Energy Reports 6 (2020) 1768–1777

Contents lists available at ScienceDirect

Energy Reports

journal homepage: www.elsevier.com/locate/egyr

Research paper

The human dimensions of a green–green-dilemma: Lessons learned from the wind energy — wildlife conflict in Germany

Tanja M. Straka [a,b,*], Marcus Fritze [a,1], Christian C. Voigt [a]

[a] Department Evolutionary Ecology, Leibniz Institute for Zoo and Wildlife Research, Alfred-Kowalke-Str. 17, 10315 Berlin, Germany
[b] Technische Universität Berlin, Institute of Ecology, Rothenburgstr. 12, 12165 Berlin, Germany

ARTICLE INFO

Article history:
Received 14 April 2020
Received in revised form 25 June 2020
Accepted 26 June 2020
Available online xxxx

Keywords:
Biodiversity conservation
Conflict mitigation
Human dimensions
Renewable energy

ABSTRACT

Green–green dilemmas are particularly challenging since they involve two desirable goals, yet with detrimental counter-effects. Although wind energy production is to some desirable as a form of renewable energy for reducing global CO_2 emission, it conflicts with conservation goals when airborne animals die during collisions. Yet, protecting species with high collision risk may prevent to some extent the deployment of wind turbines or involve altered operation schemes with lowered energy production, two constraints impairing the development of wind energy production. Stakeholders involved in wind turbine projects discuss this dilemma not only based on their knowledge and interests, but also on their thoughts and emotions about wind turbines or affected animals such as bats. We studied some of these cognitions and emotions of stakeholders involved in the local realization of wind turbine projects (e.g. planning or authorization) to shed light on fundamental aspects of disagreements. We undertook a self-administered online survey (n=537 respondents) with six stakeholder groups from the wind energy and conservation sector to understand i) their value orientations, beliefs and emotions, the predictive potential of ii) value orientations, beliefs, emotions on trust as well as iii) trust among and in stakeholders involved in decision making processes. We observed that beliefs about the importance of wind turbines and emotions towards wind turbines differed across stakeholders while emotions towards bats were generally positive. Overall, stakeholders had low trust in each other. Representatives from the wind energy sector had more trust in politicians compared to conservationists. Trust was most strongly influenced by beliefs about the importance of wind turbines. Beliefs about the importance of wind turbines were in turn most strongly influenced by emotions towards bats and wind turbines. We argue that awareness of different beliefs and emotions among stakeholders should be acknowledged in this apparent conflict to foster trust among stakeholders.

1. Introduction

The worldwide promotion and development of wind energy production is a controversially discussed topic. While wind turbines promise to reduce CO_2 emission and thus contribute to coping with the global climate crisis, the ongoing negative impact of wind turbines on airborne wildlife emerges as an urgent biodiversity issue (Rydell et al., 2012; Thaker et al., 2018; Voigt et al., 2015). It is critical in this scenario that both climate change and biodiversity crisis are acknowledged as two of the major problems in this century (IPBES, 2019; IPCC, 2013) and that each of these pressing issues are recognized as wicked problems. Wicked problems are 'ill-defined problems that are too complex to be solved by rational systematic processes' (Rittel and Webber, 1973). It is common to many wicked problems that they are multicausal, i.e. there is no one and clear solution and stakeholders might have opposing solutions at hand, each influenced largely, albeit not exclusively by the respective background information held by the stakeholders. Climate change requires immediate actions (IPCC, 2013), yet at the same time the global biodiversity crisis involves species extinctions at alarming rates as well (IPBES, 2019). Although involved stakeholders may justify their solutions based on specific knowledge and expertise, suggested solutions may have no privilege a priori. Moreover, finding consensus about objectives, scale and speed of impacts and how to handle regional versus global conservation problems is often challenging, particularly when one party is perceived to assert

* Corresponding author at: Technische Universität Berlin, Institute of Ecology, Rothenburgstr. 12, 12165 Berlin, Germany.
E-mail addresses: tanja.straka@tu-berlin.de (T.M. Straka), marcus.fritze@uni-greifswald.de (M. Fritze), voigt@izw-berlin.de (C.C. Voigt).
[1] Current affiliation: Universität Greifswald, Applied Zoology and Nature Conservation, Loitzer Str. 26, 17489 Greifswald, Germany.

https://doi.org/10.1016/j.egyr.2020.06.028

its interest at the expense of another (Dickman, 2010; Young et al., 2007, 2010). The challenge of solving wicked problems gets even more complex if one has to prioritize the solution of one wicked problem over the solution of another, which is the case for wind turbines and the protection of species with high collision risk. The dilemma of producing green energy at the cost of the death of thousands of endangered bats and birds each year turns the wind turbine-wildlife conflict into a typical example of a green–green dilemma; a dilemma that splits the views of involved parties and that evokes emotional responses in involved groups (Voigt et al., 2019). While biodiversity conservation is to some stakeholders more or at least equal important than climate change, for others wind energy production is more highly prioritized than biodiversity goals (Voigt et al., 2019). While there are certain efforts to align climate change with biodiversity goals such as turning wind turbines off at sensitive times for wildlife (Arnett et al., 2011; Arnett and May, 2016), clashing values, views and interests among groups and organizations is likely to affect the ability to collaborate on conservation goals, initiatives and actions (Manfredo et al., 2017).

Collaboration among all parties involved is crucial for solving the green–green dilemma between the wicked problems of protecting the global climate and the global biodiversity. The outcome of such collaborations could be improved decision-making resulting ultimately in conflict resolution (Stern and Coleman, 2015). In the implementation of wind energy production, collaborative processes among stakeholders ranging from environmental NGOs, wind energy companies and governmental agencies were found to be most effective if the emphasis was put more on local issues and less on the interests of the energy sector (Wolsink and Breukers, 2010), yet past studies largely ignored the effect of beliefs, emotions and trust on stakeholder actions. Collaborative processes require arguably one factor the most: trust (Young et al., 2016). Trust is a key feature of the participation and conflict literature, but also other fields such as social psychology (Young et al., 2016). Trust is fundamental in social relationships (Möllering, 2006), it is beneficial for collaborations, helpful for mitigating conflict situations and for finding creative solutions among involved parties (Cvetkovich and Winter, 2003; Stern and Coleman, 2015; Young et al., 2016). Consequently, the lack of trust can be a barrier in effective collaborations and hence, hinder finding creative solutions or even breaking agreements or acting in opposition to conservation initiatives (Stern, 2008). Trust has been highlighted in a range of studies relevant to conservation such as invasive species management (Estévez et al., 2015) or restoration projects (Metcalf et al., 2015). Trust is fragile and much easier to destroy than to create (Poortinga and Pidgeon, 2004). However, trust among and between actors can also become an outcome of participation (Young et al., 2016) since repeated interactions are opportunities to build trust among parties (Ainsworth et al., 2020; Stern and Coleman, 2015). The concept of trust and underlying drivers has received so far little attention in studies related to the green–green dilemma of wind turbines and wildlife, yet attention to trust could guide discussions and potentially alleviate conflicts among stakeholders by becoming aware of different views and paradigms.

