = 5.51; t (152.46) = 1.81, p = .07, two-tailed). The magnitude of the differences in the mean scores (mean difference = 1.14, 95% *CI*: -.11 to 2.39) was very small (eta squared = .009).

Income. The one-way between-groups ANOVA showed a non-significant difference in windmill-attitude scores for the three income groups: $F(2, 352) = .13$, $p = .87$. The difference in mean scores between the groups was of very small effect, with eta squared = .0007.

Relationships between variables

A Pearson r correlation-analysis between all the scale-variables was conducted, in order to examine relationships between variables. Several correlations in the variables' matrix were significant, the strongest was a negative correlation between windmill-attitudes and anticipated noise and visual aesthetics, $r = -.71$, n = 350, $p < .001$.

Age showed a small, negative correlation with windmill-attitudes, $r = -.16$, n = 338, $p = .004$.

All descriptive statistics and correlations are presented below (Table 1).

Table 1

Descriptive statistics and correlations for study variables

Variable	*n*	*M*	*SD*	1	2	3	4	5	6	7	8	9	10
1. Windmill-attitudes	355	14.25	4.97	_(.87)_									
2. Age in years from 18 to 35	348	25.28	4.22	-.16**	_								
3. Areal/ species protection	347	19.50	3.76	-.18**	.10	_(.80)_							
4. Identification with nature	362	59.89	11.47	-.19**	.14**	.61**	(.87)__						
5. Perceived environmental threat	363	22.81	4.51	.17**	-.06	.39**	.30**	_(.81)_					
6. Environmental self-identity	364	14.07	3.86	.07	.09	.42**	.49**	.45*	_(.87)				
7. Perceived planning- and building justice	357	9.45	3.43	.52**	-.09	-.21**	-.08	.11*	.07	(.89)_			
8. Perceived climate justice	352	14.18	2.60	.14*	.04	.30**	.20**	.52**	.38**	.08	_(.56)		
9. Preferred ownership and use of electricity	353	28.27	5.44	.22**	-.13*	-.07	-.13*	-.06	-.05	.12*	.05	(.76)_	
10. Anticipated noise and visual aesthetics	359	10.02	2.97	-.71**	.13*	.21**	.17**	-.15**	-.04	-.48**	-.17**	-.24**	(.79)__

Note. * $p < .05$, ** $p < .01$; Scale reliabilities are presented in brackets ().

Predictors for windmill-attitudes

Standard multiple regression was used to assess whether different scale-variables were significant predictors for windmill-attitudes. The total variance explained by the model as a whole was 56 %, F (7,334) = 60.00, p < . 001.

Identification with nature was a significant predictor on a p < . 01-level (p = .003), whereas perceived planning- and building justice, and anticipated noise and visual aesthetics were significant predictors on a p < . 001-level.

The unstandardized regression-coefficients for the significant predictors (Table 2), indicated that when score on identification with nature increased with one unit, score on windmill-attitudes decreased with .06 units; when score on perceived planning- and building justice increased with one unit, score on windmill-attitudes increased with .32 units; and that when score on anticipated noise and visual aesthetics increased with one unit, score on windmill-attitudes decreased with .93 units.

The standardized regression-coefficient's values indicated that anticipated noise and visual aesthetics (β =-.56) made the strongest significant unique contribution in explaining windmill-attitudes. Perceived planning- and building justice (β = .22) and identification with nature (β = -.13) also made significant, but weaker, unique contributions (see Table 2).

Perceived environmental threat, environmental self-identity, perceived climate justice, and preferred ownership and use of electricity were non-significant predictors for windmill-attitudes.

Table 2

Standard multiple regression for windmill-attitudes

Variable	B	95% CI for B		SE B	β	R^2	R^2_{adj}
		LL	UL				
Model						.56	.55
Constant	19.96***	15.90	24.01	2.06			
Identification with nature	-.06**	-.09	-.02	.02	-.13		
Perceived environmental treat	.08	-.02	.18	.05	.07		
Environmental self-identity	.09	-.03	.20	.06	.07		

Perceived planning- and building justice	.32**	.20	.44	.06	.22
Perceived climate justice	-.03	-.19	.14	.08	-.02
Preferred ownership and use of electricity	.04	-.02	.11	.03	.05
Anticipated noise and visual aesthetics	-.93***	-1.08	-.79	.07	-.56

Note. CI = confidence interval; *LL* = lower limit; *UL* = upper limit. ** $p < .01$, *** $p < .001$

Categorization of green-on-green groups

As described in the methods-section, participants were classified into one of the four green-on-green groups based on their windmill-attitude and areal/species-protection scores. Table 3 shows the distribution of participants across the four groups. The first group, consisting of 27 participants, had low scores on both windmill-attitudes (5-15) and on areal/species-protection (5-15). This group was named double low. 169 participants were classified into the second and largest group; nature green. These participants had low scores on windmill-attitudes and high scores on areal/species-protection (15-25). The third group; technology green, was classified by high scores on windmill-attitudes (15-25) and low scores on areal/species-protection. With 23 participants, this group was the smallest. 127 participants were found to be in the fourth group; double high, scoring high on both windmill-attitudes and areal/species-protection.

Table 3

Green-on-green groups yielded from a dual-factor model

	Areal/species protection	
Windmill-development	Low	High
Low	Double low N= 27 7.8%	Nature green N= 169 48.8%
High	Technology green N= 23 6.6%	Double high N= 127 36.7%

Note. Total N = 346

Mean-score differences between the four green-on-green groups

A multivariate analysis of variance (MANOVA) was performed to investigate whether identification with nature, perceived environmental treat, environmental self-identity,

perceived planning- and building justice, perceived climate justice, preferred ownership and use of electricity, and anticipated noise and visual aesthetics; differed between groups in the green-on-green dilemma.

There was a statistically significant difference between the four interest-groups on the combined dependent variables, F (21, 930) = 11.33, $p < .001$; Pillai's Trace = .61; $\eta_p^2 = .20$. When the results for the dependent variables were considered separately, using a Bonferroni adjusted alpha level of .007, significant differences were detected for identification with nature, perceived environmental treat, environmental self-identity, perceived planning- and building justice, and anticipated noise and visual aesthetics (Table 4). All the significant univariate comparisons showed either medium or large effect size. The largest effect size was found for noise and visual aesthetics, $\eta_p^2 = .32$, indicating that 32 % of the variance in noise and visual aesthetics-scores was explained by interest-groups. The two non-significant results showed small effect size.

Tukey's post-hoc tests, with a Bonferroni adjusted alpha level of .01, was conducted for the five significant univariate comparisons. Results of these post-hoc tests are shown in Table 4, along with means and standard deviations for each group on each of the dependent variables. Overall, for identification with nature, the nature greens (M=64.16, SD=9.87) had significantly ($p < .001$) higher mean-scores than all the other groups. The double highs (M=59.14, SD=9.78) had significantly ($p < .001$) higher mean-scores than both double lows (M=49.48, SD=10.61) and technology greens (M=44.50, SD=10.16). For perceived environmental threat, the nature greens (M=22.84, SD=4.84) had significantly ($p = .002$) higher mean-scores than the double lows (M=19.48, SD=4.47) and significantly ($p = .006$) higher mean-scores than the technology greens (M=19.45, SD=4.00). The double highs (M=23.91, SD=3.49) had significantly ($p < .001$) higher mean-scores than both double lows (M=19.48, SD=4.47) and technology greens (M=19.45, SD=4.00). The following post-hoc tests were all significant on a $p < .001$-level. For environmental self-identity, the nature greens (M=14.47, SD=3.71) and double highs (M=14.75, SD=3.59) had significantly higher mean-scores than double lows (M=11.00, SD=3.72) and the technology greens (M=10.85, SD=3.57). For perceived planning- and building justice, the technology greens (M=11.10, SD=3.35) and the double highs (M=10.95, SD= 2.85) had significantly higher mean-scores than the nature greens (M=8.00, SD=3.16). For anticipated noise and visual aesthetics, the double lows (M=10.36, SD=2.81) and nature greens (M=11.61, SD=2.32) had significantly higher mean-scores than the double highs (M=8.15, SD=2.40). In addition, the nature greens had significantly higher mean-scores than the technology greens (M=8.10, SD=2.40).

Table 4

Mean levels of dependent variables by four green-on-green groups (N = 346)

Dependent variables	green-on-green groups								$F(3, 314)$	η_p^2
	Double low (*n*=25)		Nature green (*n*=153)		Technology green (*n*=20)		Double high (*n*=120)			
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*		
Identification nature	49.48_a	10.61	64.16_b	9.87	44.50_a	10.16	59.14_c	9.78	35.00***	.25
Environmental treat	19.48_a	4.47	22.84_b	4.84	19.45_a	4.00	23.91_b	3.49	11.70***	.10
Environmental self-identity	11.00_a	3.72	14.47_b	3.71	10.85_a	3.57	14.75_b	3.59	13.05***	.11
Planning- and building justice	9.44	4.07	8.00_b	3.16	11.10_c	3.35	10.95_c	2.85	21.85***	.17
Climate justice	13.48	2.96	14.18	2.64	13.10	2.00	14.53	2.45	2.57	.02
Ownership and use of electricity	28.10	6.21	27.41	5.79	28.55	5.62	29.29	4.72	2.71	.03
Noise and visual aesthetics	$10.36_{a,b}$	2.81	11.61_b	2.32	$8.10_{a,c}$	2.40	8.15_c	2.55	48.79***	.32

Note. *** $p < .001$. Post-hoc Tuckey comparisons were employed to analyze group-means in cases of significant *F*-tests. Significant differences between group-means are identified by different letters. Means having the same subscript are not significantly different. Means not marked by letters are not significantly different from any group-means.

