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Mapping wind-power controversies on social media: Facebook as a powerful mobilizer of local resistance

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ABSTRACT

Social media is a powerful communication tool through its universality and ease of access, which potentially has a huge impact on implementation of wind power. This study investigate a large corpus of Danish Facebook pages advocating anti-wind power viewpoints, distinguishing between localisation, different user groups, subjects and activity types. In doing this the following questions are answered: How localised are wind protests on Facebook?; To what extent can we perform a qualitative discourse analysis on different groups of Facebook users?; What can be said about the differences between community and cross-cutting Facebook users?; How are the voiced concerns articulated?; How are concerns managed by Facebook users?

1. Introduction

The development of wind power technology has been the foundation for an export adventure of the Danish Wind Industry (Garud and Karnøe, 2003) as well as the cornerstone in the Danish transition towards an energy system independent of fossil fuels. Thus, the Danish parliament has agreed to promote the establishment of a longer-term goal of meeting 50% of Denmark's electricity needs through wind power by 2020[1]. This seems to be in alignment with the Danish public opinion, where approximately 85% are in favour of promoting wind power compared to other forms of energy (Eurobarometer, 2006; Megafon, 2015). However, when we focus on the regional level, several municipalities have reported severe protests from local communities against planned sites for wind turbines. Conversely, other municipalities report no or insignificant resistance from local communities despite a high density of wind turbines (Anker, 2016). This observation is in line with recent studies showing that resistance does not seem to come from cumulative negative experiences of wind turbine encounters per se (Ladenburg et al., 2013; Ladenburg, 2015).

Recent results from the Wind 2050[2] project suggests that inadequate economic incentives, lack of local ownership, and an inexpedient planning process are central causes for the local resistance to wind power development (Clausen and Rudolph, 2018; Cronin et al., 2017). The planning process seems to accumulate resistance because the public space offered to citizens is a technical-regulative 'closed space' disempowering the local community (Gaventa, 2006).

Thus, it appears that the circumstances regarding planning and development have been causing concerns in the local community, as much as the wind turbines per se. This might explain why the initial strong protests against planned wind turbine projects slowly decrease after (and if) the wind turbines have been put into service (Devine-Wright, 2005; Wolsink, 2007).

Research attempting to identify the possible reasons for local community opposition to wind farm sites has identified several explanations. Thus, in a summary of research conducted between 1990 and 1996, Simon (1996) reported visual impacts and noise as the most frequently reported problems. The list of concerns has since been expanded, and a more varied picture has been reported (e.g., Krohn and Damborg, 1999;

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[1] The Danish Energy Agreement on Danish Energy Policy 2012–2020, March 2012.

[2] Wind2050 is an independent research project funded by the Danish Council for Strategic Research focusing on how major energy projects are planned and anchored in a democracy (http://www.wind2050.dk).

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Huber et al., 2012; Wolsink, 2012; Borch, 2018). A different approach has been taken by Munk (2014), who used an issue dictionary to explore a corpus of websites in order to map wind energy controversies online. Munk showed that although some concerns were crosscutting considerably, variations existed among the ten mapped sites (eight Danish and two Scottish) (Munk (2014).

Traditionally, Danish wind turbine planning has been dominated by a top-down and generic regulatory framework in (Anker and Jørgensen, 2015). Thus, the regulatory regime regards natural resource management as predominantly a scientific/engineering problem that underestimates the differences in preferences coming from deeply seated value differences that exist largely independent of technical solutions (Daniels and Cheng, 2004, p. 128). This regime also relies on conventional communication and participation activities, where the authorities reach out to the citizens via traditional methods such as hearings, letters and debates in local media. However, technology has changed substantially and as Walker et al. (2015, 138) stated, "We now recommend and employ social media (e.g., Facebook, Twitter), email, websites, and blogs to both communicate with stakeholders and invite their participation."

The wind turbine industry has expressed their concerns regarding wind power opponents use of communication strategies. Thus it has been hypothesised that a few very active individuals voice their opinions outside their own community leading to the development of local resistance (Viden om Vind, 2013).

In this study, we set out not only to quantitatively map the wind energy controversy on Facebook but also the characteristic of concerns communicated through social media and it shapes protests towards wind power sites. This is important because opponents to wind energy is believed to have a profound impact on energy planning through social media, but not necessarily in ways hypothesised by e.g. the wind industry.

Hence, in Section 1 we ask the following question: What is the role of Facebook groups in the formation and distribution of concerns towards specific wind farm sites in Denmark?

In Section 2, Literature Review, we address some prevailing theories on the role of the web and social media in local resistance within techno-scientific controversies. Section 3, Methodology, explains first how the Facebook corpus has been mapped and then how the content of the corpus (i.e., different categories of posts) has been coded and analysed. In Section 4, Results and Discussion, we first consider some methodological challenges before we discuss and answer five guiding questions that considers social media as a space for communicating anti-wind siting viewpoints on Facebook, distinguishing between different user groups, subjects and activity types. In Section 5, Conclusion and Policy Implications, we answer the advanced research questions and give some ideas on how to ameliorate the building up of conflicts around wind turbine siting by a more deliberate use of social media as an important part of energy planning.

2. Literature Review

The term 'social acceptance' has faced definitional difficulties over time (Fournis and Fortin, 2017), as the validity and normative implications of the concept have been rightly questioned. Ellis and Ferraro (2016) have summarised the criticisms and point to the risk that it oversimplifies a complex social phenomenon. In doing so they suggest a broad definition of social acceptance inspired by Upham et al. (2015, 107): 'a favourable or positive response (including attitude, intention, behaviour and — where appropriate — use) relating to proposed or in situ technology or social technical system by members of a given social unit (country or region, community or town and household, organisation)'.

This definition is a break with the normative notion of reaching community 'acceptance' or 'overcoming' opposition as well as the prevalent Not-in-in-my-back-yard (NIMBY) rhetoric, which has been criticized as obscuring the rationales of nuanced local responses lying between outright opposition and full acceptance (e.g. Bell et al., 2013; Batel and Devine-Wright, 2015; Devine-Wright, 2005 2011; Jones and Eiser, 2010; Papazu, 2017; Wolsink, 2012, 2007, 2006).