While trust is an abstract concept that is context specific, trust assessments can be based on cognitive (e.g. explicit evaluations), affective (e.g. emotional judgement) and subconscious psychological processes (Luhmann, 1979; Stern and Coleman, 2015). Theory suggests that shared goals, thoughts, opinions and values (i.e., perceived similarity) are foundations of trust (Needham and Vaske, 2008). Values represent what is important in people's lives, they help to select and justify actions and are used to evaluate other people and events (Rokeach, 1973). In relation to wildlife management and trust, people with higher scores in their domination values towards wildlife management (i.e. human mastery over wildlife) were found to have higher trust in state-wide agencies, but were also suggested to have less trust in others based on their desire to maintain primary representation in decision-making (Manfredo et al., 2017). In relation to the siting of energy development, understanding values (besides preferences) of residents early in the decision-making process to limit potential conflicts is increasingly acknowledged (Pocewicz and Nielsen-Pincus, 2013). Further, concepts such as beliefs (Haselhuhn et al., 2010; Lount and Pettit, 2012; Poortinga and Pidgeon, 2004) and emotions (Dunn and Schweitzer, 2005) have also been found to be associated with trust. For instance, emotions with positive valence, such as happiness and gratitude, were found to increase trust while emotions with negative valence, such as anger, to decrease trust (Dunn and Schweitzer, 2005). While familiarity with a topic influences people's belief (Morris et al., 2012), positive or negative beliefs about an issue influence how people interpret events or information which is an important precondition of maintaining trust (Poortinga and Pidgeon, 2004). Key components of trust are further the characteristics of people involved, interactions or relationships among them and the context in which trust or distrust is developed (Stern and Coleman, 2015).

Understanding human dimensions in relation to energy research and meaningful collaborations are crucial for realizing future energy systems (Devine-Wright, 2014; Sovacool et al., 2015) and the dimensions of stakeholders which 'hold a stake' in the green versus green dilemma of wind turbines and wildlife play a key part in the decision-making process. We acknowledge that the broad public as well as local communities play an important role in the context of wind turbines (e.g. NIMBY) and the development of renewable energy in general (Devine-Wright, 2014). Particularly since an increasing body of research is focusing on identifying sites for sustainable wind development on already developed land (i.e. land degraded by humans) rather than placing wind turbines in undisturbed habitats (Baruch-Mordo et al., 2019; Kiesecker et al., 2011, 2020). Nevertheless, the number of such areas in Germany is limited and space for new wind turbines gets exhausted while the wind energy expansion targets are still not achieved. Therefore, policy and wind energy planners aim to develop new sites in areas which were not considered before due to conservation issues (BDEW, 2019; FA Wind, 2017). Hence, the conflict between wind energy and conservation increases. Experts from the wind energy sector, authorities or conservation organizations which are directly involved in the practical planning and realization of wind turbine development have received so far little attention. Therefore, in this study, we focus on those stakeholders with expertise in the context of wind energy and conservation in order to understand their specific views and opinions. These stakeholders range from companies developing and operating wind turbine parks or consultants who conduct environmental assessments. Further, conservation authorities who oversee the environmental assessment and decide on mitigation schemes during the authorization process for wind turbine parks such as implementing species specific curtailments, or even re-evaluating the site of the wind turbines such as withdrawing or relocating wind turbines that are too close to sensitive breeding sites (Arnett and May, 2016). But also volunteers from non-governmental organizations (NGOs) like bird watchers or bat conservationists and employees of environmental NGOs observing the planning processes and intervening when they anticipate detrimental effects for nature conservation (Fritze et al., 2019). All these stakeholders have their own expertise and knowledge, but also their own interests and views about wind turbines which influence their specific actions and their interactions. These different views and expertise can also be a base to build fruitful

collaborations and solutions for the further development of an environmentally friendly energy transition — as long as these stakeholders trust each other.

The aims of our study were to understand (i) value orientations, beliefs and emotions of stakeholders, the predictive potential of (ii) value orientations, beliefs, emotions on trust as well as (iii) trust among and in stakeholders involved in decision making processes of wind turbine projects. We predicted that values would have the strongest predictive potential on trust since it is situated at the base of cognitive processes (Fulton et al., 1996) and that a lack of trust would be particularly apparent among stakeholders which had the largest discrepancies in their values. We further predicted that stakeholders with the most familiarity about wind turbines (e.g. members of the wind energy sector) would have the most positive beliefs about them. Understanding these underlying concepts, their predictive potential on trust and being aware of different paradigms among stakeholders might be a starting point for discussions and help to pave the way for efficient political decision concepts in future.

2. Methods

2.1. Questionnaire design

The questionnaire included (a) a subset of the New Environmental Paradigm (Dunlap et al., 2000; Dunlap and York, 2008) which has been widely and cross-culturally applied to measure human–nature relationships (Hawcroft and Milfont, 2010), (b) dimensions of emotions, i.e. valence (Jacobs et al., 2014) (c) specific beliefs about wind turbines i.e. pro-green energy beliefs, (d) themes (items) investigating trust in different groups of stakeholders (Stephenson, 2013) and (e) demographic parameters (e.g. age, gender). Items of the questionnaire can be found in the Supplementary Material Table A.

2.1.1. Trust (dependent variable)

We measured trust in stakeholder groups involved in the political and practical aspects of wind turbine development, namely companies developing and operating wind turbines, conservation authorities, nature conservation organizations and politicians. We included politicians in this part since they are the main drivers of the energy transition and are the elected entities of a society to work out the practical steps of achieving both the biodiversity and climate goals. However, we did not include them in our survey sample since here, we focussed on experts and professionals in the field of wind energy and conservation to understand their specific views. We used a composite scale of items representing three different components of trust (adapted from Stephenson, 2013), specifically: expertise, accessibility and trust in decision making (see Suppl. Material Table A).

2.1.2. New environmental paradigm (independent variable)

The New Environmental Paradigm (NEP) framework is a psychometric scale to measure environmental concern among people (Dunlap et al., 2000; Dunlap and York, 2008). Broadly, the framework measures value orientations or basic beliefs about two ideologies on human–nature relationships: the Dominant Social Paradigm (DSP) and the NEP. While the Dominant Social Paradigm (DSP) reflects an anthropocentric ideology, i.e. prioritizing human welfare over environmental concerns, the New Environmental Paradigm (NEP) is more an ecocentric ideology focusing on beliefs that humans are part of natural systems and hence, a sustainable use of nature. Hence, with this framework it is possible to get a better understanding about where people assess themselves and their own views between these two opposite and extreme positions. We used a subset from this framework with three items from each ideology (DSP and NEP, see Suppl. Material Table A) and respondents could rate on a 7 point scale how much they agreed with each statement (from 1 = 'strongly disagree' to 7 = 'strongly agree with 4 as neutral point). Average scores were calculated for each ideology to calculate the latent constructs.

2.1.3. Emotions (valence) (independent variable)

Emotions were measured through a bipolar scale using valence (four items: do not like–like, unpleasant–pleasant, negative–positive, not enjoyable–enjoyable) following Jacobs et al. (2014). Respondents were asked to rate their emotion towards bats (as representative example for wildlife and relevant in the green–green dilemma) and wind turbines on a 7- point scale with 'not at all' to 'very strong'. Hence, higher scores indicated more positive emotions towards bats or wind turbines, respectively. Although this valence scale has been used in wildlife related issues (Jacobs et al., 2014), valence ('pleasantness') has also been found to be relevant for wind turbine assessments (Maehr et al., 2015) and hence, we selected this category for our survey.

2.1.4. Pro-green energy beliefs (independent variable)

A scale was developed containing six items to measure specific beliefs about wind turbines, hereafter labelled as 'pro-green energy beliefs' (see Suppl. Material Table A). Beliefs can be distinguished as beliefs in an object or in beliefs about an object (Fishbein and Raven, 1962). Beliefs in an object refer to the existence of the object, while beliefs about an object refer to the way it exists (Fishbein and Raven, 1962); in this case the object is wind turbines. The belief items were developed based on previous conversations and experiences of two of the authors who work with stakeholders in the green versus green dilemma. In detail, two items of this set of beliefs addressed the importance of wind turbines during the energy transition and superiority above other renewable energy sources, two items addressed the superiority of wind energy production above other issues (namely species conservation and landscape protection) and two items general beliefs about the climate change crisis and the role of energy transition. Items were tested in a pilot survey with n = 5 participants for clarity. While the NEP paradigm is a very broad concept of beliefs about human–nature relationships they are likely linked to specific beliefs (Corral-Verdugo et al., 2003) as in this case of wind turbines.