Discussion

The current study aimed to 1) investigate whether differences in demographics, mainly proximity and county, affected windmill-attitudes, 2) examine which of several factors that best predicted windmill-attitudes, 3) explore whether the green-on-green dilemma was multidimensional rather than unidimensional and could yield four different groups, and 4) explore whether these possible groups differed in terms of mean-scores for variables.

There was no significant difference in windmill-attitude scores for the different proximity groups, thus H1a was not supported. H1b was supported; there was a significant difference in windmill-attitude scores for the different county groups, and a significant difference between counties and mean-scores on factors related to windmill-attitudes. There was either small or no significant differences in windmill-attitude scores for the other demographic variables. For H2, three of the seven predictor-variables (identification with nature, perceived planning- and building justice and anticipated noise and visual aesthetics) had a significant impact on windmill-attitudes. H2 was thus partly supported. The participants were categorized to four distinct green-on-green groups based on their scores for attitudes towards windmills and areal/species-protection, and thus H3 was supported. H4 was partly supported; scores on five of seven dependent variables significantly differed between the four green-on-green groups.

Differences in windmill-attitudes

The current study found no significant differences in windmill-attitude scores for proximity. This finding of no significant differences in windmill-attitude scores based on whether one lived close or far away from a windfarm, indicates that a "proximity-hypothesis" (Dear, 1992) might not be valid in the case of this study. Previous studies have found that living closer to a windfarm both contributes to more negative attitudes (e.g., Dugstad et al., 2020; Swofford & Slattery, 2010; Thayer & Freeman, 1987) or more positive attitudes (e.g., Braunholtz, 2003; Simon, 1996; Warren et al., 2005) towards windmills. Some studies also match the findings of the current study; that proximity does not significantly affect attitudes (e.g., Andersen, 1997; Krohn & Damborg, 1999).

For county, participants from Nord Norge had significantly lower windmill-attitude scores than all the other county-groups. As mentioned in the methods and results-section, a follow-up analysis examined which of the predictors for windmill-attitudes that differed between counties. Significant differences for five of the in total seven predictor-variables

appeared. Overall, participants from Nord Norge had significant different mean-scores on climate justice, perceived environmental threat and noise and visual aesthetics than other groups. The latter are of main interest for the current study and will be briefly mentioned under the section predictors of windmill-attitudes.

Regarding the other demographic variables, there were no significant differences in windmill-attitude scores for different genders, occupations, different educational levels and income. For educational background, there was a significant, yet small difference in windmill-attitude scores for some of the groups; participants with background in natural science and technical studies, had significant lower mean scores than participants in health science. This could reflect participants with the first two backgrounds having more knowledge towards possible negative drawbacks with windmill-implementation than the latter. Age showed a significant small, negative correlation with windmill-attitudes. This finding indicated that higher age is associated with more negative windmill-attitudes, and is thus consistent with most of the previous studies examining age in relation to these attitudes (e.g. Ek, 2005; Gregersen & Tvinnereim, 2019; Mariel et al., 2015). Regarding place of living, those living in more rural areas had significantly lower windmill-attitude scores than those living in more urban areas. This is in line with previous studies (e. g. Coleby et al., 2009; Yuan et al., 2015). However, the current study instead emphasized differences between counties, as this gives a more interesting and useful representation of the Norwegian population regarding windmill-attitudes. It is also worth mentioning that the mean-difference in the scores for urban versus rural had a small effect size, whereas the mean-difference in windmill-attitude scores for counties, had a medium effect size.

Predictors of windmill-attitudes

Three of in total seven factors were significant predictors for windmill-attitudes in the present study. Anticipated noise and visual aesthetics were the strongest predictors. The negative sign for rate of increase, indicated that those expecting to be more annoyed by auditive and visual aspects, would have more negative windmill-attitudes. Perceived planning- and building justice was the second strongest predictor, with a positive sign for rate of increase, which indicated that if the participants felt properly included, they would take a more positive stand toward windmills. Most of the previous studies examining multiple factors simultaneously, have also found these two factors being the strongest predictors for windmill-attitudes (e.g. Devine-Wright, 2004; Firestone at al., 2018; Hoen et al., 2019; Ki et al., 2022; Olson-Hazboun et al., 2016; Wolsink, 2007). Finally, one of the three scales for environmental beliefs; identification with nature, also predicted windmill-attitudes. The

negative sign for rate of increase indicated that those with a strong tie to areal/species, were more negative toward windmills, this effect size was small. This is in line with other studies that have found that other factors than environmental beliefs are more important in predicting windmill-attitudes (Olson-Hazboun et al., 2016; Rand & Hoen, 2017). These results support the importance of measuring several factors simultaneously, in order to see which of them that predicts windmill-attitudes (Devine-Wright, 2004; Firestone et al., 2009; Wolsink, 2000, 2007). The possible interaction between factors is beyond the scope of this study, but it is important to take into consideration. Furthermore, given that the significant factors examined in the current study reflects dimensions also above the individual concerns, these results add to the notion that the NIMBY-concept is a too simplistic explanation for negative windmill-attitudes (e.g., Bell et al., 2005; Devine-Wright, 2005; Rand & Hoen, 2017; van der Horst, 2007; Wolsink, 2007).

Perceived environmental threat, environmental self-identity, perceived climate justice, and preferred ownership and use of electricity, were all non-significant predictors. This will be further elaborated under the section limitations. The two latter will in addition be briefly mentioned under environmental beliefs. The following paragraphs will in more detail cover the current study's significant predictors and possible interpretations.

As noted in the method-section, anticipated noise and visual aesthetics were measured together, but an exploratory analysis showed that both aspects individually significantly affected windmill-attitudes in a negative direction. The present study only focused on anticipated concerns regarding noise and visual impact. Previous studies examining such anticipations, overall find that concerns about both noise (e.g. Dudleston, 2000; Eltham et al., 2007; Warren et al., 2005; Wolsink, 2000) and visual aesthetics (e.g. Pedersen & Waye; van der Horst, 2007; Warren et al., 2005; Wolsink, 2000, 2007) affect windmill-attitudes in a negative direction, and thus correspond to the findings of the current study. However, anticipated impacts not always correspond with actual perceived impacts – demonstrated by Warren et al. (2005): Visual and noise impacts were experienced less than commonly anticipated (p. 866). Eltham et al. (2007) found a similar pattern regarding the noise-aspect. To complicate the matter even further, factors influencing noise are many and create a complex picture (e.g., Haac et al., 2019; Hübner et al., 2019; Ki et al., 2022; Pohl et al., 2018). For example, people will have different thresholds for perception of noise (e.g., Haac et al., 2019; Klæboe & Sundfør, 2016). Thus, it is difficult to say whether actual noise-impact will affect windmill-attitudes in the same negative manner as the anticipated, or not.

The same complex picture arises for the anticipated impacts concerning visual aesthetics. “Beauty is in the eye of the beholder”; the perception of a landscape and features in that landscape is clearly subjective (e.g., Campbell, 2004; Devine-Wright, 2005; Habron,1998; Khron & Damborg, 1999; Short, 2002; Warren et al., 2005). Building on the notion that windmill-attitudes will be affected by evaluations of how well windmills fit within different landscapes (see Firestone et al., 2018; Hoen et al., 2019; Ki et al., 2022; Scherhaufer et al., 2017; Wolsink, 2000), the present study’s finding can indicate that windmills are precepted as a “bad fit” for Norwegian landscapes in general, per now. In contrast to Norway, there is a notion in Denmark that «wind-turbines are now seen as an integral part of the Danish cultural landscape, … there would be a public outcry if they were removed” (Nielsen, 2002, p. 130). This shows how cultural differences in windmill-perceptions exist even between neighbor-countries as Norway and Denmark. Windmill-perceptions can change over time, as Warren et al. (2005) notes; “windfarms may come to represent new cultural landscapes for the early 21st century” (p. 872). With this in mind, the Norwegian perception of windmills as disrupting the landscape might not be the same over time – and the perception might even change to positive. However, given different results between different countries in the perception of windmills visual aesthetics, it is natural to assume different results also for different counties in Norway – due to for example different topography and different subcultural values (Devine-Wright, 2008, 2009; Swofford & Slattery, 2010; Vorkinn & Riese, 2001). Thus, the higher mean-score on anticipated noise and visual aesthetics for participants in Nord Norge could, among other things, reflect preservation of cultural heritage/land – given that many areas in this county is valuable for the Sami-people (e.g. Ellingsen, 2020; Børstad et al., 2021). Windmill-building on such areas tend to be less accepted (Cohen et al., 2014; Leiren et al., 2020; Westerlund, 2022).