A Literature review regarding both social acceptance and social acceptability by Fournis and Fortin (2017) convey both the richness and the limitations of the major questions that have so far driven the efforts to elaborate a conceptual definition. In doing so, they elaborate on social acceptability and add a territorial perspective. Social acceptability is then described as a complex process that seek to bring together numerous variables that are attached to the three levels macro/-meso/micro, each one relating to specific temporalities. The challenge is to gather these variables into a coherent frame from which would emerge a project meaningful and desirable for the concerned territory (Fournis and Fortin (2017). One conclusion from the review is that it is difficult for most of territories to achieve a fully virtuous social acceptability of wind farm development projects (Fournis and Fortin (2017)

An early and profound public engagement process grounded in a communicative, deliberative dialogue taking account of people's concerns have often been highlighted as key to a more fruitful and effective wind farm development process (Aitken et al., 2016). Another highlighted key is the negotiation over local interests, for example compensatory measures and a fair distribution of benefits in affected communities (Cowell et al., 2011). However, these highlights have rarely been achieved in practice (Slee, 2015; Rydin et al., 2015).

Wind power planning is often related to "who is allowed to participate, how their voices are heard, how the various positions are negotiated, and how the project plan is adapted to the views expressed" (Jolivet and Heiskanen, 2010). Inappropriate consideration of the local community and its concerns and values often lead to severe conflicts that spread in several directions where by the number of unhappy community members increase (Borch, 2018).

Some developers of wind power have prepared media strategies, such as identifying and supporting 'champions' from within local communities with the goal of building acceptance through more organic social interactions (Lantz and Flowers, 2010). However, with the increasing universality and ease of access to different types of social media (the Internet, Facebook, Twitter, etc.), anti-wind campaigners can also become highly effective communicators. The power of social media has been demonstrated by Reusswig et al. (2016) in their study of a local conflict on a particular wind farm site in the state of Baden-Württemberg, where the potential opposition was mobilised via campaigns in both via traditional media (local radio, TV and newspapers) and via social media. Their analysis of the social media activities revealed very asymmetric results as those opposing initiatives and leading critical individuals were very active in advocating and posting their views and criticising other positions. On the other hand, supporters of the wind park were almost completely silent (Reusswig et al. (2016).

Within science and technology studies (STS), it has been suggested that voiced concerns in online media create useful opportunities for tracing how actors organise around issues in a controversy (Rogers and Marres, 2000; Venturini, 2010; Yaneva, 2013). Inspired by media studies and digital sociology, the proposition states that digital traces left by actors online (e.g., search queries, hyperlinks, comments, profile data, likes, friendship connections, etc.) can be repurposed for social research and support what Richard Rogers calls 'online groundedness' (Rogers, 2009 2013). Instead of validating insights from online analysis through additional offline work (e.g., by triangulating with interviews or observations on the ground) or confining the analysis to limited questions about the media (e.g., what occurs on Facebook or Twitter), the goal is to make claims about the controversy through the study of online data. Thus, the underlying assumption is that digitally mediated interaction is not a domain of its own but has become part and parcel of how controversies unfold (Venturini, 2012). As it has been shown previously, in the case of wind power controversies, it is possible to make

claims about the particular set of concerns that emerge in relation to particular turbine sites based on the interactions of users on digital platforms (Munk, 2014). This is true in two senses: 1) the textual data deposited in posts and comments can be coded to show how the visibility of issues changes over time and across contexts; 2) the interactional patterns of users, (i.e., the way in which they engage with each other by commenting on or linking to each other's content) can be used to identify groups of users that congregate around the same concerns and determine the centrality of individual users in relation to these groups (see also Munk, forthcoming).

3. Methodology

3.1. Mapping the facebook corpus

The mapped Facebook corpus contains 11,278 posts and 5772 comments from 73 Danish wind protest pages/groups dating from the creation of the page/group to the point of data collection in January 2016. We used the Netvizz application, which has been developed for Facebook API research by Rieder (2013), to collect the corpus. The application provides a full text record of posts and comments with various engagement metrics and time of creation as metadata. It also hashes the IDs of the users, which means that the author of a post or a comment can be identified across the dataset, even though the ID has been anonymised. We thus know which posts and comments each user has been authoring. It is important to stress that de-anonymisation is possible as long as the users choose to keep their posts and comments visible on public forums on Facebook, because a full text search would be able to identify a particular post or comment directly on the platform. The benefit of hashing user IDs, however, is that users remain anonymous inside the dataset and that a decision by a user to either remove their comments from Facebook or make them invisible to the public would effectively seal anonymisation. The 73 wind protest pages/groups were found using the Netvizz search module in January 2016. We searched for the terms "vind" (wind) and "møller" (turbines) in different combinations and qualitative selected all Danish wind protest pages/groups from the search results. Pages/groups that did not contain either of these words in their titles or about sections are thus not part of the corpus. We have to date no examples of wind protest groups being left out as a result of these criteria, but it is a theoretical possibility.

3.2. Coding and content analysis

To analyse and categorise the content of the collected Facebook data, the post-engagements from each user have been isolated in forty different PDF documents—one for each user—and gathered in the digital qualitative analysis program Atlas.ti. Here, the content of the engagements has been coded thematically in accordance with a predetermined—yet still case-sensitive—set of categories to be able to identify themes and subjects that characterise the debate. Each post-engagement might very well contain several codes, if the content covers several themes.

The code-set consists of nineteen codes divided into three different code-groups: tangible, intangible and no category (Table 1). The composition of the seventeen codes was carried out by the writers of this article with inspiration from Munk (2014). The code-set was at that point developed for the analyses of e-mail and letter correspondences among municipalities, citizens, higher administrative organisations and other stakeholders as well as citizen complaints and responses to public hearings/consultation periods concerning three wind turbine projects in DK reported by Borch et al., (forthcoming). The code-sets were then further developed from a thorough reading of the media coverage, objections and complaints, while making a note every time a new reason for objecting, supporting or expressing of any kind of opinion about the wind turbines was introduced (inductive approach). The code-set used for this analysis of Facebook users can be considered an updated version of the one used by Borch et al. (forthcoming) for the analyses of concerns in connection with the development of three wind turbine sites in Denmark so that it corresponds to the content found in the engagements of the Facebook users. The codes 'Macro-economic impact' and 'Micro-economic impact' have, for example, been added to the code-set during the coding process of the Facebook users because this code was estimated to be descriptive of a large number of arguments of which no other code was deemed descriptive.