2.2. Study sample

We sent out a self-administered online survey (LamaPoll) to stakeholders who were familiar with or directly involved in wind turbine planning processes (hereafter named 'stakeholders'). Following a snowball sampling (Dragan and Isaic-Maniu, 2013), we asked these stakeholders to forward the online survey to colleagues in their respective field. The starting point of this snowball sampling approach was an email distribution list of participants who joined a conference in Berlin, Germany on wind turbines and biodiversity conservation. Respondents could identify themselves in the questionnaire as agents from the wind energy sector (hereafter named 'members of the wind energy sector'), conservation authorities, employees and volunteers from NGOs, researchers or other. In total, we received 537 responses with the most numerous responses from consultants (n = 103), conservation authorities (n = 102) and volunteers from NGOs (n = 101) followed by researchers (n = 63), employees from NGOs (n = 57) and members of the wind energy sector (n = 23) and 88 respondents from other professional backgrounds. The median age class of participants was between 45–54 years. More male (n = 247) than female respondents (n = 170) participated in the survey (no answer regarding gender=32).

2.3. Statistical analyses

All analyses were undertaken using R version 3.3.3 (R Core Team, 2018). Internal consistencies of DSP and NEP value orientations, emotions (valence), pro-green energy beliefs and trust were estimated with Cronbach's alpha using the psych package (Revelle, 2018). All scales, except for DSP, showed Cronbach's alpha against the accepted cutoff point of .70 (see Suppl. Material Table A). While a Cronbach's alpha above .70 is generally used to indicate acceptable reliability (Bland and Altman, 1997), a generally accepted cut-off point for Cronbach's alpha is in question (Vaske, 2008). Hence, we included the DSP ideology in further analyses to understand the predictive potential although it showed a Cronbach's alpha below .70 (see Suppl. Material Table A). The reliability for 'DSP' did not increase when items were deleted and hence, all original items were kept within their construct.

The relationship between DSP and NEP value orientations, emotions (valence), pro-green energy beliefs and trust was tested using a piecewise SEM in the piecewise SEM package (Lefcheck, 2016). Since all variables deviated from a normal distribution (Shapiro–Wilk test, $p < 0.001$ for trust, valence, beliefs and DSP and NEP), we fitted generalized linear models. Differences in DSP and NEP value orientations, emotions (valence), green energy beliefs and trust among stakeholders were tested using ANOVA and post hoc Tukey's HSD.

3. Results

3.1. Value orientations, beliefs and emotions of stakeholders

Except for *NEP value orientations* (ANOVA, F (5, 440) = 0.77, $p = 0.57$) which was overall high ($M = 5.1$), all other underlying concepts differed among stakeholders (Fig. 1).

Among NGO employees, consultants and members of the wind energy sector, we found small, yet significant discrepancies for *DSP value orientations* (ANOVA, F (5, 440) = 2.6, $p < 0.05$) and *emotions towards bats* (ANOVA, F (5, 438) = 2.9, $p < 0.05$). While DSP value orientations were overall moderate ($M = 3.4$), NGO employees had significant lower DSP value orientation compared to consultants and members of the wind energy sector (Tukey's HSD, $p < 0.05$; Fig. 1). Emotions (valence) towards bats were overall high and positive ($M = 6.5$). However, members of the wind energy sector had significantly less positive emotions towards bats compared to NGO employees and consultants (Tukey's HSD, $p < 0.05$; Fig. 1).

We found larger discrepancies among stakeholders with respect to *pro-green energy beliefs* (ANOVA, F (5, 442) = 33.3, $p < 0.001$) and *emotions towards wind turbines* (ANOVA, F (5, 439) = 2.9, $p < 0.001$). Overall pro-green energy beliefs were moderate ($M = 3.2$), yet members of the wind energy sector showed the highest pro-green energy beliefs of all groups (Tukey's HSD, $p < 0.001$; Fig. 1). NGO volunteers showed the lowest pro-green energy beliefs, differing significantly from those of conservation authorities, researchers and consultants (Tukey's HSD, $p < 0.001$; Fig. 1). Pro-green energy beliefs were also significantly lower for NGO employees compared to consultants (Tukey's HSD, $p < 0.001$; Fig. 1).

Although emotions towards wind turbines were overall more moderate ($M = 3.7$) than emotions towards bats, members of the wind energy sector stood out among all other stakeholders by rating their emotions towards wind turbines highest (Tukey's HSD, $p < 0.001$; Fig. 1). NGO volunteers rated lowest in their emotions towards wind turbines which were significantly lower compared to those of all other stakeholders (Tukey's HSD, $p < 0.01$; Fig. 1). Similarly, as for pro-green energy beliefs, NGO employees showed significantly lower emotions towards wind turbines compared to consultants (Tukey's HSD, $p < 0.01$).

3.2. Predictive potential of value orientations, beliefs and emotions on trust

The piecewise SEM showed significant relationships between value orientations, emotions, pro-green energy beliefs and trust (AIC = 26; BIC 79.2; Fig. 2). The path between NEP value orientations and trust was, however, not significant (SEM; 0.02, $p = 0.58$). With the exclusion of this path for trust, the model fit of SEM improved marginally (AICc = 24; BIC = 74.2). The strongest relationships originated from pro-green energy beliefs influencing trust (SEM; 0.41, $p < 0.001$). The strongest effects on pro-green energy beliefs came from emotions (valence) towards bats (SEM; −0.12, $p < 0.01$) and towards wind turbines (SEM; 0.80, $p < 0.001$) while direct effects between emotions and trust were significant but less strong (bats: SEM; 0.11, $p < 0.01$, wind turbines: SEM; 0.23, $p < 0.001$). Moreover, the effects of DSP value orientations were stronger correlated with trust than with pro-green energy beliefs (SEM; 0.17, $p < 0.001$). Significant and non-significant effects explained 54% of the variation of trust and 83% of pro-green energy beliefs.

3.3. Trust in stakeholders involved in the planning and erection of wind turbines

Trust in stakeholders involved in the planning and erection of wind turbines varied largely (Fig. 3). Across all stakeholders, the lowest overall trust was found in politicians ($M = 2.2$) with the second lowest trust in members of the wind energy sector ($M = 2.6$). The highest overall trust was found in nature conservation organizations ($M = 4.2$) followed by consultants ($M = 3.8$) and conservation authorities ($M = 3.7$). Trust in these groups, however, varied significantly among stakeholders (trust in *politicians*: F (5, 442) = 7.2, p < 0.001; in *members of the wind energy sector*: F (5, 442) = 32.1, p < 0.001; in *nature conservation organizations*: F (5, 442) = 4.2, p < 0.001; in *consultants*: F (5, 443) = 21.5, p < 0.001; in *conservation authorities:* F (5, 442) = 14.5, p < 0.001, ANOVA).