The current study indicated that perceived planning- and building justice is a vital factor in explaining windmill-attitudes, thus corresponding to previous studies (ex. Gross, 2007; Ki et al., 2022), and in line with theories for procedural justice (Gross, 2007; Lienhoop, 2018; Schuitema & Bergstad, 2019, p. 302; Walker, 2009). The results furthermore showed the importance of reducing the “democratic deficit” (Hindmarsh & Matthews, 2008; Olson-Hazboun, 2016), both on a national and a local level. The mean for the planning- and building scale was quite low, reflecting a general dissatisfaction regarding the participation and inclusion in windmill-projects across Norway. The recent Fosen-case could have affected the perceived lack of planning- and building justice (Amnesty, 2023; Sveen, 2023). However, some countries, as Denmark and Germany, have overall successful implementation of wind

power, which could be linked to the fact that these projects are developed at a local level (Wolsink, 2007). This contradicts with the current situation in Norway: NVE first gives concession to municipalities, then the municipalities must regulate areas for wind power development (Ståvi, 2022). The case illustrated in the introduction, where NVE, without inconclusion of the locals, proposed a map of suitable areas for windmill-implementation (Lundberg & Richardson, 2021), reflects this. Interestingly, the Norwegian government suggested, in January 2023, changes regarding wind power implementation: The suggestion was that municipalities first must decide what areas they want to use for development, then NVE can give concession (Regjeringen, 2023).

In the current study, environmental beliefs were, as said, used as a collective term for three factors. Only identification with nature appeared as a significant negative predictor for windmill-attitudes. Previous research on various environmental beliefs has yielded different results. Some studies have found environmental beliefs to be a significant predictor towards windmill-attitudes in a positive direction (e.g., Ek, 2004; Larson & Krannich, 2016; Mulvaney et al., 2013), some in a negative direction (e. g. Jacquet, 2012; Fergen & Jacquet, 2016), some studies have not found a significant relationship (e.g. Olson-Hazboun et al., 2016; Hoen et al., 2019), and a few studies have found that environmental beliefs simultaneously yield both positive and negative attitudes towards windmills (e.g., Bidwell, 2013; Swofford & Slattery, 2010; Warren & Birnie, 2009). However, the framing of environmental beliefs tends to vary between studies. This shows the importance of simultaneously examining several aspects of it. The current study tries to give a nuanced perspective, by examining identification with nature, perceived environmental threat (adaptation of NEP) and environmental self-identity.

Interestingly, even though Norwegian youths overall have high mean-scores for both perceived environmental threat and for environmental self-identity, neither of these was found to be significant predictors of windmill-attitudes. This is in line with Rand & Hoen (2017), who states that concern for climate change may be met with indifference and does not automatically give support for wind (p. 19). This emphasizes the notion of measuring several aspects of environmental beliefs. The fact that identification with nature was the only one of the three factors for environmental beliefs that turned out to be significant (negative correlated), can reflect the Norwegian context; where closeness to nature, wildlife, the variety of landscapes, being outdoors, in many ways are incorporated as a part of the culture (Hofmann et al., 2018). Hence, preserving nature and pristine areas could, for respondents,

turn out to be more important than building out renewable energy, when the two are conflicting.

A multidimensional view on the green-on-green dilemma; categorization to groups

The green-on-green dilemma, named by Warren and colleagues (2005), are mentioned in an increasing number of studies examining windmill-attitudes, studies as Bidwell, 2013; Burch et al., 2020; Groothuis et al., 2008; Jackson, 2011; Swofford & Slattery, 2010; and Voigt et al., 2019. However, as mentioned in the introduction, studies seem to have a unidimensional view on this dilemma; the individuals in the dilemma can be either technology-green (reduction in GHG-emissions via wind-energy development) or nature-green (areal and biodiversity-conservation). But the green-on-green dilemma probably have more complexity and nuances, and the current study sought to explore a multidimensional view, building on correlation-results and a dual-factor model.

The current study found a significant negative, but weak, correlation between windmill-attitudes and areal/species-protection. More research is needed to fully understand how they interact. Some previous studies have found that respondents rate preserving biodiversity versus combating GHG-emissions via wind-energy development, as equally important (Grinde, 2019; Voigt et al., 2019), the latter study found biodiversity to be equally or more important. These studies support the notion that low score on one scale don't necessarily indicate high score on the other scale.

Furthermore, the current study identified four different groups within the green on green-dilemma, based on attitude-scores regarding windmills and areal/species-protection. Two different cutoff points was tested, both yielding four groups, named in the results-section: double low[1], nature green[2], technology green[3] and double high[4]. At the first cutoff point (12.5) for low and high windmill-attitudes and areal/species-protection, the double low and technology green groups were considered too small, with only 2 % of the total sample in each of these two groups. Such a small group percentage would have made it difficult to examine the tendencies for the double low and the technology green, - how they differed from the two other groups. Therefore, a new cutoff point (15) was applied. With this point 6.6 % of the sample ended in technology green, and 7.8 % in double low, 36.7 % in double high, and 48.8 % in nature green. The identification of these four groups indicates that for the current

[1] Double low: low scores on both windmill-attitudes and areal/species-protection
[2] Nature green: low scores on windmill-attitudes, high scores on areal/species-protection
[3] Technology green: high scores on windmill-attitudes, low scores on areal/species-protection
[4] Double high: high scores on windmill-attitudes, high scores on areal/species-protection

sample, most respondents favored areal/species-protection, but within this, the sample is divided in windmill-attitudes; some oppose windmill-development (the nature greens), while others support windmill-development (the double highs). Hence, the identification of groups supports that there is more complexity in the green-on-green dilemma than a unidimensional view suggests. The fact that the double high group was the second biggest group, further supports the need for a multidimensional view on the green-on-green dilemma; with a unidimensional view, individuals in this group could have been misinterpreted as only supporting one point of view, when they in reality support both. This is also the case for the individuals in the double low group. Even though this group was quite small, their tendencies or what they emphasize could have been misinterpreted as not supporting only one point of view, when they in reality support neither.

Even though no previous studies have tested such a dual factor model for the green-on-green dilemma, and have classified participants into groups; the group-trends in this current study are similar to the already mentioned study by Voigt et al. (2019), who found that among several stakeholder-groups, most judged biodiversity-goals as just as important as or more important than wind-energy production. The current study's identification of four groups in the green-on-green dilemma also contradicts the notion about "viewing general opposition to wind energy as fueled by conservativism, rather than by a local environmental ethic" (Bidwell, 2013, p. 197). The double low group could reflect more traditional values – and thus more conservatism, but such values were not measured in the current study. Furthermore, the group nature green clearly reflects a wind-opposition fueled by biodiversity-concerns. In addition, the double high group also reflects a biodiversity-concern, even though this group supports windmills. The individuals in double high, could thus, by the individuals in nature green, be seen as having unrealistic expectations. Maybe the best interpretation of the double highs is that they might accept implementation of windmills under certain conditions. This corresponds to Burch et al.'s (2020) findings of willingness to support wind energy development as long as biodiversity conservation is not negatively impacted.

To sum up; examining and mapping different views in the green-on-green dilemma is important, in order to capture the complexity of the problematic. In addition, the multidimensional view diminishes the chance of ignoring different concerns, and thus contributes to a broader inclusion of individuals when discussion solutions for balancing the biospheric aspect (avoiding severe biodiversity-effects) with the atmospheric aspect (reduction of GHG-emission via implementation of wind-energy development) in windmill-implementation.

A multidimensional view on the green-on-green dilemma; group differences

In addition to identifying four groups in the green-on-green dilemma, the current study sought to examine whether mean-scores of the seven different scale-variables differed between the groups. There was a significant difference between the groups on the combined dependent variables, supporting the notion of different concerns and tendencies for the different groups. When looking at the dependent variables separately, significant differences was detected for five of the seven; identification with nature, perceived environmental threat, environmental self-identity, perceived planning- and building justice, and anticipated noise and visual aesthetics. Mean-scores for the variable perceived climate justice and the variable preferred ownership and use of electricity did not significantly differ between the groups. This will be elaborated under limitations.

For identification with nature, double low and technology green did not differ significantly from each other. However, both these groups had significantly lower mean-scores than nature green and doble high. In addition, nature green had significantly higher mean-scores than double high. Nature green was thus the group scoring highest for identification with nature. This is in line with the current study's finding about identification with nature being a significant predictor for windmill-attitudes; participants who felt a stronger tie to nature/other species, tended to be more negative towards windmills. Thus, it was not unexpected that the individuals who favored areal/species-protection above windmill-development had the highest mean-score for identification with nature, significantly different from all the other three groups. Unfortunately, few previous windmill attitude-studies have used this scale measuring identification with nature, and it is therefore difficult to draw conclusions about how valid this scale is in the green-on-green dilemma, although it gave interesting results in this current study. Previous studies have mentioned strong place identity as a factor contributing to lower windmill-attitudes (e.g., Devine-Wright, 2005, 2009). However, place-identity scales might not only reflect ties to places and/or other humans, but maybe also, among other aspects, reflect ties to the nature and/or other species in general. Nature identity can maybe be seen as representing a "generalized place identity". Thus, nature greens group in the current study, might not only have high nature identity, but also high general place identity.