In addition to empirically grounding the changes in the code-set, the codes have also been compared and adjusted in accordance with categories and variables used for explaining and theorising the social acceptance and public perception of wind turbines by Wolsink (2012) and Devine-Wright (2005).

In this study we follow the methodology path made by other scholars

Table 1
Explanation of code-set for analysing Facebook users posts (based on Borch et al. forthcoming).

Tangible (established rules/laws/procedures/parameters):
1. **Environmental impact assessment (EIA)** (Matters of the environment, problematic or insufficient EIA report + dissatisfaction with visualizations + concern for the environment, wildlife, endangered species e.g. protection of groundwater, protection of natural areas and impact on 'Bilag IV' species)
2. **Landscape identity** (Visual impact on the landscape, emplacement, visual harmony with other wind turbines and impact on cultural heritage)
3. **Noise and low-frequency noise** (Matters of noise, incl. the measuring of noise and low-frequency noise)
4. **Shadowing and light flashes** (Problematic shadowing, red light or light flashes)
5. **Economic compensation** (Fear of getting economically tied to one's present home + direct compensation systems/arrangements)
6. **Benefits** (Ownership, sales of shares community benefits, 'Grøn Ordning' etc.)
7. **Safety** (Fear of placing turbines near roads + fear of catastrophic failure e.g. wings falling off or fire + ice being spread by the wings)
Intangible (No established rules/laws/procedures/parameters):
8. **Welfare of domestic/farm animals** (Impact on for example mink, horses, cattle, dogs etc.)
9. **Health concerns** (Incl. sleep disturbance/dyssomnia, migraine, stress, concentration problems etc.)
10. **Trust** (Matters of trust and/or distrust aimed at the municipality representatives/developer/opposition groups/other decision makers + suspicion of conspiracy + prejudiced/non-cooperative/biased municipality/wind industry/other stakeholders + poorly thought-through policies, suspicion of incorrect/false/suppressed information/communication)
11. **Fairness of process** (Incl. low priority of rural areas, lack of benefits for the local community compared to the benefits for the developer, uneven composition of the local population, incapacitation/ignorance/lack of involvement of local citizens/community, pressure from developer, failing to meet official municipality visions, problems with or lack of communication between stakeholders, all matters of exercising a right of access to documents. Use of the words 'manipulation', 'betray, 'unfair', 'undemocratic')
12. **Place attachments** (Family life, impact on one's home, garden and everyday life, well-being, quality of life, dreams and matters of family/historic value, cohesiveness)
13. **Common sense arguments** (Dissatisfaction with the logic behind current laws, permits etc. + arguments about evidence including valuing/validating research, science and facts. Lack of evidence, problems with already existing evidence, ignored or unused evidence. The way evidence is produced is unacceptable + disagreements over the interpretation of facts, definitions, laws etc.).
14. **Moral, ethics and empathy** (Critique of double standards, matters of inhumanity, lack of empathy and disrespect of human life and values)
15. **Micro-economic impact** (Incl. low priority of 'udkantsdanmark', uneven composition of the local population, increase or decrease in local jobs, impact on local tourism)
16. **Macro-economic and climate change impact** (Incl. disbelief in the efficiency of wind energy/renewable energy when it comes to mitigate climate change, disbelief in the benefits for the national economy and/or "welfare state", higher electricity bills, concern about surplus production of energy from wind turbines and/or concern that electricity from wind turbines is sold too cheaply to foreign countries).
No category:
17. **Support of the project**
18. **Suggested solutions** (E.g. the discussion of onshore vs. offshore)
19. **Other**

of content analysis (Holsti, 1969; Krippendorff, 2012 2004; Neuendorf, 2016; Vaismoradi et al., 2013).

First, in this study, only one person has coded the data. Thus, the coding process relies solely on the interpretation of one person. While this ensures a high level of consistency in the coding process, two independent coders would be preferable in order to generate more reliable conclusions from a content analysis. The coding was discussed between the authors on a regularly basis in order to compensate for subjectivity by the coder and to generate statistical analysis. A few alterations to the code-set rules or merges of codes might change the quantitative output significantly. Therefore, the most useful part of this content analysis is the qualitative output in the form of a list of quotations under each code that provides the reader with insight in how certain themes of concern are communicated by certain stakeholders over time (Table 1).

During the coding process, the coder has chosen to assign codes to post-engagements rather than words, sentences and paragraphs. Thereby, the coder has ensured that each post-engagement is assigned a maximum of one code for each code type. This choice allows the coder to use Atlas.ti's analysis tool 'Code Document Table' to provide statistics of the distribution of codes, i.e., how many post-engagements have been associated with certain codes by the coder.

4. Results and Discussion

Of the 11.278 posts in the corpus, 7039 are from pages and 4239 are from public groups. A page on Facebook is by definition public (it cannot be closed or made invisible to non-members). This means that all posts and comments left by users on this page can be seen by everyone. It also means that Facebook is allowed, as per its agreement with its users, to share these posts and comments with third parties. A group, however, can be both public, closed or secret, depending on the settings chosen by its admins. Content from public groups, such as that of pages, is visible to anyone and can be shared with third parties. We only include public groups in the corpus and, hence, stay in compliance with the agreements between Facebook and its users.

However, even though the content of both public groups and pages is equally open, and thus in principle equally available for users to engage with, there may still be differences in the way it is promoted in the feeds of individual users or shows up in search results. Facebook does not provide detailed documentation on the way its algorithms filter content, and thus, we have to rely on other indicators to assess their possible effects. As shown in Fig. 1, posts in public groups are more likely to receive comments than posts on pages. Conversely, posts on pages are more likely to be shared than posts in open groups. We cannot know for certain why this is the case, but it suggests that Facebook does not provide the same visibility to content from open groups and pages. It is also possible that members of open groups have a preference for commenting, whereas users who like pages are more prone to sharing, or that users tend to post content on pages that are more shareable and in open groups that are more inviting to comment. The latter seems to be supported by the fact that we find four times as many shared links in posts on pages than we find in substantial status updates. For posts to groups, there is an equal proportion of shared links and status updates.