Overall, members of the wind energy sector showed the highest trust in politicians, their own group (members of the wind energy sector) and consultants. In contrast, NGO volunteers showed the lowest trust in politicians and in members of the wind energy sector (Fig. 3; Table 1). While members of the wind energy sector trusted *politicians* significantly more compared to all other stakeholders except for conservation authorities, NGO volunteers showed the lowest trust in *politicians* (Tukey's HSD, $p < 0.05$; Fig. 3; Table 1). Further, members of the wind energy sector trusted their own group (*members of the wind energy sector*) significantly more compared to all other stakeholders while NGO volunteers trusted *members of the wind energy sector* least (Tukey's HSD, $p < 0.05$). NGO employees trusted members of the wind energy sector significantly less than consultants (Tukey's HSD, $p < 0.05$). Lastly, members of the wind energy sector trusted *consultants* significantly more compared to all other stakeholders, except for consultants themselves (Tukey's HSD, $p < 0001$), while consultants trusted in their own group (*consultants*) significantly more than the remaining four stakeholders (Tukey's HSD, $p < 0.001$). NGO volunteers and employees had the lowest trust in conservation authorities which was significantly different to conservation authorities, consultants or researchers (Tukey's HSD, $p < 0.01$). Interestingly, trust in *nature conservation organizations* only differed between NGO volunteers and consultants, with a significant higher trust of consultants than volunteers (Tukey's HSD, $p < 0.01$).

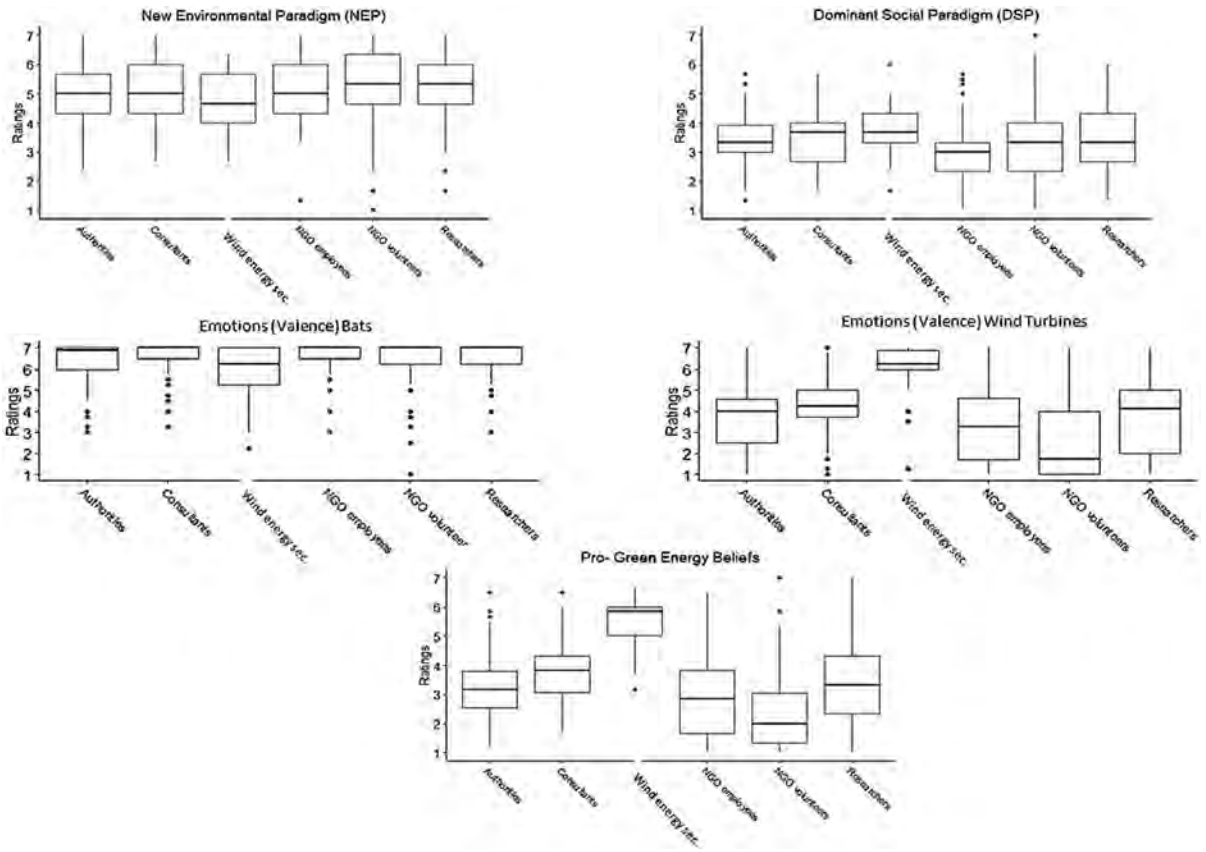

Fig. 1. Boxplots showing ratings of environmental value orientations (NSP and DSP), pro-green energy beliefs and valence towards bats and wind turbines among stakeholders (see Suppl. Material Table B). The box extends from the lower to upper quartile values of the data, with a line at the median; whiskers represent the range of the data with maximum and minimum and dots show outliers.

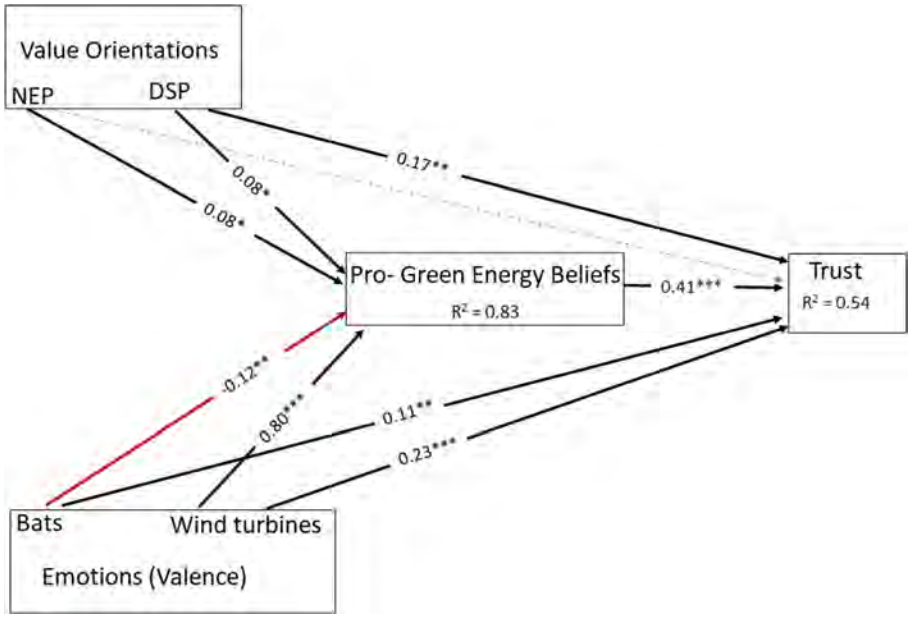

Fig. 2. Piecewise SEM with underlying constructs for trust in stakeholders explained by standardized coefficients and *p*-values represented as $p \leq .001^{***}$, $p \leq .01^{**}$, $p \leq .05^{*}$. The path between NEP and trust (dashed line in grey) was excluded from the final model.

4. Discussion

A basic understanding of different perspectives between stakeholders can lead to a level of trust in collaborating processes (Sponarski et al., 2014). Here, we investigated the relationships between and differences in value orientations, pro-green energy beliefs, emotions (valence) and trust among stakeholders involved in the green–green dilemma. We found that stakeholders mostly varied in their pro-green energy beliefs and emotions towards wind turbines with members of the wind energy sectors

Table 1
Mean ratings and standard deviation (Std) trust of stakeholders in politicians, members of the wind energy sector, conservation authorities, consultants and NGOs. Post hoc comparisons using Tukey's HSD. Significant differences (at the 0.05 level) shown by letters and marked in light grey.