Regarding perceived environmental threat, double low and technology green did not significantly differ from each other, and nature green and double high did not significantly differ from each other. The mean-scores for the two latter groups were significantly higher than for the two first groups. As mentioned earlier, an adaptation of the NEP-scale is used to

measure perceived environmental threat in the current study. Bidwell (2013) found that higher scores on the NEP-scale had a positive relationship with both wind enthusiasm and wind caution. It thus seems as the NEP-scale, according to the green-on-green dilemma, has a double-meaning, and can measure/reflect both atmospheric and biospheric concerns. This notion together with the current study's findings, can indicate that the adapted NEP-scale used, especially captures the youths that are concerned for biodiversity, nature greens and double highs, but the two groups are different regarding possible solutions for climate challenges. For the nature greens, implementation of windmills might be a part of the problem – based for example on the areal and species-disruption windmill-building often contributes to, whilst the double highs might see windmills as a solution under certain conditions. Swofford and Slattery (2010) reported a similar finding; climate change concerns could influence support for wind power, but only to a limited extent (Lundheim et al., 2022).

Environmental self-identity showed the same pattern as perceived environmental threat. This indicates that the environmental self-identity scale used in the current study, especially captures the youths with high scores for areal/species-protection – just as the NEP-scale. Overall, in the current study, all the scales under the collective term environmental beliefs, seem to be most related to the concern for biodiversity. This corresponds with the findings of Fergen and Jaquet (2016).

For perceived planning- and building justice the double low group did not significantly differ from any of the other groups on mean-scores. Nature green had significantly lower mean-scores than technology green and double high. Technology green and double high did not significantly differ from each other. The findings indicates that perceived justice for implementation of windmills is highest among those who have higher windmill-attitudes, and consistent with findings from both the current and previous studies about that higher perceived justice is related to more positive windmill-attitudes (e.g., Gross, 2007; Jaquet, 2015; Hoen et al., 2019). It is impossible to draw conclusions about causality here. Anyway, the findings support the notions about sufficient inclusion of locals in the implementation-process, as an important part of a successful process (e.g., Krohn & Damborg, 1999; Wolsink, 2006).

Finally, for anticipated noise and visual aesthetics, double low did not significantly differ from nature green and technology green. However, double low did significantly differ from double high, with the first having a significantly higher mean-score than the latter. Nature green significantly differs from technology green and double high, with higher mean-scores than both. Technology green and double green did not significantly differ from each

other. These two groups also had the lowest mean-scores. A higher mean-score for this scale variable reflects more anticipated concerns over noise and visual aesthetic aspects. Thus, the findings indicated that the anticipation of windmills to be noisier and visually disrupting, are highest among those who have low windmill-attitudes: double low and nature green. This mirrors previous findings showing that those with anti-windfarms views expecting wind-turbines to be much nosier and visually intrusive than those who favor wind-power (Khron & Damborg, 1999; Warren et al., 2005, p. 867).

The findings above reflect the importance of identifying nuances in the green-on-green dilemma and examine how different groups differ and/or relate to each other. The natural greens and double highs are in the current study, the groups with the highest mean-scores for environmental beliefs. It is interesting that these two groups – different in windmill-attitudes – agree in attitudes regarding areal/species-protection. It seems they have more in common than what would have been revealed if only by studying windmill-attitudes. When it comes to planning- and building justice, and noise and visual aesthetics, the main divide seems to be between those scoring high or low on windmill-attitudes.

Strengths and limitations

A major strength of the current study is that it examines several possible predictor variables simultaneously. Knowledge to date about the vide arrange of factors affecting public attitudes towards wind power development in Norway is limited (Kaltenborn et al.., 2022), hence the current study contributes to narrow this research gap. Furthermore, this study is not limited to attitudes regarding one specific windmill-case, but is instead based on a broader sample from respondents all over Norway – in order to more generally map factors affecting windmill-attitudes in a Norwegian context. In addition, the study also explores how participants from different counties differ in windmill-attitudes and is thus able to make suggestions both for a broader and a more specific sample. The current study's aim to implement a dual factor model in the green-on-green dilemma, can be seen as a strength.

Regarding the limitations, first, the results may not be generalizable to other countries or populations. There seem to be some international consensus about what factors that predict windmill-attitudes the most (e.g. Devine-Wright, 2004; Firestone at al., 2018; Hoen et al., 2019; Ki et al., 2022; Wolsink, 2007), but especially the fact that windmills differ in historical and cultural value and that different countries have different windmill-implementation policies, will make it difficult to draw conclusions across countries. In addition, the sample

consisted of mostly students, and more females than males, limiting the study's relevance for the broader Norwegian population as well as the male population.

The data was collected through a questionnaire, and as for all self-reported data, there are chances that there were biases in responding. Especially the social desirability bias could have affected the answers. Furthermore, the data was collected during and right after the mentioned Fosen-case, something that could have contributed to respondents overall reporting lower windmill-attitudes, higher areal/species-protection and/or perceiving the procedural justice as lower. The results may have been different if the study had been conducted at a time without an ongoing, national windmill conflict.

Even though the current study included several factors that might predict windmill-attitudes, it did not seek to test how these factors might interact and form a tangled model for attitude-prediction. Furthermore, only demographic and psychological variables were included, not contextual variables such as framing in media. It is therefore not possible to draw complex conclusions of how the interplay of factors affect windmill-attitudes based on the current study's results.

The study also yielded some non-significant results. The variable perceived climate justice and the variable preferred ownership and use of electricity were neither significant predictors for windmill-attitudes, nor did their mean-scores significantly differ between groups in the green-on-green dilemma. The climate-justice scale showed quite low reliability for the current sample and was originally used in a study conducted in Pakistan (Anjum & Aziz, 2022). Thus, the insignificant results could be due to a lack of generalizability of the scale to more industrial countries. Additionally, the scale was translated from English to Norwegian, and could have lost some of its meaning in the translation-process. Regarding ownership and use of electricity, the sample itself could have contributed to the non-significant results. As pointed out above, the sample mainly consisted of students. In addition, there was an age-limit set to 35 years. This sample- and age-group might pay less attention to the more economic aspects of windmill-implementation. Furthermore, environmental self-identity and perceived environmental threat were non-significant predictors for windmill-attitudes. These two variables seemed to be more related to attitudes regarding areal/species-protection rather than windmill-attuites, which can explain the findings.

Finally, when identifying the groups in the green-on-green dilemma, two different cutoff points were tested. The first cutoff point gave a less suitable group distribution. In addition, the two cutoff points yielded different rankings in terms of group size/number of participants in each of the groups. It is therefore important to consider what cutoff point that

is being used for attitudes for windmills and for areal/species-protection, regarding generalizability.

Implications and future directions

The current study sought to explore how a set of factors affected youths' attitudes towards wind power development in Norway, as such knowledge – in a Norwegian context – to date is limited (Kalternborn et al., 2022). Its results demonstrate that several factors simultaneously affect windmill-attitudes, and show the importance of integrating such factors in a framework (e.g., Devine-Wright, 2005; Wolsink, 2000, 2007). Furthermore, these results indicate that selfish motives behind more negative windmill-attitudes is rare, suggesting that future research should move the lens fully away from the NIMBY-aspect. Future studies on windmill-attitudes should continue to explore a range of factors and their predictive value. It will also be of importance to explore the complexity of how different factors might interact – both internationally, and especially in the Norwegian context. For the overall term environmental beliefs, it is important that future research strives to examine several factors of it.

Demographic variables, as those examined in the current study, should be of interest in future research, both regarding how strong effect they have on windmill-attitudes alone, and if/how they mediate the attitudes through other variables – in a more tangled model. The proximity-hypothesis should continue to be tested in future windmill-attitude studies. The role of proximity will likely vary between countries – and within countries. Several factors are also thought to affect the interaction (Swofford & Slattery, 2010), and more research is needed in order to try to understand the full picture.

Future research in a Norwegian context should strive to examine windmill-attitudes in both a specific manner – by for example in-depth interviews related to a specific windmill-implementation case, and in a broader manner – mapping several municipalities/counties. This will bring more insight in how factors such as subcultural aspects and topography could affect the attitudes, where in Norway the individuals are more/less supportive towards windmill-projects and why. If these aspects are considered when planning different projects, this could increase the perceived trust among the locals.