As shown in Fig. 2, almost half of the status updates receive comments, which is only the case for less than a third of the links. The links, however, are far more likely to be shared again by others. A hypothesis could therefore be that a combination of factors on the platform (algorithmic, cultural, and content related) prompt users to post more shareable links on pages than they do in open groups.

With this in mind, we now will guide our analysis by a number of underpinning questions that will help answer the overall research question of this study, namely, what is the role of Facebook groups in the formation and distribution of concerns towards specific wind farm sites in Denmark?

4.1. How localised are wind protests on facebook?

Wind protest on Facebook is predominantly organised through dedicated groups and pages. These are usually set up in response to a specific wind turbine siting and are thus local forums in which one could assume that local concerns are voiced. Thus, one way to explore how concerns about wind turbines spread on Facebook is to test if this assumption of 'localness' holds true. Are these groups and pages as local in practice as they appear to be in principle? We have adopted two ways of operationalising the test, namely, by gauging the degree to which users advocate their viewpoints across multiple forums through network analysis and by evaluating the content of their advocacy through discourse analysis.

As shown in Fig. 3, the first step is to ascertain whether users are active in more than one forum. If we define activity as a post or comment on a post (i.e. a more substantial contribution than a 'like' or a 'share') and we set a minimum criteria of one comment for a post to be taken into consideration (i.e. a criteria that discounts posts with no substantial engagement by other users), this results in 581 users who are considered in the dataset to be making substantial contributions. Out of these 581 users, as many as 472 or 81% are active exclusively on a single forum. Only 10 users are active on 4 forums or more, and no users are active on more than 10 forums in total. As there are 73 forums in the dataset, we

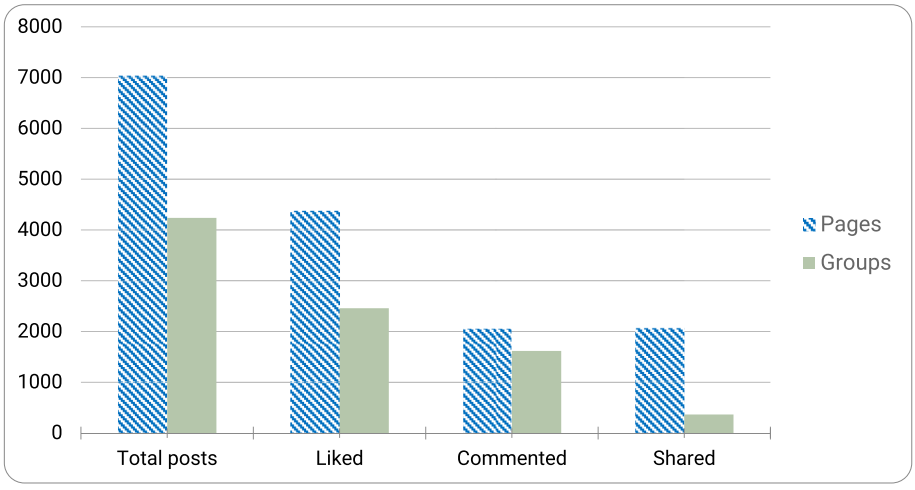

Fig. 1. Difference between Facebook pages (can only be public) and Facebook groups (can be both public, closed or secret) (x-axis) considering total posts and number of likes, comments and sharings (y-axis).

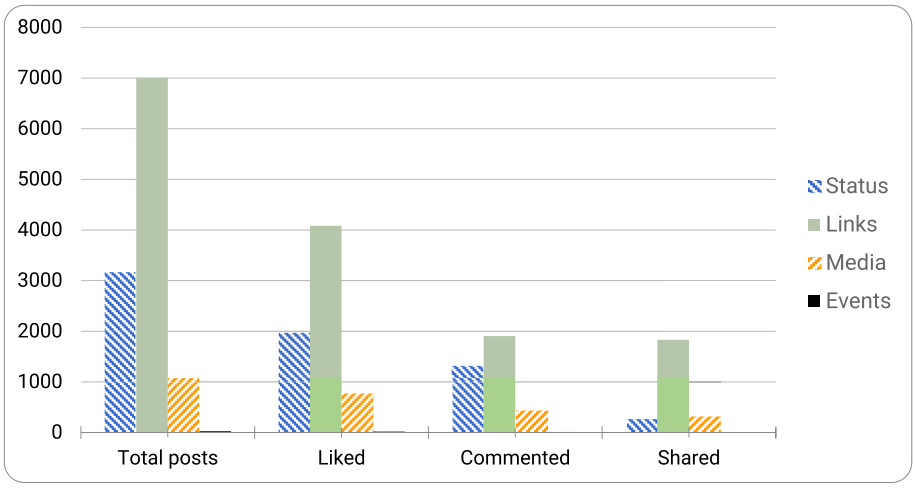

Fig. 2. Difference between Facebook status, links, media and events (y-axis) considering total post and number of likes, comments and sharings (x-axis).