Stakeholder	Trust in politicians		Trust in members of the wind energy sector		Trust in Cons. Authorities		Trust in consultants		Trust in nature conservation organizations	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
NGO volunteers	1.8 a, b	0.8	1.9 a, b	1.1	3.0 a, b, c	1.4	3.1 a, b, c	1.5	3.8 a	1.6
NGO employees	2.1 a	1.0	2.3 a, c	1.2	3.2 a, b	1.3	3.1 a, b	1.4	4.4	1.4
Consultants	2.2 a, b	0.9	3.0 a, c	1.2	4.1 b	1.1	4.5 b	1.2	4.5 a	1.1
Researchers	2.2a	1.0	2.5 a, b	1.2	3.7c	1.4	3.7 a, b	1.5	4.4	1.5
Conservation authorities	2.4 b	0.9	2.6 a, b	1.1	4.3 a, b	1.1	3.8 a,b, c	1.2	4.3	1.1
Members of the wind energy sectors	2.9 a,	1.2	5.1 a	1.1	3.7	1.5	5.4 a	1.0	3.7	1.4

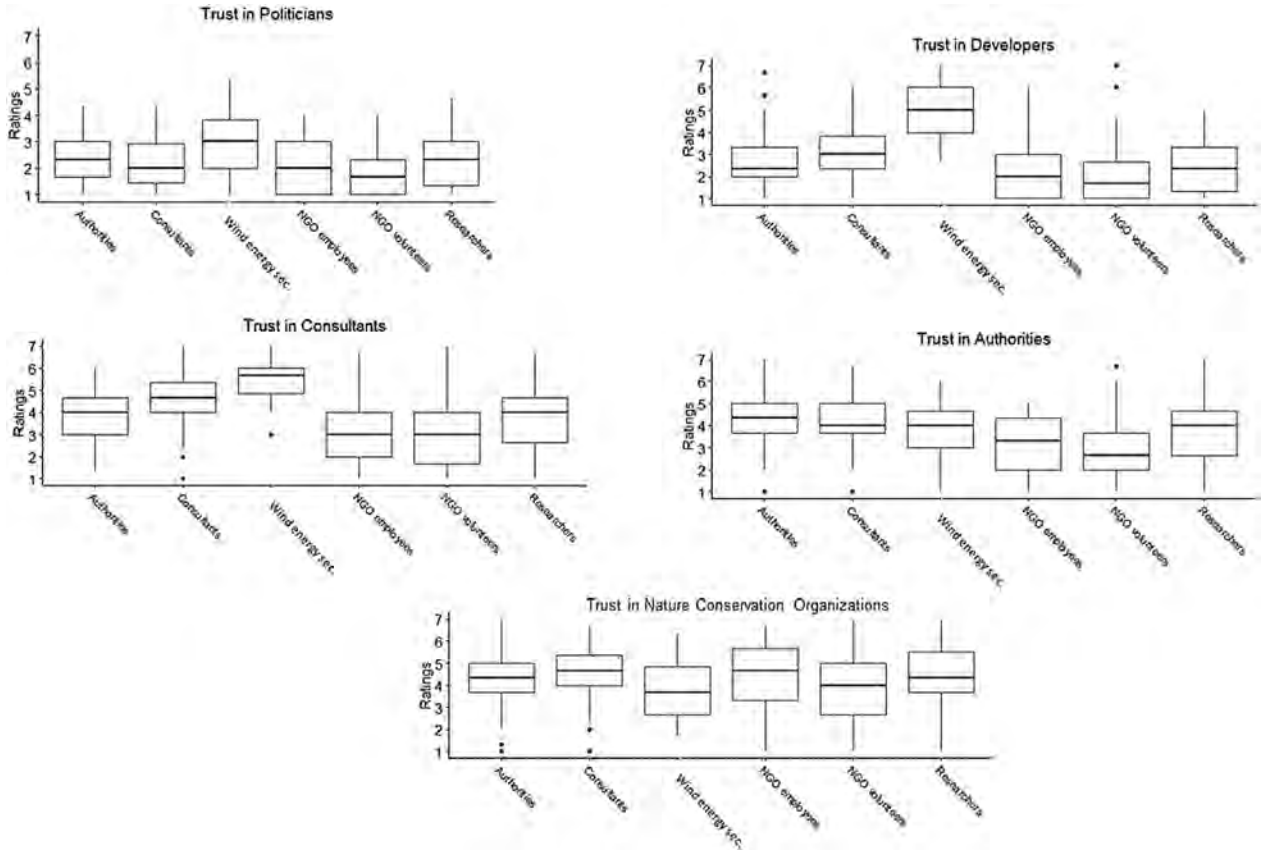

Fig. 3. Average trust of stakeholders involved in the green–green dilemma in politicians, members of the wind energy sectors, consultants, conservation authorities and nature conservation organizations. Scale ranging from 1 (strongly disagree) to 7 (strongly agree). The box extends from the lower to upper quartile values of the data, with a line at the median; whiskers represent the range of the data with maximum and minimum and dots show outliers.

and NGO volunteers on either side of the extremes. In contrast to our expectations, beliefs had a stronger predictive potential on trust than value orientations and beliefs were strongly influenced by emotions. Our results provide applied and theoretical understanding of value orientations, beliefs, emotions and trust among stakeholders involved in the green–green dilemma, particularly in the conflict between wind energy production and wildlife conservation. To our knowledge, these concepts have not been applied before to the wind energy–wildlife conflict.

4.1. Differences in value orientations, emotions and beliefs among stakeholders

NEP value orientations capture items focusing on sustainable use of nature by humans (Dunlap et al., 2000; Dunlap and York, 2008). Overall, NEP value orientations were high among all stakeholders without significant differences. In contrast, DSP value orientations reflect statements that humans can modify the environment to suit their needs as well as an acknowledgement of human knowledge and ingenuity. While DSP value orientations were overall moderate, members of the wind energy sector and consultants rated highest on these items and NGO employees lowest. Since wind turbines are a man-made modification of the environment, it does not seem surprising that members of the wind turbine sector rated high on this scale and support human intervention in nature more than other stakeholders. Despite the differences among these three stakeholders (members of the wind energy sector, consultants and NGO employees), results of our survey are promising. Value orientations are at the base of the cognitive hierarchy, i.e. of thought processes. Therefore, value orientations are more stable (Fulton et al., 1996) and more difficult to influence or to change than constructs higher in the cognitive hierarchy such as attitudes (Manfredo et al., 2017). This suggests that if value orientations would have differed too much among stakeholders, these quite stable constructs would have clashed. It is further suggested that shared values might facilitate

the process of creating definitions about shared problems (Stern and Coleman, 2015) which is an important component in resolving wicked problems related to natural resource management (Stern and Coleman, 2015; Weber and Khademian, 2008). Indeed, awareness about the alignment that sustainable use of nature (NEP value orientations) matters equally to all stakeholders involved in the green–green dilemma in Germany might provide a basis for constructive discussions and collaborations. Interestingly, the highest discrepancies among stakeholders were found in their pro-green energy beliefs and emotions in relation to wind turbines. Compared to other stakeholders, members of the wind energy sector had the most positive emotions towards wind turbines and beliefs that wind turbines should be promoted above other renewable sources. Also, they considered wind turbines to be more important than e.g. landscapes or biodiversity conservation. This result was anticipated since familiarity with an issue or object influences beliefs (Morris et al., 2012). NGO volunteers were on the other side of the extreme. In our previous publication in which we showed each belief item separately, it was apparent that NGO volunteers, among other stakeholders except for members of the wind energy sector, did not consider wind energy production of higher priority than biodiversity goals (Voigt et al., 2019). Hence, the highest challenge here might be to be aware of and to find potential ways to mitigate or even to reconcile contrasting beliefs and emotions in relation to wind turbines of members of the wind energy sector and NGO volunteers. This clash of beliefs and emotions towards wind turbines can be a crucial part to consider in relation to trust or distrust between the aforementioned groups since these contrasting beliefs and emotions might weaken or even hinder positive interactions between these groups; though interactions are an important component during trust building processes.