The present study's finding about the strong, predictive value of anticipated noise and visual aesthetics on windmill-attitudes, indicates that familiarity with the sound and visual intrusion is important even before the implementation. When planning specific windmill

projects, individuals in the surrounding areas should be given the opportunity to hear how strong the noise from the windmills actually is, and be shown pictures of how the landscape will look like with the windmills. This should happen early on and throughout the whole planning- and building-process. Furthermore, if including the locals from the early stage, a collaboration-process between the windmill-company and locals, can result in windfarm layouts better adapted to the specific environment it is implemented in – Additionally, the inclusion of locals is important for the perceived planning- and building justice. As shown in the current study, this factor is also very influential in determining attitude. The sample showed overall low perceived planning- and building justice, indicating that the Norwegian governments suggestion of new rules for implementation of windmills, involving an earlier inclusion of the locals, is very much needed. In order to see whether both the noise and visual aspect and perceived procedural justice might modulate during the wind-development process (e.g., Hoen et al., 2019; Wolsink, 2007), future studies should to some extent attempt to a more longitudinal design.

The present study indicated that a dual factor model could be a useful tool in addressing the green-on-green dilemma. The dual factor model as a theoretical basis will help identify individuals that might have been overlooked or misinterpreted with a unidimensional view, by only examining windmill attitudes. Future studies on the green-on-green dilemma should seek to implement this model, explore different cutoff points for attitudes on windmills and areal/species-protection, and whether they yield the same groups and group sizes as the current study found. Future research could also contribute to expanding this dual factor model even further, by examining whether there are even more aspects related to the green-on-green dilemma. For example, is it possible to assume – especially in the light of the Fosen-case – that areal and species-protection are two separate dimensions rather than one unit, for some individuals/respondents. Testing the validity of the dual factor model and how the groups differ or are similar in different variables will also contribute to a better understanding of values and how individuals/groups will react regarding different implementation plans.

Conclusion

The current study found no support for the proximity hypothesis. This corresponds to some previous research (e.g., Andersen, 1997; Krohn & Damborg, 1999), but contradicts other studies (e.g., Baxter et al., 2013; Groth & Vogt, 2014; Swofford & Slattery, 2010). However, the proximity hypothesis should continue to be of interest in future research since

other factors might influence the relationship between proximity and windmill-attitudes. The result of the study also suggests that windmill-attitudes and factors affecting these attitudes, differ across Norwegian counties. The participants from Nord Norge had significant lower mean-score on windmill-attitudes than the other four groups – and significant different mean-scores on climate justice, perceived environmental threat, noise and visual aesthetics and on planning- and building justice than other groups. Several factors could have contributed to these results, including protection of culturally valuable places and mistrust to windmill-companies. Understanding how and why different counties might differ in windmill-attitudes, is important, and more comprehensive research mapping individuals from all over Norway simultaneously, is needed.

Three significant predictors for windmill-attitudes were found in the current study. Overall, the findings support measuring several factors simultaneously to see which factors predict windmill-attitudes the most (Devine-Wright, 2005). Anticipated noise and visual aesthetics were the strongest predictor and perceived planning- and building justice the second strongest. These findings are consistent with most previous, international research (e.g., Devine-Wright, 2004; Firestone at al., 2018; Hoen et al., 2019; Ki et al., 2022; Wolsink, 2007). The results regarding perceived planning- and building justice, underpins the importance of inclusion of locals in windmill-projects. Identification with nature was the third strongest predictor, consistent with some previous research (e.g., Jacquet, 2012; Fergen & Jacquet, 2016). The findings also show the importance of measuring several aspects of environmental belief, as different aspects might yield different results.

Furthermore, the current study suggests that the green-on-green dilemma is multidimensional rather than unidimensional. By measuring attitudes for windmills and for areal/species-protection simultaneously, a more holistic picture of the green-on-green dilemma is achieved. Based on scores for these two scales, the study identified four groups, indicating that a dual factor model can be applicable for studies on the green-on-green dilemma. The individuals in the second biggest group, double high, would be in risk for being overlooked or misinterpreted with a unidimensional view on the green-on-green dilemma. This is also the case for the individuals in the group double low.

The current study indicates that the green-on-green groups differ in mean-scores for several variables. The nature greens and double highs had the highest mean-scores for the variables under the overall term environmental beliefs. These variables were related to areal/species-protection, and it is interesting that these two groups agree on biodiversity-protection, even though they disagree on windmill-implementation. This aspect would have

been overlooked with a unidimensional view on the green-on-green debate - if only measuring windmill-attitudes. However, more future research is needed to conclude whether a dual-factor model is a useful tool in the green-on-green dilemma, and whether group differences for variables can be generalized.

As a final point, it is important that windmill-attitude studies don't frame negative attitudes as something unfavorable – or something to overcome. Regarding windmill implementation –implementation of renewable energy in general - it is crucial to prioritize the goals of the Intergovernmental Panel on Climate Change (IPCC) and the goals of the Intergovernmental science-policy Platform on Biodiversity and Ecosystem Services (IPBES). Both are equally important. In order to balance the development of renewable energy in terms of windmills, with the protection of biodiversity, a broad net of professions need to collaborate, and the knowledge of locals needs to be included.

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Appendix A: Consent form

Dette er et spørsmål til deg om å delta i et master-forskningsprosjekt hvor formålet er å undersøke nordmenns holdninger til vindmøller på land. Forskningsprosjektet presenteres som en anonym spørreundersøkelse, hvor du blir bedt om å svare på ulike spørsmål relatert til temaet. Det er ikke mulig å bla frem og tilbake etterhvert som du svarer på spørsmålene.

Spørreskjemaet er nettbasert, laget på den digitale plattformen Qualtrics. Spørreskjemaet du får, er på norsk, men i appendiks i selve masterprosjektet, vil dette være vedlagt på engelsk.

Prosjektet er godkjent av den forskningsetiske komiteen ved Psykologisk Institutt, Universitetet i Oslo (ref. nr. 2514142).

Følgende kriterier må være oppfylt for deltakelse:
1. Du må være mellom 18 og 35 år
2. Du må bo i Norge

Hvem er vi: Vi er en student og en forsker. De ansvarlige for denne undersøkelsen er masterstudent Åshild Røen og forsker og master-veileder Dr. Gulnaz Anjum, begge fra Psykologisk Institutt ved Universitetet i Oslo.
Hva handler studien om: Denne masterstudien ønsker å undersøke holdninger nordmenn har til vindkraft på land. Dette gjøres gjennom et spørreskjema.
Hva vil du bli bedt om å gjøre: Hvis du samtykker til å delta i studien, vil du bli bedt om å besvare dette spørreskjemaet. Det tar omtrent 10 minutter å svare på undersøkelsen.
Risiko og fordeler: Det er ingen mulige risikoer knyttet til gjennomføring av spørreskjemaet.
Svarene dine er konfidensielle: Konfidensialitet sikrer anonymitet. Svarene holdes privat, og det er kun de prosjektansvarlige (masterstudent Åshild Røen og forskere/veileder Dr. Gulnaz Anjum) som har tilgang på data. Selv om vi har tilgang på data, har vi ikke mulighet til å identifisere de ulike deltakerne. Alle data gitt av deg, er fullstendig anonymt og ikke koblet til IP-adresse. Altså vil svarene du gir, ikke gjøre det mulig for noen, verken prosjektansvarlige eller andre deltakere å identifisere hvem du er. Data vil lagres i fem år. Dersom vi ønsker å formidle eventuelle interessante funn videre, for eksempel gjennom publisering av studien, vil

det ikke inkluderes noe informasjon som kan gjøre det mulig å identifisere deg. Ansvarlig for data er Dr. Gulnaz Anjum (gulnaz.anjum@psykologi.uio.no).

Deltakelse er frivillig: Du velger selv om du vil delta i studien. Du får ikke betalt for deltakelse i studien. Vi ber om at du besvarer spørsmålene så nøyaktig og presist som mulig. Hvis det er spørsmål du ikke ønsker å svare på, går det an å hoppe over disse. Du kan også forlate og avslutte spørreskjemaet når som helst, ved å gå ut av nettleseren du brukte for å åpne spørreskjemaet. Alle dine svar blir da automatisk slettet fra vårt datamateriale.

Hvis du har spørsmål: Kontakt masterstudent Åshild Røen (mail: aashiroe@student.sv.uio.no, mob.nr: 96042494) eller forsker/veileder Dr. Gulnaz Anjum (mail: gulnaz.anjum@psykologi.uio.no). Det er også mulig å kontakte personvernombudet ved UiO, for svar på spørsmål om UiOs behandling av personopplysninger og oppfyllelse av rettigheter etter personvernregelverket (kontaktperson: Roger Markgraf-Bye, mail: personvernombud@uio.no). **NB! Ikke legg ved sensitiv informasjon i e-post.** Dersom du trenger å sende sensitiv informasjon, kontakt personvernombudets e-post for å få instruksjoner om hvordan dette kan sendes inn.

Eventuelle klager vedrørende studien kan sendes til Dr. Gulnaz Anjum (gulnaz.anjum@psykologi.uio.no).

Jeg har lest informasjonen over og har fått svar på det jeg eventuelt lurte på. Jeg samtykker til å delta i studien:

□ Ja

□ Nei

Appendix B: Demographics

Hvilket kjønn er du?

Velg ett av følgende svaralternativ:

□ Mann

□ Kvinne

□ Annet

Hvor gammel er du? Oppgi svaret i år

[ ] år

Hvor i Norge bor du?