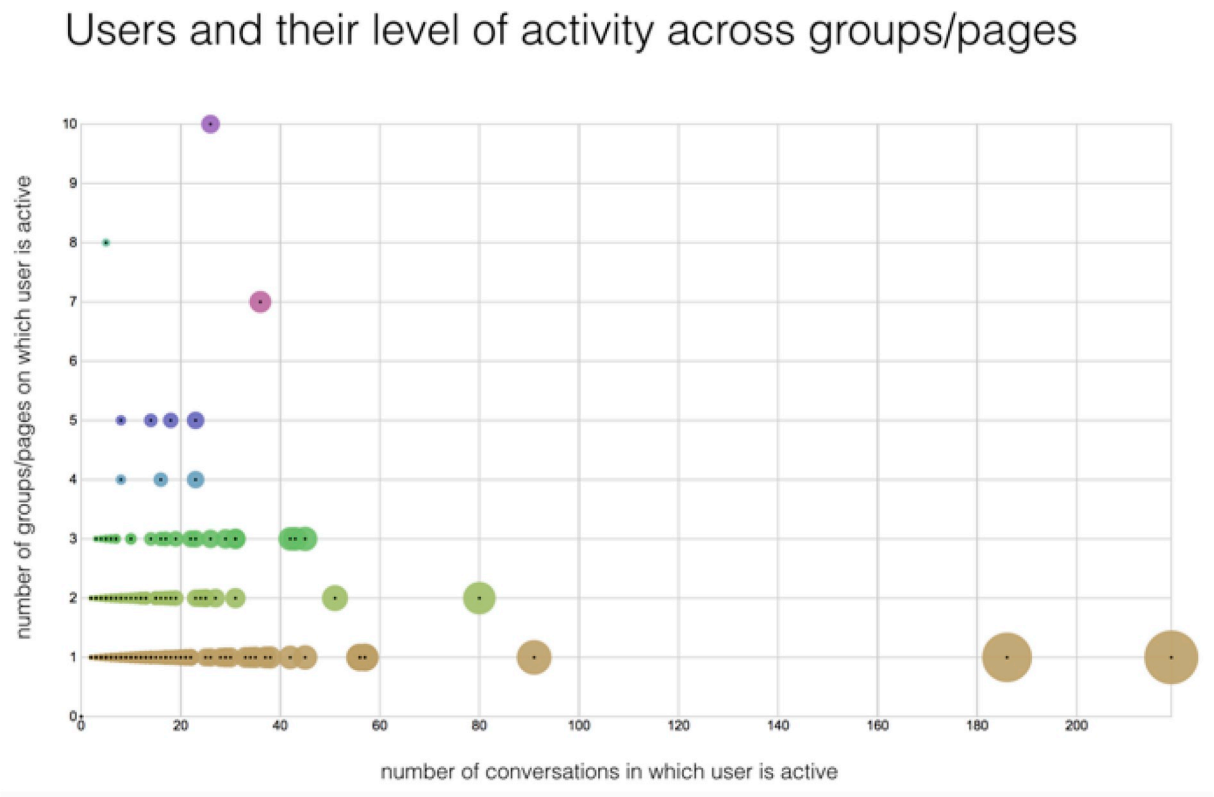

Fig. 3. Users and their level of activity across groups/pages.

conclude that no users come close to being omnipresent across Danish wind protest groups or pages on Facebook. Notably, this is after we have excluded the page owners from the analysis. Page owners would be naturally inclined to authoring content for their own page alone but even if we exclude them, most of the remaining highly active users tend to author content for only on 1 or 2 pages. We could have expanded the activity to include likes or shares, but given that sharing seemed to be driven by the way algorithms push content (with a marked difference between the pages and the groups in the corpus) and given that a like is a relatively gratuitous investment for a user, we decided to restrict the analysis to the actual authors of the content.

Indeed, the fact that a user is active on more than one page does not necessarily make that user less locally committed. As shown in Fig. 4, many pages and groups are effectively protesting wind turbine projects in the same local area and thus gather communities of multipage users around them that are every bit as locally committed as a single-page user. We have marked up clusters from the local areas of two Danish municipalities, Thy (siting of the National Test Centre of Large Wind Turbines) and Roskilde, to illustrate the point. The claim rests on a network analysis of how users (black nodes) interact with posts from different pages and groups (coloured nodes) by either authoring these posts or commenting on them. The graph has been spatialised with a force vector layout algorithm (ForceAtlas2) in Gephi. The layout introduces a repulsive force between all nodes, which is counteracted by the edges acting as springs and holding connected nodes together in clusters. It is thus possible to read clustering in the network as an