We chose bats as representative example for wildlife species affected by wind turbines since they are protected in many countries and play globally a role in wind turbine planning. Additionally, we expected that bats evoke more varied emotions (Knight, 2008), while birds are supposed to be more popular. Birds are besides bats the most affected airborne wildlife taxon by wind turbines. In contrast to our expectation, emotions for bats were consistently high. It might be interesting for future studies to compare emotions of stakeholders towards different taxa affected by wind energy development and how this influences trust and decision-making processes, since arguably no decision is completely free of emotions (Nelson et al., 2016).

4.2. Relationship between value orientations, emotions, beliefs and trust in stakeholders involved in the green–green dilemma

Shared values are supposed to be one of the major components for trust (Needham and Vaske, 2008). However, interestingly, beliefs were stronger predictors for trust than value orientations Nevertheless, consistent with a previous study of wildlife agencies in the USA (Manfredo et al., 2017), we found a significant link between domination value orientations (DSP) and trust. We further found that beliefs were strongly predicted by emotions, particularly by positive emotions towards wind turbines and to a lower extent by negative emotions towards bats. This confirms the influence of emotions on beliefs (Frijda et al., 2000) and underpins the fact that emotions should not be ignored in discussions around wind turbines. Emotions are known to influence the content and the strength of individual's beliefs and 'beliefs fuelled by emotions' are known to stimulate people to action or to approve the actions of others (Frijda et al., 2000). Further, in alignment with previous findings that positive emotions are stronger drivers for trust than negative ones, positive emotions towards bats and wind turbines showed significant effects on trust (Dunn and Schweitzer, 2005). It has to be noted though that while emotions influence trust, this is likely to be only possible when individuals are not aware of the source of their emotions (Dunn and Schweitzer, 2005). Certainly, other factors that influence trust in each other were not captured in our study. For instance, trust may also be influenced by an individual's perception of how controllable a conflict is with higher levels of (real or perceived) individual control lessening the need to have trust in another stakeholder (Sponarski et al., 2014). Nevertheless, our results suggest that understanding particularly beliefs and emotions and to some extent value orientations of stakeholders might add to the picture in conflict discussions around wind turbines.

4.3. Differences in trust among stakeholders

Entities to be trusted may come in various forms, such as organizations or representatives of an environmental NGO and in each case, the trustor places faith in something to serve some predictable service of function (Stern and Coleman, 2015). In our case, we investigated trust among stakeholders in members of the wind energy sector, consultants, NGOs and politicians. While NGOs were rated with the highest trust among all stakeholders, politicians were the least trusted, particularly by NGO volunteers but not by members of the wind energy sector. This result might reflect the strong political support of wind energy development while conservation issues such as bat fatalities are still not sufficiently addressed (Voigt et al., 2015). Disagreements among stakeholders and their trust were mostly found towards the wind energy sector and consultants. Interestingly here, members of the wind energy sector trusted consultants more than consultants rated trust in their own group. This is surprising since feelings of social connectedness and assumption of shared values or concerns can be antecedents for trust (Stern and Coleman, 2015). Hence, generally it is more likely to trust a group in which one belongs. In planning processes, consultants are commissioned by members of the wind energy sector and members of the wind energy sector can decide who they hire and trust while consultant companies compete which could lead into some lack of trust. However, it has to be noted that we measured trust and lack of trust (absence of a specific judgement about trust) and not distrust (trustor believes that the trusted entity will perform an action that will actually be harmful to the trustor) (Stern and Coleman, 2015).

Interestingly as well, besides members of the wind energy sector, NGO volunteers showed a low trust in nature conservation organizations and their decisions in relation to wind turbine developments. This controversy might be caused by the predicament of some nature conservation organizations when supporting both wind energy production and nature conservation. It is likely that NGO volunteers which specifically work for nature conservation perceive that NGOs prioritize climate goals over biodiversity goals which is also currently a point of discussion, e.g. in Germany (DNR, 2020; RGI, 2018). Such a lack in trust of NGO members in nature conservation organizations is unfortunate because NGO volunteers also acknowledge an environmental friendly energy transition (Voigt et al., 2019). This aspect might cause a challenge to nature conservation organizations which are often dependent on volunteers since a lack of trust can lead into behaviours ranging from disobedience of regulations, reduced revenues from donations, dropping out from or even protesting against actions (Stern and Coleman, 2015). Local support for wind turbine planning processes might be difficult if not impossible to obtain if citizens (of which many might be volunteers in environmental NGOs) are not included in this process (Pocewicz and Nielsen-Pincus, 2013; Wolsink and Breukers, 2010). Collaborative processes such as democratic decision concepts at a local

scale seems particularly important here, because 'shared power' improves trust and increases levels of pro-energy activities (van der Schoor and Scholtens, 2015).

4.4. Building trust by acknowledging cognitive and emotional processes

Mismatches between institutional and interpersonal trust are not uncommon (Stern and Coleman, 2015; Young et al., 2016) and building trust has been of interest to many scholars in the conflict and conservation literature (Stern and Coleman, 2015; Young et al., 2016). For instance, it is suggested that when the present knowledge, but also values and interests of all participants in participatory processes are considered, it is more likely that new information is accepted (Young et al., 2016). Based on our results, we would add that it is also crucial to consider beliefs and emotions in these processes. While there might be a notion that emotions might cloud people's judgement, it becomes increasingly acknowledged that decisions in conservation are not free of emotions (Nelson et al., 2016). In fact, decision-making utilizes both cognitive and emotional processes (Greene et al., 2004; Kahneman, 2011). Trust can also emerge through increased willingness to share power in terms of knowledge and decision implementation (Young et al., 2016). Elements such as collaborative procedure development, transparency in decision-making and the equitable distribution of benefits and risks where possible are also suggested to be important in building trust since these elements can contribute to creating a safe environment for trust to emerge (Stern and Coleman, 2015). Such a process may also lead to a better understanding of different values, beliefs, attitudes and goals and the potential to seek shared solutions for conflicts (Young et al., 2016). It is widely recognized that different types of knowledge are needed to be integrated in the management of natural resources and to have a common understanding of what the conflict is about and what is understood as the conflict solution (Young et al., 2016). Here, we argue that different beliefs need to be understood as well in these processes. While sharing these beliefs might also need a safe environment, sometimes, a trustworthy champion who is trusted by all involved stakeholders might not only be able to make a difference by helping to find compromises (Young et al., 2016), but also by creating this safe environment. Lastly, getting to know where each other stands in terms of their thought and emotions is always an important starting point. Therefore, being aware of different beliefs, emotions and value orientations among stakeholders and considering these in discussions should be better promoted, e.g. in well-organized dialogues and decision processes, preferably with champions trusted by stakeholders.

5. Conclusion

Building and maintaining trust among stakeholders may be the most important aspect during the energy transition. Trust-building requires effort and resources but also opportunities for dialogues between involved parties to identify shared problems and shared solutions. Importantly, it may also require recognizing problems as shared ones and awareness of trade-offs (Redpath et al., 2013) as well as a willingness to share power in terms of knowledge and decision implementation (Young et al., 2016). In this study, we found that stakeholders involved in the green–green dilemma mostly varied in their beliefs and emotions in relation to wind turbines of which particularly beliefs were an important predictor for trust and where influence by emotions. Based on these findings, we recommend the following:

- Being aware about similar or different beliefs about the benefits and trade-offs of wind turbines during the development process.
- Creating a safe environment and opportunities to share and discuss these beliefs besides sharing and exchanging knowledge from evidence-based research on wind turbines as a step forward to build trust.
- Transparency about trust. While this might be a challenging and new endeavour to some, if stakeholders better understand and monitor besides beliefs also trust, they may be able to find ways to build trust among each other (Sponarski et al., 2014).'