Velg ett av følgende svaralternativ:

□ Nord Norge

□ Trøndelag

□ Østlandet

□ Sørlandet

□ Vestlandet

Velg ett av følgende svaralternativ:

Jeg bor...

□ I en stor by

□ I en liten by

□ I et tettsted/landsby

□ På landet

Hva er ditt høyeste, fullførte utdanningsnivå?

Velg ett av følgende svaralternativ:

□ Grunnskole (10 år)

□ Fagbrev/videregående

□ Høyskole/universitet, lavere grad (opp til 3 år)

□ Høyskole/universitet, høyere grad (5 år eller flere)

Hva er din yrkes-/studiebakgrunn?

□ Naturvitenskapelige fag

□ Humaniora- og samfunnsvitenskapelige fag

□ Språk/økonomi

□ Helsefag

□ Tekniske fag

Hva er din beskjeftigelse?

Velg ett av følgende svaralternativ:

□ Student, evnt. student med deltidsjobb

□ Fulltids- eller deltidsarbeidende

□ Jeg er for tiden arbeidsledig og/eller trygdet

□ Ønsker ikke å svare

Hva var inntekten din i 2022?

Velg ett av følgende svaralternativ:

□ Under 250 000 NOK

□ Mellom 250 000 og 500 000 NOK

□ Over 500 000 NOK

Hva er avstanden mellom ditt bosted og nærmeste vindmølle/vindmøllepark?

Velg ett av følgende svaralternativ:

□ 0-5 km

□ 5-10 km

□ 10-20 km

□ 20-50 km

□ Mer enn 50 km

Appendix C: Identification with nature

Fra Cameron, 2004; Schmitt et al., 2019

Spørsmålene besvares gjennom en Likert-skala fra 1-7, hvor 1 er «svært uenig» og 7 er «svært enig».

[R] indikerer spørsmål hvor skåre er snudd

	1 Svært uenig	2. Uenig	3. Litt uenig	4. Nøytral	5. Litt enig	6. Enig	7. Svært enig
1. Jeg har mye til felles med andre arter.							
2. Jeg kjenner på sterke bånd til andre deler av naturen.							
3. Jeg har vanskeligheter med å danne bånd til naturen. [R]							
4. Jeg kjenner ikke på en følelse av å være «knyttet» til naturen. [R]							
5. Jeg tenker ofte på ideen om at jeg er en del av et større økosystem.							
6. Generelt, har det å være en del av en større natur lite å gjøre med hvordan jeg opplever meg selv. [R]							
7. Generelt, er det å være en del av en større natur en viktig del av mitt selvbilde.							
8. Ideen om at jeg er en del av en større natur dukker sjelden opp i mine tanker. [R]							

9. Generelt, er jeg glad for å være en del av et større økosystem.	
10. Jeg kjenner ofte på ubehag over å være en del av naturen. [R]	
11. Det å være en del av naturen føles ikke bra. [R]	
12. Generelt, føler jeg meg bra når jeg tenker på meg selv som en del av en større natur.	

Appendix D: Perceived environmental threat

Fra Dunlap et al., 2000; Schmitt et al., 2019

Spørsmålene besvares gjennom en likert-skala fra 1-7, hvor 1 er «svært uenig» og 7 er «svært enig».

[R] indikerer spørsmål hvor skåre er snudd

	1 Svært uenig	2. Uenig	3. Litt uenig	4. Nøytral	5. Litt enig	6. Enig	7. Svært enig
1. Livet som vi kjenner det, er under en nær forstående trussel.							
2. Hvis mennesker ikke dramatisk endrer sin relasjon til jorden, vil skaden gjort være umulig å reversere/reparere.							
3. Overforbruk utgjør en alvorlig risiko for menneskeheten og livet på jorden.							
4. Sannsynligheten for global miljø-ødeleggelse er lav.							

Appendix E: Environmental self-identity

Fra Schmitt et al., 2019; van der Werff, 2013

Spørsmålene besvares gjennom en likert-skala fra 1-7, hvor 1 er «svært uenig» og 7 er «svært enig».

	1 Svært uenig	2. Uenig	3. Litt uenig	4. Nøytral	5. Litt enig	6. Enig	7. Svært enig
1. Å handle miljøvennlig er en viktig del av den jeg er.							
2. Jeg er en type person som handler miljøvennlig.							
3. Jeg ser på meg selv som en miljøvennlig person.							

Appendix F: Perceived planning- and building justice

Vi ber deg her svare på ulike utsagn knyttet til byggeprosess av nærmeste vindmøllepark. Hvis du ikke vet om noen vindmøllepark nær deg, svarer du ut fra hvordan du opplever byggeprosesser av vindmølleparker generelt i Norge foregår. Utsagnene besvares gjennom en Likert-skala fra 1-5, hvor 1 er «svært uenig» og 5 er «svært enig».

	1 Svært uenig	2. Uenig	3. Nøytral	4. Litt enig	5. Svært enig
1. Jeg ble godt informert før byggeprosessen av nærmeste vindmøllepark.					
2. Jeg følte at jeg var en del av planleggingsfasen/byggeprosessen.					
3. Jeg følte at hele lokalsamfunnet var en del av planleggingsfasen/byggeprosessen.					
4. Byggeplanen ble fulgt, det var ingen overraskende hendelser under/etter byggeprosessen.					

Appendix G: Perceived climate justice

Fra Anjum & Aziz, 2022

Utsagnene besvares gjennom en Likert-skala fra 1-5, hvor 1 er «aldri» og 5 er «alltid».

	1 Aldri	2. Sjelden	3. Noen ganger	4. Ofte	5. Alltid
1. Klimaendringer er hovedsakelig forårsaket av utviklede industrialiserte land.					
2. Utviklingsland forårsaker i svært liten grad klimakatastrofer (oversvømmelser, hetebølger, brann osv.).					
3. Myndighetene i fattige land er ansvarlige for tap og skader forårsaket av klimakatastrofer.					
4. Fattige mennesker blir uproporsjonalt rammet av klimaendringer.					
5. Kvinner rammes hardere enn menn av klimakatastrofer.					

Appendix H: Preferred ownership and use of electricity

Utsagnene besvares gjennom en Likert-skala fra 1-5, hvor 1 er «svært uenig» og 5 er «svært enig».

[R] indikerer spørsmål hvor skåre er snudd

	1 Svært uenig	2. Uenig	3. Nøytral	4. Litt enig	5. Svært enig
1. Hvis vindmøllefirmaet er **internasjonalt** eid, påvirker dette min holdning til vindmøller i en positiv retning. [R]					
2. Hvis vindmøllefirmaet er **nasjonalt** eid, påvirker dette min holdning til vindmøller i en positiv retning.					
3. Hvis vindmøllefirmaet er **lokalt** eid, påvirker dette min holdning til vindmøller i en positiv retning.					
4. Eierskapet påvirker ikke holdningen min til vindmøller. [R]					
5. Hvis elektrisiteten generert av vindmøllene selges/brukes til **utlandet**, gjør dette meg mer positiv til vindmølleparker. [R]					
6. Hvis elektrisiteten generert av vindmøllene selges/brukes **nasjonalt**, gjør dette meg mer positiv til vindmølleparker.					
7. Hvis elektrisiteten generert av vindmøllene selges/brukes **lokalt**, gjør dette meg mer positiv til vindmølleparker.					
8. Hvor elektrisiteten brukes påvirker ikke holdningen min til vindmøller. [R]					

Appendix I: Anticipated noise and visual aesthetics

Utsagnene besvares gjennom en Likert-skala fra 1-5, hvor 1 er «svært uenig» og 5 er «svært enig»

	1 Svært uenig	2. Uenig	3. Nøytral	4. Litt enig	5. Svært enig
1. Jeg synes vindmøller er bråkete.					
2. Jeg synes vindmøller er stygge å se på.					
3. Jeg synes vindmøller forstyrrer i naturen.					

Appendix J: Attitudes towards windmills

Utsagnene besvares gjennom en Likert-skala fra 1-5, hvor 1 er «svært uenig» og 5 er «svært enig».

	1 Svært uenig	2. Uenig	3. Nøytral	4. Litt enig	5. Svært enig
1. Jeg synes det er viktig at vi sikrer grønn energi i form av vindkraft på land.					
2. Jeg synes det er viktig at vi **raskt** sikrer grønn energi i form av vindkraft på land.					
3. For meg er det viktig at vi bygger ut vindmølleparker fremfor å fokusere på energisparing.					
4. For meg er vindkraft en ren energikilde som bør anvendes.					
5. Jeg synes ikke at vindmøller er ødeleggende for natur-estetikken.					

Appendix K: Attitudes towards areal/species-protection

Utsagnene besvares gjennom en Likert-skala fra 1-5, hvor 1 er «svært uenig» og 5 er «svært enig».