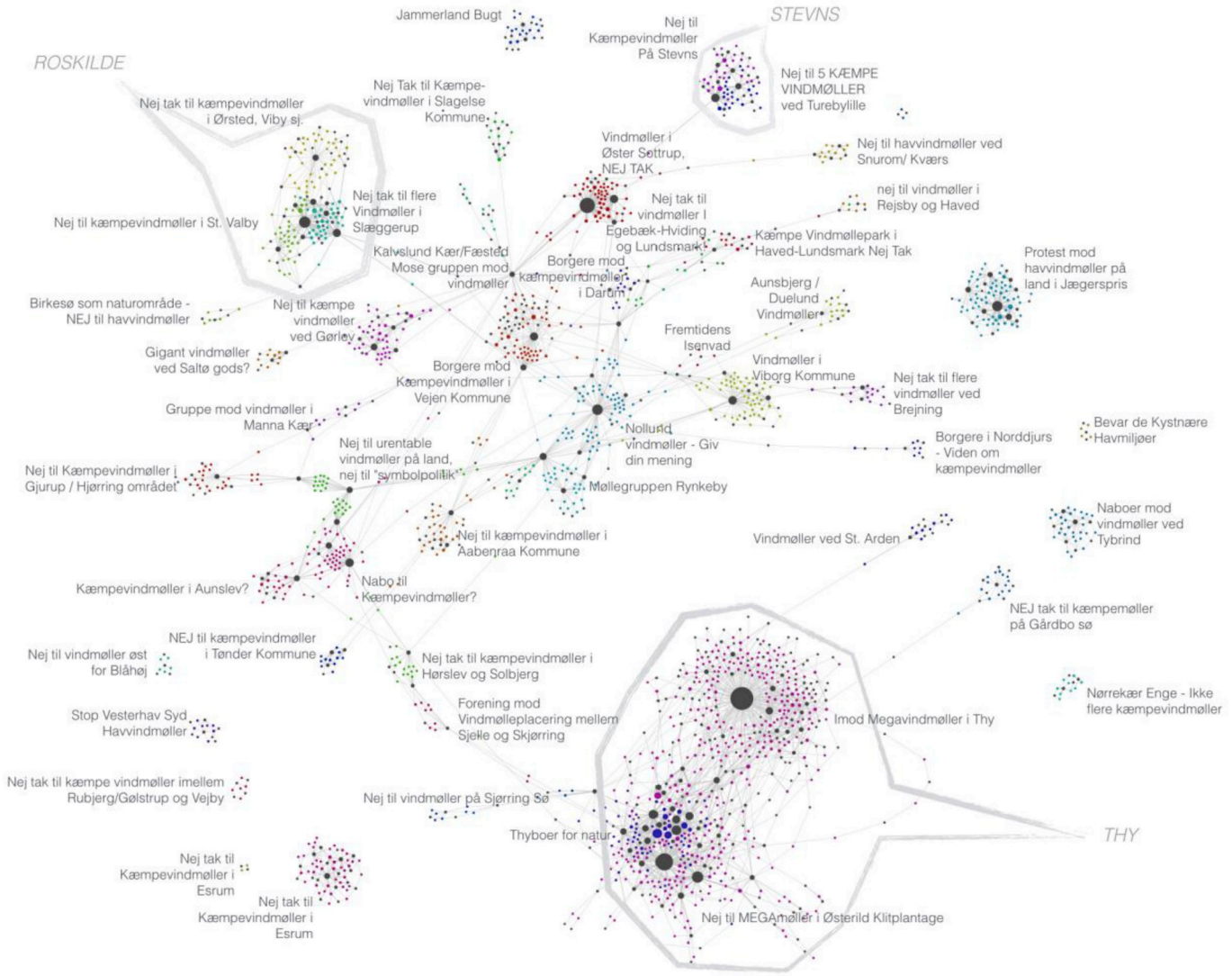

Fig. 4. Clusters of pages and groups protesting against local wind turbine projects. Two clusters of pages and groups from the two Danish municipalities Thy and Roskilde have been marked up.

indication that a large group of users are active around the same group of posts (from the same page/group when clusters are mono-coloured and from several pages/groups when clusters are multi-coloured). When we see content from different pages/groups occur in the same clusters, it is an indication of strong user overlap between these pages/groups. We find that these instances can almost always be attributed to the fact that the pages/groups in cluster are protesting either the same turbine project or turbine projects in the same local area. It is thus possible to conclude that, in general, Facebook users who protest wind power projects in Denmark are mostly locally engaged.

4.2. To what extent can we perform a qualitative discourse analysis on different groups of users?

The network analysis allows us to select users of particular interest for a qualitative discourse analysis of content. Specifically, we use it to select two groups of users who we label as 'community actors' and 'cross-cutting actors'. We are now interested in understanding if there is a difference among the concerns voiced by users that are active on a single localised forum (community actors) and those voiced by users that are active across many different sites (cross-cutting actors).

Community actors are defined as users that are active on 1 page or group only. We rank them so that we select the users that are active on the highest possible *variety* of posts within that page or group. We chose variety rather than sheer volume of activity since the latter could, in principle, favour users that comment many times on a few posts, whereas the former favours users that recurrently make their voice heard in different discussions.

Cross-cutting actors are defined as users that are active on at least 3 different pages and groups and have a high betweenness centrality (Brandes, 2001) in a bipartite network of users and posts. We chose betweenness because it favours users that engage in discussions with a diverse variety of other users and can thus act as bridging nodes in the network. Betweenness centrality is computed by mapping the shortest paths between all nodes in the network and subsequently calculating, for each node, the number of shortest paths passing through it. Effectively, this means that a node that connects many different clusters in the network will score high, whereas a node that is heavily connected in an isolated cluster will score low. Translated to users, this means that we rank them by their ability to bridge between communities.

4.3. What can be said about the differences between community and cross-cutting actors?

As Reusswig et al. (2016) states, opposition towards wind turbine projects does not only exist in "physical space" (rallies, civil

disobedience, public meetings, etc.). Opposition first and foremost occurs in "public discourse, i.e., the public use of arguments" (Reusswig et al. (2016): 221). In their case study analysis of a wind turbine site in Baden-Wurttemberg, they have used the methodology of "discourse network analysis" applied to mass media coverage (newspaper articles) as a means to visualise the linkages between actors and arguments. Their analysis emphasises, among other things, the asymmetrical relationship between the activity in both mass media and social media (Twitter, Facebook, etc.) of opponents and supporters, showing that opponents are remarkably more active in mass media and social media than supporters. Their discourse network analysis furthermore enables the authors to isolate 41 different arguments and divide them thematically into six different groups. Reusswig et al.'s analysis is further developed through "direct participatory observation" taking place at public meetings accompanied by personal interviews, which thus complements the analysis of discourse with an analysis of physical interactions (Reusswig et al. (2016): 223).

Whereas Reusswig et al. (2016) discourse network analysis to some degree resembles the methodological steps chosen for our own analysis, our aim is different since we on look at the deeper dynamics of Facebook. Thus, our focus is less on the linkages between actors and arguments, and instead we apply a content analysis to a broader composition of opposing Facebook activity to identify thematic patterns in arguments and patterns of activity considering what concerns are expressed.

As to the question of *what* kind of concerns are expressed by community and cross-cutting actors, Table 2 shows that a count of the codes applied during the analysis might give the reader an estimate of the distribution of concerns.

Furthermore, a comparison between concerns voiced by community and cross-cutting actors is shown in Fig. 5.

For a qualitative analysis, a quantitative count of codes is a controversial subject. Morgan (1993) has a few remarks on the act of counting codes in a qualitative analysis. Because the counting of codes enables both the quantitative and qualitative analysts to obtain "a sense of what is in the data" (Morgan (1993): 114), the use of these counts is not trivial. In a quantitative content analysis, a count of codes can be seen as a result in itself, whereas a count of codes in a qualitative content analysis can be seen as a basis for further interpretation. When qualitatively approaching wind power controversies and social media, as we do in this analysis, the above count of codes is useful as a first step in an interpretation process focusing on how these concern-patterns "came to be" and why they "occur in the ways they do" (Morgan (1993): 116). Our interpretation of the above is the following:

Table 2
The distribution of concerns from 1084 coded quotations shown as count of each code.

All (1084 quotations coded)	
1. Noise and low-frequency noise:	404
2. Fairness of process:	386
3. Landscape identity:	272
4. Health concerns:	254
5. Common sense arguments:	204
6. Environmental Impact Assessment (EIA):	186
7. Economic compensation:	164
8. Trust:	160
9. Moral, ethics and empathy:	158
10. Place attachments:	135
11. Macro-economic impact:	131
12. Suggested solutions:	109
13. Benefits:	89
14. Shadowing and light flashes:	73
15. Welfare of domestic/farm animals:	38
16. Safety:	30
17. Micro-economic impact:	21
18. Other:	17
19. Support of the project:	16

- Community actors are more active than cross-cutting actors.
- The top 6 codes are the same for cross-cutting actors and community actors, except for 'morale, ethics and empathy' for cross-cutting actors and 'environmental impact assessment (EIA)' for community actors.
- The codes 'noise and low-frequency noise' and 'fairness of process' are used significantly more than the other codes.
- The bottom six codes are the same for cross-cutting actors and community actors: 'shadowing and light flashes', 'welfare of domestic/farm animals', 'micro-economic impacts', 'support of the project' and 'other'.