While the question remains what different forms of trust or distrust may develop in these situations and what their impact is in relation to process outcomes for natural resource management (Stern and Coleman, 2015) understanding human dimensions in relation to renewable energy sources is crucial for realizing future energy systems with the support of involved parties (Devine-Wright, 2014; Sovacool et al., 2015). Here, beliefs, but also emotions about wind turbines should not be overlooked.

CRediT authorship contribution statement

Tanja M. Straka: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Visualization, Writing - original draft. **Marcus Fritze:** Conceptualization, Investigation, Methodology, Writing - review & editing. **Christian C. Voigt:** Conceptualization, Investigation, Methodology, Writing - review & editing.

Declaration of competing interest

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

Acknowledgements

We thank all the participants who joined the main survey and participants who tested the pilot survey and provided valuable feedback. We further thank the publication fund of the TU Berlin to cover the Open Access publication fees.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Appendix A. Supplementary data

Supplementary material related to this article can be found online at https://doi.org/10.1016/j.egyr.2020.06.028.

References

Ainsworth, G.B., Redpath, S.M., Wernham, C.V., Wilson, M.W., Young, J.C., 2020. Integrating scientific and local ecological knowledge to address conservation conflicts: towards a practical framework based on lessons learned from a Scottish case study. Environ. Sci. Policy 107, 46–55.

Arnett, E.B., Huso, M.M.P., Schirmacher, M.R., Hayes, J.P., 2011. Altering turbine speed reduces bat mortality at wind-energy facilities. Front. Ecol. Environ. 9, 209–214.

Arnett, E.B., May, R.F., 2016. Mitigating wind energy impacts on wildlife: Approaches for multiple taxa. Human-Wildl. Interactions 10, 28–41.

Baruch-Mordo, S., Kiesecker, J.M., Kennedy, C.M., Oakleaf, J.R., Opperman, J.J., 2019. From Paris to practice: sustainable implementation of renewable energy goals. Environ. Res. Lett. 14 (2), 024013.

BDEW, BWE, VDMA, VKU, WWF, Greenpeace, Germanwatch and DUH, 2019. 10 Punkte für den Ausbau der Windenergie -Vorschläge zur Gewährleistung von Flächenverfügbarkeit, Handhabbarkeit naturschutzrechtlicher Vorgaben und Stärkung vor Ort. BDEW, BWE, VDMA, VKU, WWF, Greenpeace, Germanwatch and DUH, Berlin, p. 4, URL: https://www.bdew.de/media/documents/Stn_20190903_10-Punktefuer-Ausbau-Windenergie-Verbaende.pdf.

Bland, J.M., Altman, D.G., 1997. Statistics notes: Cronbach's alpha. BMJ 314 (7080), 572. http://dx.doi.org/10.1136/bmj.314.7080.572.

Corral-Verdugo, V., Bechtel, R.B., Fraijo-Sing, B., 2003. Environmental beliefs and water conservation: An empirical study. J. Environ. Psychol. 23 (3), 247–257.

Cvetkovich, G., Winter, P.L., 2003. Trust and social representations of the management of threatened and endangered species. Environ. Behav. 35 (2), 286–307.

Devine-Wright, P. (Ed.), 2014. Renewable Energy and the Public: From NIMBY to Participation. Routledge.

Dickman, A.J., 2010. Complexities of conflict: the importance of considering social factors for effectively resolving human–wildlife conflict. Animal Conserv. 13 (5), 458–466.

DNR, BUND, DUH, Germanwatch, Greenpeace, NABU and WWF, 2020. Thesenpapier zum naturverträglichen Ausbau der Windenergie. URL: https://www.nabu.de/imperia/md/content/nabude/energie/wind/200130-thesenpapier-windenergieausbau.pdf.

Dragan, I.-M., Isaic-Maniu, A., 2013. Snowball sampling completion. J. Stud. Soc. Sci. 5, 160–177.

Dunlap, R.E., Van Liere, K.D., Mertig, A.G., Jones, R.E., 2000. New trends in measuring environmental attitudes: measuring endorsement of the new ecological paradigm: a revised NEP scale. J. Soc. Issues 56 (3), 425–442.

Dunlap, R.E., York, 2008. The globalization of environmental concern and the limits of the postmaterialist values explanation: New environmental paradigm scale: From marginality to worldwide use: Evidence from four multinational surveys. Sociol. Q. 49, 529–563.

Dunn, J.R., Schweitzer, M.E., 2005. Feeling and believing: the influence of emotion on trust. J. Personal. Soc. Psychol. 88 (5), 736.

Estévez, R.A., Anderson, C.B., Pizarro, J.C., Burgman, M.A., 2015. Clarifying values, risk perceptions, and attitudes to resolve or avoid social conflicts in invasive species management. Conserv. Biol. 29 (1), 19–30.

FA Wind, 2017. Windenergienutzung und gebietsschutz. Berlin: Fachagentur zur Förderung eines natur- und umweltverträglichen Ausbaus der Windenergie an Land e.V. p. 22, URL: https://www.fachagentur-windenergie.de/fileadmin/files/Veroeffentlichungen/FA_Wind_Best{and}saufnahme_WE_und_Gebietsschutz_3-2017.pdf.

Fishbein, M., Raven, B.H., 1962. The AB scales: An operational definition of belief and attitude. Human Relat. 15 (1), 35–44.

Frijda, N.H., Manstead, A.S., Bem, S., 2000. The influence of emotions on beliefs. In: Frijda, Manstead, Bem (Eds.), Emotions and Beliefs: How Feelings Influence Thoughts. pp. 1–9.

Fritze, M., Lehnert, L.S., Heim, O., Lindecke, O., Roeleke, M., Voigt, C.C., 2019. Fledermausschutz im Schatten der Windenergie. In: Naturschutz und Landschaftsplanung, Vol. 51. pp. 20–27.

Fulton, D.C., Manfredo, M.J., Lipscomb, J., 1996. Wildlife value orientations: A conceptual and measurement approach. Human Dimens. Wild. 1 (2), 24–47.

Greene, J.D., Nystrom, L.E., Engell, A.D., Darley, J.M., Cohen, J.D., 2004. The neural bases of cognitive conflict and control in moral judgment. Neuron 44, 389–400.

Haselhuhn, M.P., Schweitzer, M.E., Wood, A.M., 2010. How implicit beliefs influence trust recovery. Psychol. Sci. 21 (5), 645–648.

Hawcroft, L.J., Milfont, T.L., 2010. The use (and abuse) of the new environmental paradigm scale over the last 30 years: A meta-analysis. J. Environ. Psychol. 30 (2), 143–158.

IPBES, 2019. In: Díaz, S., Settele, J., Brondízio, E.S., Ngo, E.S.H.T., Guèze, M., Agard, J., Arneth, A., Balvanera, P., Brauman, K.A., Butchart, S.H.M., Chan, K.M.A., Garibaldi, L.A., Ichii, K., Liu, J., Subramanian, S.M., Midgley, G.F., Miloslavich, P., Molnár, Z., Obura, D., Pfaff, A., Polasky, S., Purvis, A., Razzaque, J., Reyers, B., Roy Chowdhury, R., Shin, Y.J., Visseren-Hamakers, I.J., Willis, K.J., Zayas, C.N. (Eds.), Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, Germany, p. 56.

IPCC, 2013. In: Stocker, T.F., Qin, D., Plattner, G.-K., Tignor, M., Allen, S.K., Boschung, J., Nauels, A., Xia, Y., Bex, V., Midgley, P.M. (Eds.), The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, p. 1535.