	1 Svært uenig	2. Uenig	3. Nøytral	4. Litt enig	5. Svært enig
1. Mitt velvære øker når jeg er ute i naturen fremfor i mer urbane/bebygde områder.					
2. Jeg synes hytter/hyttefelt ødelegger naturområder.					
3. Jeg synes vi skal unngå å bygge veier i urørt natur.					
4. Jeg synes det er viktig å ta det biologiske mangfoldet/artsmangfoldet i betraktning under ulike byggeprosjekt.					
5. Jeg er generelt bekymret over artsutryddelse.					

Appendix L: Debriefing

Debriefing form

Takk for at du tok deg tid til å svare på denne spørreundersøkelsen. Som nevnt helt i starten av undersøkelsen, er formålet til dette forskningsprosjektet å undersøke nordmenns holdninger til vindmøller på land. Hvorfor?

Klimakrisen er en av vår tids største kriser, og for å bremse global oppvarming, må vi tenke nytt; bærekraftig og grønt. Det finnes flere klimatiltak vi som individer kan gjøre, blant annet å kjøpe mindre klær, redusere kjøttforbruk og begrense antall flyreiser. Og på samme måte finnes det større klimatiltak som bestemmes og reguleres av politikere – og inkluderer og påvirker et helt samfunn. Eksempel på et slikt klimatiltak er fokus på det grønne energiskiftet. Energi generert av fossilt brensel er en av de største «klimaverstingene», og har vært ansvarlig for 86 % CO_2-utslipp i løpet av de siste 10 årene (Canadell et al., 2021; van Asselt & Green, 2022). Et energiskifte vil altså hjelpe mye på reduksjon av CO_2 i atmosfæren, kombinert med andre tiltak – både individuelle og kollektive.

Energi generert av vindkraft er en av kildene til grønn energi, og er sammen med vannkraft, den grønne energi-kilden Norge satser mest på. Samtidig, møter utbygging av vindkraft mye motstand. Årsakene til hva som ligger bak – hva som påvirker holdninger til vindkraft, er mange – og ofte svært sammensatte. Det gjør forskningen på vindkraft-holdninger spennende, vanskelig og viktig. Rent estetiske, visuelle og auditive faktorer – som hvorvidt man synes vindmøller er stygge, bråkete eller forstyrrende for landskapet, kan påvirke holdningene. Aspekt relatert til eierskap og økonomi kan påvirke holdningene. Opplevelsen av å være sett, hørt og delaktig i planleggings- og byggeprosessen kan påvirke holdningene. Og mer personlige karakteristika, som «miljøidentitet» og vurdering av miljørettferdighet, kan påvirke holdningene. Mye av den tidligere forskningen på holdninger til vindkraft har fokusert på hovedsakelig disse faktorene – enten enkeltvis eller i kombinasjon. Gjeldene studie ønsker også å se hvorvidt disse faktorene påvirker vindkraft-holdninger, men studiens hovedfokus er på et annet, større fenomen som omfatter mer enn bare selve mennesket i vindkraft-debatten; green-on-green konflikten.

Til slutt er det viktig å få frem at denne studien ikke vektlegger vindkraft verken som svært

positivt eller negativt. Vindkraft har både fordeler og ulemper, dette gjør debatten komplisert og det er nettopp dette green-on-green konflikten setter søkelyset på. Green-on-green konflikten viser at balanse i klimatiltak er nødvendig; vi må bremse CO_2-ustlipp og global oppvarming samtidig som vi må ta hensyn til bevaring av biologisk mangfold. Med tanke på best mulig planlegging og bygging av vindmølleparker, er det viktig at flere fagfelt samarbeider; fagfelt som psykologi, sosiologi, biologi og tekniske fag. Foreliggende studie ønsker i hovedsak å sette fokus på at en green-on-green konflikt eksisterer i vindkraft-debatten, hvordan ståsted i denne konflikten kan påvirke vindkraft-holdninger, hvilke faktorer som kan påvirke hvilket ståsted man tar, samt andre faktorer som kan være med på å påvirke holdninger. Så svarene du nettopp har avgitt er nyttige.

Hvis du ønsker å lese mer om green-on-green konflikten i vindmølle-debatten og om andre faktorer som kan påvirke vindkraft-holdninger, kan du ta en titt på disse artiklene her:
https://www.tandfonline.com/doi/abs/10.1080/09640560500294376
https://www.mdpi.com/2071-1050/12/19/8184
https://cicero.oslo.no/no/artikler/lokale-forhold-og-prosess-avgjor-holdninger-til-vindkraft

Og har du har flere spørsmål knyttet til disse temaene, kan du gjerne sende meg en mail på aashiroe@student.sv.uio.no.

Appendix M: Ethical approval

UiO : University of Oslo
Faculty of Social Sciences – Departement of Psychology

Åshild Røen
Gulnaz Anjum

Ref.number: **25141420**
Date: 31 January 2023

Ethical evaluation of research project

Your project, "Examining factors that affect attitudes towards windmills in a Norwegian context" has been ethically evaluated by the Department of Psychology's internal research ethics committee.

After the evaluation The Department of Psychology's internal research ethics committee recommend the project.

Sincerely yours, on behalf of the Committee,

Professor Silje Endresen Reme, Head of Committee
Members of the Department of Psychology's Research Ethics Committee
https://www.uio.no/for-ansatte/enhetssider/sv/psi/psi-eng/internal-ethics-committee/index.html

Postal address:
E-mail:
www.uio.no

Appendix N: Overview of the samples sociodemographic characteristics

Table 5
Overview of the samples sociodemographic characteristics

Sociodemographic characteristics	*n (%)*	Total (missing)	Mean	SD	Span
Gender		359 (6)	1.70	.49	1-3
Male	113 (31%)				
Female	242 (66.3%)				
Other	4 (1.6%)				
County		360 (5)	3.27	1.04	1-5
Nord Norge	35 (9.6%)				
Trøndelag	32 (8.8%)				
Østlandet	154 (42.2%)				
Vestlandet	116 (31.8%)				
Sørlandet	23 (6.3%)				
Place of living		360 (5)	1.37	.48	1-2
Urban area	228 (62.5%)				
Rural area	132 (36.2%)				
Educational level		360 (5)	2.91	.78	1-4
Grunnskole (10 år)	5 (1.4%)				
Fagbrev/videregående	113 (31%)				
Høyskole/universitet, opp til 3 år	152 (41.6%)				
Høyskole/universitet, mer enn 5 år	90 (24.7%)				
Educational background		361 (4)	2.43	1.17	1-5
Natural science	61 (16.7%)				
Humaniora/social science	192 (52.6%)				
Language/economy	29 (7.9%)				
Health science	48 (13.2%)				
Technical studies	31 (8.5%)				
Occupation		360 (5)	1.30	.51	1-4
Student/student with part-time work	258 (70.7%)				
Employee	97 (26.6%)				
Unemployed	3 (.8%)				
Don’t want to answer	2 (.5%)				
Income in 2023		365	1.53	.80	1-3
Under 250 000 NOK	241 (66%)				
Between 250 000 and 500 000 NOK	54 (14.8%)				
Above 500 000 NOK	70 (19.2%)				
Proximity to windmills		352 (13)	4.32	1.03	1-5
0-5 km	11 (3%)				

5-10 km	15 (4.1%)
10-20 km	36 (9.9%)
20-50 km	78 (21.4%)
More than 50 km	212 (58.1%)

Note. Age was a scale-variable, and not presented in this table. For mean and SD for age, see Table 1 in the results-section. For gender, the category "others" were excluded from all analysis. For occupation, the categories "unemployed" and "don't want to answer" were excluded from all analysis.

Appendix O: Exploratory analysis anticipated noise and visual aesthetics

Table 6

Exploratory analysis: Standard multiple regression for windmill-attitudes with noise and visual aesthetics as separate predictor-variables

Variable	B	95% CI for B		SE B	β	R^2	R^2_{adj}
		LL	UL				
Model						.56	.55
Constant	19.35***	15.24	23.46	2.09			
Identification with nature	-.05**	-.09	-.02	.02	-.12		
Perceived environmental treat	.08	-.02	.18	.05	.08		
Environmental self-identity	.07	-.03	.20	.06	.07		
Perceived planning- and building justice	.32***	.20	.44	.06	.22		
Perceived climate justice	-.03	-.19	.14	.08	-.01		
Preferred ownership and use of electricity	.05	-.02	.12	.04	.06		
Anticipated noise	**-.673****	**-1.10**	**-.24**	**.22**	**-.14**		
Anticipated visual aesthetics	**-1.02*****	**-1.22**	**-.82**	**.10**	**-.47**		

Note. CI = confidence interval; *LL* = lower limit; *UL* = upper limit. ** $p < .01$, *** $p < .001$. In this exploratory analysis, anticipated noise and anticipated visual aesthetics is of interest, and therefore these results are written in bold.