The fact that community actors are more active than cross-cutting actors becomes less significant considering the small difference between the two groups in what kind of concerns they voice. The biggest difference we find is in the category of "morale, ethics and empathy". This is expected as cross-cutting actors are probably often giving general support over having a particular opinion about the details of a site, which often requires local knowledge. Thus, in the following analysis on how the concerns are articulated, we hardly need to distinguish between the two groups of actors.

4.4. How are the voiced concerns articulated?

Similar to what has been shown through numerous case studies of wind power controversies (Simon, 1996; Devine-Wright, 2011; Wolsink, 2012; Borch et al. (forthcoming)), concerns over noise, low-frequency noise, landscape and the environment are frequent matters of concern articulated by both groups of actors. We have chosen to categorise these concerns, along with concerns about shadowing, economic compensation and benefits, as "tangible" concerns because municipalities have the opportunity to address these concerns by referring to current laws and the "Wind power act" (vindmøllebekendtgørelsen)[3]. If tangible concerns are appropriately considered in accordance with the wind power act, then the municipality can refer to this and determine whether adjustments are needed. If, however, the municipality has not followed the wind power act appropriately, it can be expected that this will prompt distrust in the process, i.e., top two on the list of concerns. It is widely known that the municipality planners are under pressure when processing building permits and occasionally make mistakes. The problem with this is that concerns of, for example, tangible issues such as noise or impact assessment now become intangible, i.e., how do the authorities rebuild trust when Facebook posts spread the word of "common sense" that they cannot be trusted?

Hence, we now turn to the less tangible but abundant concerns considering values and perceptions. Here, "fairness of process" stands out. By fairness of process, we thus refer to either a fear of or an actual experience with being treated unfairly by politicians, public bodies and/or developers—that the whole process is undemocratic, arrogant, manipulative and/or unlawful. To illustrate this category, we have translated a few quotes from the actors, as posted on Facebook.

> *"Poor people. They are up against the greedy mafia [wind power developers Red.]. Yes and manipulating officials"*

> *"It appears to me as a rather incompetent peace of work the Environmental Agency has made with the new act of noise and quiet disguised. At any rate it is thought-provoking that they have to make such big miscalculations in order to find place to install wind turbines on shore???"*

> *"Hi anyone have any ideas how we can use the Østerildgate Scandal to help get rid of the VK [V=Venstre & K=Konservative: the two parties in the then right wing government. Red.] mafia in the coming election? If we*

[3] For an in-depth description of the Danish legal framework of wind turbine siting see: Anker and Jørgensen, 2014.

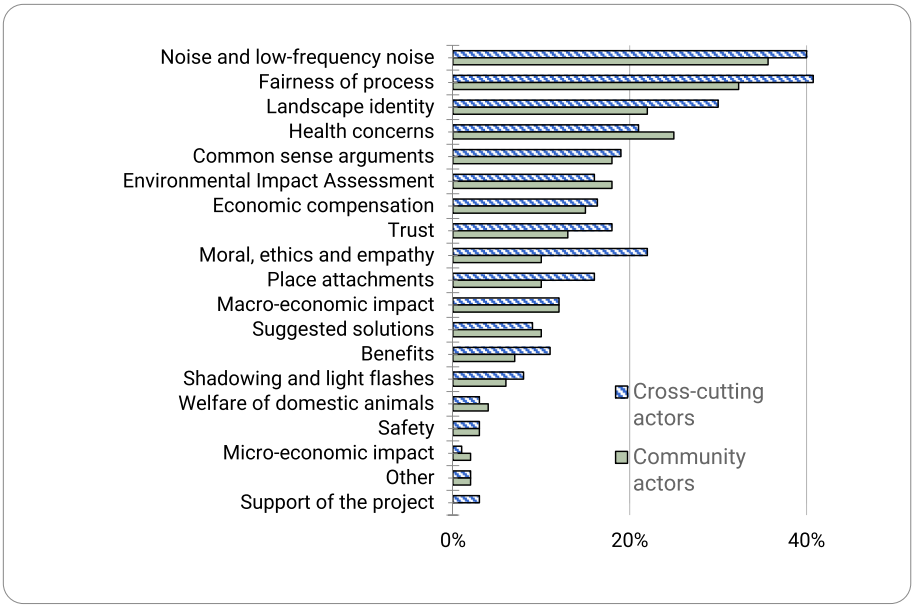

Fig. 5. Distribution of concerns across community actors (n = 662) and cross-cutting actors (n = 422).

can help EL [Enhedslisten: a far left wing opposition party. Red.] some way..the people need to know the level of corruption behind this test centre."

In addition, health concerns are frequently represented in the dataset and are illustrated with a few quotes as follows:

"A lot of money (taxpayers!) for the developers and landowners. The losers will be citizens who must live with health risks from low frequency noise, house losing value, and a nature spoiled by these giants."

"You cannot ignore all these people who report severe health nuisance in connection with their nabourship to giant wind turbines? Quite a lot of the people who complain about nuisance even was pro wind turbines before they were put up! Together this tells me that a problem exist and it must be investigated, and I personally do not want to be a guinea pig …. "

The code 'common sense arguments' is one of the more abstract codes applied to the dataset. Similar to the code 'morale, ethics and empathy', it refers to a certain tone in the argument and is therefore almost always used along with another code referring to the theme of the argument. It has been applied to quotes referring to facts, logic, knowledge, objectivity, reality, common sense, rationality, proof, evidence, science, documentation experience, etc. The following are a few examples:

"It is a scandal that the large wind turbines are put up this close to humans and animals. Even a fool will know why the mink ran amok"

"I hate these formulations like "the area can be used for (giant) wind turbines.." Why will they not listen to reasonable arguments ??? I'ts probably just about money money money!!: S"

Simply appealing to "common sense" is not an attempt at a strong argument (Facione and Facione, 2007, 179). Instead, we highlight this code to emphasise that these arguments are frequently used in posts and, therefore, are significant in order to understand why some discussions might lead to a dead end on Facebook posts. Moreover, from the point of view of communication, little can be done to address such types of arguments once they are propagated.