Jacobs, M.H., Vaske, J.J., Dubois, S., Fehres, P., 2014. More than fear: role of emotions in acceptability of lethal control of wolves. Eur. J. Wild. Res. 60 (4), 589–598.

Kahneman, D., 2011. Thinking, Fast and Slow. Macmillan, New York.

Kiesecker, J., Baruch-Mordo, S., Heiner, M., Negandhi, D., Oakleaf, J., Kennedy, C., Chauhan, P., 2020. Renewable energy and land use in India: A vision to facilitate sustainable development. Sustainability 12 (1), 281.

Kiesecker, J.M., Evans, J.S., Fargione, J., Doherty, K., Foresman, K.R., Kunz, T.H., Naugle, D., Nibeelink, P., Niemuth, N.D., 2011. Win-win for wind and wildlife: a vision to facilitate sustainable development. PLoS One 6 (4).

Knight, A.J., 2008. Bats, snakes and spiders, Oh my! how aesthetic and negativistic attitudes, and other concepts predict support for species protection. J. Environ. Psychol. 28 (1), 94–103.

Lefcheck, J.S., 2016. Piecewisesem: Piecewise structural equation modeling in r for ecology, evolution, and systematics. Methods Ecol. Evol. 7 (5), 573–579. http://dx.doi.org/10.1111/2041-210X.12512.

Lount, Jr., R.B., Pettit, N.C., 2012. The social context of trust: The role of status. Organ. Behav. Human Decision Process. 117 (1), 15–23.

Luhmann, N., 1979. In: Burns, T., Poggi, G. (Eds.), Trust and Power. Wiley, New York.

Maehr, A.M., Watts, G.R., Hanratty, J., Talmi, D., 2015. Emotional response to images of wind turbines: A psychophysiological study of their visual impact on the landscape. Landsc. Urban Plan. 142, 71–79.

Manfredo, M.J., Bruskotter, J.T., Teel, T.L., et al., 2017. Why social values cannot be changed for the sake of conservation. Conserv. Biol. 31 (4), 772–780.

Metcalf, E.C., Mohr, J.J., Yung, L., Metcalf, P., Craig, D., 2015. The role of trust in restoration success: public engagement and temporal and spatial scale in a complex social-ecological system. Restor. Ecol. 23 (3), 315–324.

Möllering, G., 2006. Trust: Reason, Routine, Reflexivity. Elsevier, Oxford, UK.

Morris, P., Knight, S., Lesley, S., 2012. Belief in animal mind: Does familiarity with animals influence beliefs about animal emotions? Soc. Anim. 20 (3), 211–224.

Needham, M.D., Vaske, J.J., 2008. Hunter perceptions of similarity and trust in wildlife agencies and personal risk associated with chronic wasting disease. Soc. Nat. Res. 21 (3), 197–214.

Nelson, M.P., Bruskotter, J.T., Vucetich, J.A., Chapron, G., 2016. Emotions and the ethics of consequence in conservation decisions: Lessons from cecil the lion. Conserv. Lett. 9 (4), 302–306.

Pocewicz, A., Nielsen-Pincus, M., 2013. Preferences of wyoming residents for siting of energy and residential development. Appl. Geogr. 43, 45–55.

Poortinga, W., Pidgeon, N.F., 2004. Trust, the asymmetry principle, and the role of prior beliefs. Risk Anal.: Int. J. 24 (6), 1475–1486.

R Core Team, 2018. A language and environment for statisticalcomputing. R Foundation for Statistical Computing, Vienna, Austria. URL: https://www.R-project.org/.

Redpath, S.M., Young, J., Evely, A., et al., 2013. Understanding and managing conservation conflicts. Trends Ecol. Evol. 28 (2), 100–109.

Revelle, W., 2018. Psych: Procedures for Personality and Psychological Research. Northwestern University, Evanston, Illinois, USA, https://CRAN.R-project.org/package=psych Version = 1.8.12.

RGI, 2018. The renewables grid initiative. URL: https://renewables-grid.eu/fileadmin/user_upload/Files_RGI/RGI_Publications/Factsheets/20181010_RGI_Factsheet_basic3.pdf.

Rittel, H., Webber, M., 1973. Dilemmas in a general theory of planning. In: Policy Sciences, Vol. 4. Elsevier Scientific Publishing Company, Inc, Amsterdam, pp. 155–169.

Rokeach, M., 1973. The Nature of Human Values. Free press.

Rydell, J., Engström, H., Hedenström, A., Larsen, J.K., Pettersson, J., Green, M., 2012. The Effect of Wind Power on Birds and Bats Power - a Synthesis (Report No. 6511). Report by Vindval, Report for Swedish Environmental Protection Agency (EPA).

Sovacool, B.K., Ryan, S.E., Stern, P.C., Janda, K., Rochlin, G., Spreng, D., Pasqualetti, M.J., Wilhite, H., Lutzenhiser, L., 2015. Integrating social science in energy research. Energy Res. Soc. Sci. 6, 95–99.

Sponarski, C.C., Vaske, J.J., Bath, A.J., Musiani, M.M., 2014. Salient values, social trust, and attitudes toward wolf management in south-western alberta, Canada. Environ. Conserv. 41 (4), 303–310.

Stephenson, Andrew L., 2013. Assessment of Wildlife Value Orientations, State Agency Credibility, and Tolerance for Mountain Lions in Iowa (Graduate Theses and Dissertations). Paper 13239.

Stern, M.J., 2008. Coercion, voluntary compliance and protest: the role of trust and legitimacy in combating local opposition to protected areas. Environ. Conserv. 35 (3), 200–210.

Stern, M.J., Coleman, K.J., 2015. The multidimensionality of trust: Applications in collaborative natural resource management. Soc. Nat. Res. 28 (2), 117–132.

Thaker, M., Zambre, A., Bhosale, H., 2018. Wind farms have cascading impacts on ecosystems across trophic levels. Nat. Ecol. Evol. 2, 1854–1858.

van der Schoor, T., Scholtens, B., 2015. Power to the people: Local community initiatives and the transition to sustainable energy. Renew. Sustain. Energy Rev. 43, 666–675.

Vaske, J.J., 2008. Survey Research and Analysis: Applications in Parks, Recreation and Human Dimensions. Venture Publishing, p. 635.

Voigt, C.C., Lehnert, L.S., Petersons, G., Adorf, F., Bach, L., 2015. Wildlife and renewable energy: German politics cross migratory bats. Eur. J. Wild. Res. 61, 213–219.

Voigt, C.C., Straka, T.M., Fritze, M., 2019. Producing wind energy at the cost of biodiversity: A stakeholder view on a green-green dilemma. J. Renew. Sustain. Energy 11 (6), 063303.

Weber, E.P., Khademian, A.M., 2008. Wicked problems, knowledge challenges, and collaborative capacity builders in network settings. Public Adm. Rev. 68 (2), 334–349.

Wolsink, M., Breukers, S., 2010. Contrasting the core beliefs regarding the effective implementation of wind power. an international study of stakeholder perspectives. J. Environ. Plan. Manage. 53 (5), 535–558.

Young, J.C., Marzano, M., White, R.M., et al., 2010. The emergence of biodiversity conflicts from biodiversity impacts: characteristics and management strategies. Biodivers. Conserv. 19 (14), 3973–3990.

Young, J., Richards, C., Fischer, et al., 2007. Conflicts between biodiversity conservation and human activities in the central and eastern European countries. AMBIO:J. Human Environ. 36 (7), 545–550.

Young, J.C., Searle, K., Butler, A., Simmons, P., Watt, A.D., Jordan, A., 2016. The role of trust in the resolution of conservation conflicts. Biol. Cons. 195, 196–202.