Appendix P: Additional MANOVA counties

Table 7

Mean levels of dependent variables by the five county groups (N = 326)

Dependent variables	county groups										F(4, 321)	η_p^2
	Nord Norge (*n*=28)		Trøndelag (*n*=29)		Østlandet (*n*=138)		Sørlandet (*n*=23)		Vestlandet (*n*=108)			
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*		
Identification nature	62.79_a	10.04	57.93_b	13.85	59.59_b	11.02	56.70	9.47	60.98_b	11.54	1.41	.02
Environmental treat	18.79_a	7.11	22.38	5.35	23.43_b	3.80	20.43	4.65	23.47_b	3.76	8.99***	.10
Environmental self-identity	12.86	4.47	14.69	4.82	14.08	3.58	13.30	3.55	14.29	3.76	1.20	.02
Planning- and building justice	7.71	4.58	9.59	4.08	9.88	3.38	8.83	3.07	9.44	3.38	.04	.03
Climate justice	12.18_a	3.96	14.48_b	2.10	14.43_b	2.44	13.52	2.61	14.39_b	2.26	5.37***	.06
Ownership and use of electricity	26.57	6.51	29.14	5.19	28.22	5.12	27.89	5.59	28.61	5.68	.99	.01
Noise and visual aesthetics	11.89_a	3.54	9.55	3.20	9.53_b	2.73	11.09	2.33	10.01	2.96	4.86***	.06

Note. *** $p < .001$. Post-hoc Tuckey comparisons were employed to analyze group-means in cases of significant F-tests. Significant differences between group-means are identified by different letters. Means having the same subscript are not significantly different. Means not marked by letters are not significantly different from any group-means.

Appendix Q: Green-on-green groups, first cutoff point

Table 8

Interest groups yielded from the green-on-green dilemma, first cutoff point

	Areal/species protection	
Windmill-development	Low	High
Low	Double low	Nature green
	N= 7	N= 111
	2 %	32.1 %
High	Technology green	Double high
	N= 7	N= 221
	2 %	63.9 %

Note. Total N = 346

Appendix R: Questionary English version

Demographics

What gender are you?

Choose one of following:

□ Male

□ Female

□ Other

How old are you? Give the answer in years

[ ] year

Where in Norway do you live?

Choose one of following:

□ Nord Norge

□ Trøndelag

□ Østlandet

□ Sørlandet

□ Vestlandet

Choose one of following::

I live in...

□ A big city

□ A small city

□ Town/village

□ Countryside

What is your highest, completed level of education?

Choose one of following::

□ Grunnskole (10 år)

□ Fagbrev/videregående

□ Høyskole/universitet, lavere grad (opp til 3 år)

□ Høyskole/universitet, høyere grad (5 år eller flere)

What is your educational background?

Choose one of following:

□ Naturvitenskapelige fag

□ Humaniora- og samfunnsvitenskapelige fag

□ Språk/økonomi

□ Helsefag

□ Tekniske fag

What is your occupation?

Choose one of following:

□ Student, or student with part-time work

□ Employee

□ Unemployed

□ Don't want to answer

What was your income in 2022?

Choose one of following:

□ Under 250 000 NOK

□ Between 250 000 and 500 000 NOK

□ Over 500 000 NOK

What is the distance between your house and the nearest windmill-park?

Choose one of following:

□ 0-5 km

□ 5-10 km

□ 10-20 km

□ 20-50 km

□ Mer enn 50 km

Identification with nature (adapted from Cameron, 2004; Schmitt et al., 2019)
The questions are answered through a Likert-scale from 1-7, where 1 er «strongly disagree» and 7 is «strongly agree».

[R] indicates a reverse-scored item

	1 Strongly disagree	2. Disagree	3. Sligtly disagree	4. Neutral	5. Slightly agree	6. Agree	7. Strongly agree
1. I have a lot in common with other species.							
2. I feel strong ties to other parts of nature.							
3. I find it difficult to form a bond with the natural world. [R]							
4. I don't feel a sense of being "connected" to the natural world. [R]							
5. I often think about the idea that I am part of a larger ecosystem.							
6. Overall, being a part of a larger natural world has very little to do with how I feel about myself. [R]							
7. In general, being a part of the larger							

natural world is an important part of my self-image.	
8. The idea that I am part of a larger natural world rarely enters my mind. [R]	
9. In general, I'm glad to be part of a larger ecosystem.	
10. I often regret being a part of the natural world. [R]	
11. I don't feel good about being a part of the natural world. [R]	
12. Generally, I feel good when I think about myself as part of a larger natural world.	

Perceived environmental threat (adapted from Dunlap et al., 2000; Schmitt et al., 2019)
The questions are answered through a Likert-scale from 1-7, where 1 er «strongly disagree» and 7 is «strongly agree».

[R] indicates a reverse-scored item

	1 Strongly disagree	2. Disagree	3. Sligtly disagree	4. Neutral	5. Slighhtly agree	6. Agree
1. Life as we know it is under imminent threat.						
2. If humans don't dramatically change their relationship to the earth, the damage done will be beyond repair.						

3. Over-consumption is posing a serious risk to humankind and life on planet earth.
4. The likelihood of global environmental devastation is low. [R]

Environmental self-identity (adapted from Schmitt et al., 2019; van der Werff et al., 2013)

The questions are answered through a Likert-scale from 1-7, where 1 er «strongly disagree» and 7 is «strongly agree».

	1. Strongly disagree	2. Disagree	3. Slightly disagree	4. Neutral	5. Slightly agree	6. Agree	7. Strongly agree
1. Acting environmentally-friendly is an important part of who I am							
2. I am the type of person who acts environmentally-friendly							
3. I see myself as an environmentally-friendly person							

Perceived planning-and building justice

You are asked to answer different statements regarding the building-process of the nearest windmill-park. If you don't know about any windmill-parks near you, you answer these question based on how you feel about windmill building-processes in Norway in general. The

statements are answered through a Likert-scale from 1-5, where 1 is “strongly disagree” and 5 is “strongly agree”.

	1. Strongly disagree	2. Disagree	3. Neutral	4. Agree	5. Strongly agree
1. I was well-informed about the building-process of the nearest windmill-park.					
2. I felt that I was a part of the building process.					
3. I felt that the whole local community was a part of the building process.					
4. The building-plan was followed through, there was no surprising events during/after the building process.					

Perceived climate justice (from Anjum & Aziz, 2022)
The questions are answered on a Likert-scale from 1-5, where 1 is “never” and 5 is “always”.

	1. Never	2. Rarely	3. Some of the time	4. Often	5. Always
1. Climate change problems are caused mainly by industrialized developed nations.					
2. Developing countries do not play a major role in climate disasters (floods, heat waves, fire, etc.)					
3. Governments in poor countries are responsible for losses and damages caused by climate disasters.					

4. Poor people are more disproportionately affected by climate change.	
5. Women are more negatively affected by climate disasters than men.	

Preferred ownership and use of electricity
The questions are answered on a Likert-scale from 1-5, where 1 is "strongly disagree" and 5 is "strongly agree".

[R] indicates a reverse-scored item

	1 Svært uenig	2. Uenig	3. Nøytral	4. Litt enig	5. Svært enig
1. If the windmill-company has **international** ownership, this affects my attitudes towards windmills in a positive direction. [R]					
2. If the windmill-company has **national** ownership, this affects my attitudes towards windmills in a positive direction.					
3. If the windmill-company has **local** ownership, this affects my attitudes towards windmills in a positive direction.					
4. Ownership does not affect my attitudes towards windmills. [R]					
5. If the electricity generated by windmills is exported/used **internationally**, I'm more positive towards windmills. [R]					
6. If the electricity generated by windmills is exported/used **nationally**, I'm more positive towards windmills.					

7. If the electricity generated by windmills is exported/used **locally**, I'm more positive towards windmills.

8. Export/use of electricity does not affect my attitudes towards windmill. [R]

Anticipated noise and visual aesthetics
The questions are answered on a Likert-scale from 1-5, where 1 is “strongly disagree” and 5 is “strongly agree”.

	1 Strongly disagree	2. Disagree	3. Neutral	4. Agree	5. Strongly agree
1. I think windmills are noisy					
2. I think windmills are ugly to look at					
3. I think windmills disrupt in nature					

Attitudes towards windmills
The questions are answered on a Likert-scale from 1-5, where 1 is “strongly disagree” and 5 is “strongly agree”.

	1. Strongly disagree	2. Disagree	3. Neutral	4. Agree	5. Strongly agree
1. I think it is important that we ensure sources to green energy in terms of windmills					
2. I think it is important that we **quickly** ensures sources to green energy in terms of windmills					
3. To me, it is important that we build out windmill-farms rather than focus on/investing in energy-saving					
4. To me, windmills are a clean energy source that should be pursued					

5. To me, windmills do not spoil the nature view/are not harmful to the mountain view	

Attitudes towards areal/species-protection

The questions are answered on a Likert-scale from 1-5, where 1 is “strongly disagree” and 5 is “strongly agree”.

	1. Strongly disagree	2. Disagree	3. Neutral	4. Agree	5. Strongly agree
1. My well-being increase when I’m out in nature compared to more urbane/built areas.					
2. I think that cabins/cottage construction destroy nature-areas.					
3. I think we should avoid building roads in untouched nature.					
4. I think it is important to take different species/biodiversity into account during various construction work.					
5. I am concerned about the loss of biodiversity.					