4.5. How are concerns managed by facebook users?

As to the question of *how* concerns are managed by the selected Facebook users, there appears to be three types of activities that dominate the dataset: 1) sharing knowledge, 2) organisation and coordination and 3) moral support. An example of 'sharing knowledge' is posts in which links to local, national or international newspaper articles or academic papers are shared with or without a short piece of explanatory text.

An example of 'organisation and coordination' are posts in which new members are welcomed to the group and in which practical information about public meetings, rallies, consultation periods and petitions are shared. This type of activity appears to occur mostly among community actors.

An example of 'moral support' is users who comment on other users' posts supporting their message and/or point of view expressed in the posts:

"…clear voice … !"

"Well spoken, [name]"

In particular, sharing links is another example, although it might appear to be a gratuitous investment for the user (in line with likes); however, it is notable as this feature of social media is significant for the body of knowledge that each Facebook page or group holds. From a strategic communication perspective, the challenge with shares is that they are biased towards the conformity of viewpoints within a Facebook group, leading to the collective confirmation bias of the individual members of the group.

In line with the experience from the case in Baden-Württemberg, Germany (Reusswig et al., 2016), this study on a large corpus of Danish FB pages clearly shows that social media is a powerful communication tool through its universality and ease of access in terms of voicing arguments against planned wind turbine sites. In fact, in both cases, local wind turbine opponents have been very effective in using social media to not only postpone developments but also prevent the implementation of targeted siting in local communities. A habitual pattern of thinking that is mutually copied by actors and reinforced by frequent use is often observed in the wind power debate (Wolsink, 2012), and no doubt social media can accelerate this pattern.

Community actors are not necessarily against wind power as such (Barry and Ellis, 2013); their focus is on relevant and legitimate concerns of the community. The fact that some of the users are cross-cutting more Facebook pages or groups does not make it less illegitimate, since

they voice similar concerns as community users. Instead it can be seen as chance for both democracy and low-carbon lifestyles following the 'republican' view on how agnostics over local wind power development involves the open and meaningful engagement of concerned citizens with the relevant public bodies to seek what is best for the public interest (Barry and Ellis, 2013).

5. Conclusions and Policy Implications

In this study of anti-wind turbine siting Facebook pages or groups, we set out to answer the following question: what is the role of Facebook groups in the formation and distribution of concerns towards specific wind farm sites in Denmark? This question opened a new set of underpinning questions that needed to be attended to first.

First, Facebook users who protest wind power projects in Denmark are mostly locally engaged. No users come close to being omnipresent across Danish wind protest groups or pages on Facebook.

Second, it is possible to distinguish between two types of actors considering the localness of their concerns: community actors who are active on only one Facebook page or group, and cross-cutting actors who are active on at least 3 different pages and groups and have a substantial ability to bridge between communities.

Third, community actors are more active than cross-cutting actors, but the top 6 codes are the same for cross-cutting actors and community actors, except for 'morale, ethics and empathy' for cross-cutting actors and 'environmental impact assessment (EIA)' for community actors. The codes 'noise and low-frequency noise' and 'fairness of process' are used significantly more than the other codes. The bottom six codes are the same for cross-cutting actors and community actors.

Fourth, we distinguish between two types of concern, namely, tangible and intangible. Considering the tangible concerns, the planning authority can likely provide an appropriate answer since they have the opportunity to demonstrate appropriate procedures for processing the building permit and to make adjustments if needed. However, this is not always the case and can explain why concerns about "fairness of process" are frequently voiced. This may lead to other intangible issues such as "lack of trust", "health concerns", "common sense arguments" and other intangible issues, for which neither the planning authorities nor the developers can supply a counter argument.

Fifth, in the top 10 concerns expressed on FB groups and pages, we find both tangible concerns such as noise, health, and landscape identity as well as intangible concerns such as fairness of process, morale, ethics and empathy. Why some concerns are more dominant in some areas than others is difficult to determine, but undoubtedly sharing between Facebook pages and groups has an effect. Language barriers do exist and to some extent can explain why voiced concerns from Danish Facebook page groups do not necessarily follow international patterns (see Munk, 2014). It is difficult to determine whether communication from the proponents of the sites targeting the noise issue would have changed or moderated the patterns on Facebook and thus the ranking, however, the silence from proponents certainly gives opponents a communicative and strategic advantage.

Sixth, tangible issues can often be assigned to issues of national regulations or procedural errors by the local authorities; failures that can be corrected harbour suspicions to some extent and, therefore, must be avoided. In any case, "fairness of process" and "lack of trust" are serious indictments of the local authorities that must be dealt with locally. Equally disturbing is that "fairness of process" is a dominant concern beyond the local community and a common concern across multiple forums.

In this study, we have confirmed that Facebook has the potential of becoming a 'resonance space' that opponents can mobilise to voice their arguments on wind power development in a public discourse. We also can conclude that authorities seldom participate in the debate on Facebook for example by addressing procedural concerns (e.g., failure to explain decision-making processes). If planning authorities and developers of wind turbine sites remain silent against the voiced concerns, then it can be expected that the debate will develop into groupthink and become a well for common sense where members perceive falsely that everyone agrees with the group's decision; silence is seen as consent. The local planning authorities are key opponents, and we believe that social media must be embraced in order to not only avoid groupthink about conspiracies, (e.g., between developers and local politicians) but also encourage dialogue from the very beginning of the planning process that may lead to innovative solutions to community concerns about local renewable energy solutions.

Although this study only focuses on social media, it is important to stress that both "old school" (mass media and hearings) and "new school" (social media) communication should be applied in order to deliberately create a dialogue where positions can be argued and contested. Thus, in line with Barry and Ellis (2013), we recommend that rather than fearing an open debate on social media of the development of local wind power projects, it should be welcomed as an opportunity for negotiated agreement to elicit public-spiritedness and engaged citizenship.

Credit author statement

Kristian Borch: Conceptualization, Methodology, Investigation, Writing - Original Draft, Writing - Review & Editing Supervision, Project administration, Funding acquisition.

Anders k Munk: Methodology, Software, Validation, Resources, Data Curation, Writing - Original Draft, Visualization.

Vibeke Dahlgaard: Data Curation, Writing - Original Draft.

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.

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