Energy Research & Social Science 83 (2022) 102337

Contents lists available at ScienceDirect

Energy Research & Social Science

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

Is large-scale wind power a problem, solution, or victim? A frame analysis of the debate in Swedish media

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ARTICLE INFO

Keywords:
Wind energy
Wind parks
Media content analysis
Land-use
National interest areas
Planning

ABSTRACT

Media content analysis was used with the aim of developing an understanding of how the debate on large-scale wind power has played out over time in Sweden, especially in relation to the enactment of national interest areas for wind power. Covering the period 1999 to 2019 and using NVivo for coding and analysis, we reviewed a total of 788 articles in both national and regional daily newspapers. To identify which actors are present in media and how they frame large-scale wind power, we conducted a frame analysis by applying three theoretical elements developed by previous media studies. The first is a diagnostic element used to pinpoint the cause to a problem, the second a prognostic element used to pinpoint the solution to a problem, and the third a motivating element used to identify the person(s) or object(s) suffering from the problem, that is, victim. Our results emphasize that wind power in recent years has been framed as a solution more often than a cause to a problem. One prevailing framing is the localization of large-scale wind power per se and conflicts with other land-uses and national interests. We also identify a tension between international and national policy objectives and local implementation of large-scale wind power. Governmental agencies are the most common framers over time, together with individuals (e.g. locals and second home owners) and wind entrepreneurs. Importantly, whereas politicians and wind entrepreneurs most often frame wind power as a solution, individuals frame it as a cause to a problem.

1. Introduction

Globally, renewable and clean energy sources represent a major opportunity to reduce emission impacts and reach international climate policy objectives [1,2]. Wind power is rapidly growing as a renewable energy technology [3,4]. The support for it is generally strong [5–8] with governments planning large-scale wind farm establishments. However, opposition to wind power is found worldwide [9–12]. According to Gorayeb et al. [13], opposition to renewable energy in North America and Europe originates from diverse and complex sources, ranging from socioeconomic to aesthetic and environmental concerns. Not least important is the human attachment to cultural and physical landscapes, the urban–rural divide, and the rights of indigenous peoples [14]. Le Tourneau [15] claims that an emerging challenge is reconciling the growing influence of local stakeholders with national public and international private sector interests, while Liljenfeldt [16] states that wind power development as a whole may be hindered as a consequence of increasing local resistance to planning processes that are perceived as unfair or excluding of local voices. Furthermore, recent research shows that by underlining certain aspects of wind power e.g. climate concerns and economic opportunity, authorities, wind power entrepreneurs and non-governmental organizations (NGOs) play a dominant role in influencing wind power policies [17].

To advance our knowledge regarding energy transitions and national planning initiatives for wind power, it is therefore crucial to reveal how the public discourse on large-scale wind farm establishments has developed over time. Media content analyses offer a reflection of emerging and dominating frames of energy technologies. Moreover, media plays an important role in determining which viewpoints are included and represented in the public debate on energy in general, as well as on the specific technologies [18–23]. Media shapes the public understanding of the benefits and risks with wind power [24,25]. Analyzing longer periods of time can reveal changes in the prominence of certain actors and frames in media as well as shifts in social perceptions [26,25], thus helping to inform energy transition decision-making [22,23].

Being a northern European country, Sweden has ratified ambitious environmental goals across many sectors to meet net zero emissions of

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https://doi.org/10.1016/j.erss.2021.102337
Received 7 April 2021; Received in revised form 16 September 2021; Accepted 7 October 2021
Available online 28 October 2021

greenhouse gases by 2045 [27]. In this respect, the establishment of large-scale industrialized wind power production is necessary all over the country, according to the recently published national strategy for sustainable development of wind power [28]. However, there is competition on how land should be used, with wind power challenging more traditional land-uses [29]. Such tensions between different land-uses are not unique for Sweden and can be observed in many countries such as Mexico [12], Chile [11], Brazil [13], India [10] and Norway [9], or as Avila [14] displays in her case studies from across the Americas, Africa, Asia and Europe. In Sweden, this results for instance in a large number of appeals, mainly in the north and predominantly concerning conflicts between wind farming and reindeer herding and other indigenous Sámi land-use rights [9]. Another expression is the heated debate over the municipal veto on the establishment of wind farms [16], which is currently being challenged [30]. Sweden is an excellent example where wind power is an environmental, economic, political, and civil society issue that is at the core of current challenges in physical land-use planning [9,16,29,31]. Moreover, Sweden provides a case of an economically highly developed country that strives to achieving ambitious climate goals while at the same time meeting its increasing energy demand.

Despite that wind power establishments often generate land-use conflicts and site-specific opposition, in Sweden and internationally, the localization of large-scale wind farm establishments, and renewable power systems in general, is often overlooked by research. A common planning approach is to exclude areas such as nature reserves and urban areas, with an underlying assumption that large-scale wind farms can be deployed elsewhere [32]. Such approaches are, however, likely to overestimate the socio-political willingness to accept renewable energy sources, and in particular the local acceptance of new large-scale establishments [33]. Since 2004, the Swedish approach has been to designate areas considered suitable for wind power as *national interest areas for wind power*. National interest areas identify geographical areas that contain nationally important values and qualities (see Solbär et al. [31] for a detailed description of the Swedish policy of national interests). However, the methods used for identifying national interest areas for wind power have placed wind power in direct opposition to other public interests [34]. To fine-tune the localization of wind power, the public discourse on wind power and the related physical planning tools need to be understood and further explored on a more aggregated level [35–37,8].

This study aims at understanding the roles of different actors in influencing which aspects dominate the public wind power debate. Moreover, it examine which viewpoints and planning approaches that are subsequently represented, and how this has changed over time. Using Sweden as a case, we used frame analysis to explore which national and regional media frames have developed in response to the rapid expansion of large-scale wind farms between 1999 and 2019 [38] and the establishment of national interest areas by the Swedish Energy Agency in 2004 [39], and what actors engaged as framers. To further nuance the understanding, we analyzed both national and regional newspapers to capture a range of heterogeneous claims coming from different social groups and public/private actors. By including articles across a period of 21 years, we followed how wind power has been framed across two decades, as well as identified potential changes after the enactment of the national interest areas for wind power. We also examined if there are perceived conflicts and/or synergies with other land-uses in terms of national interest areas. Altogether, this study advances our knowledge of the shifts regarding energy transitions and national planning initiatives for wind power, thereby adding new knowledge to land-use planning.

2. Media and frame analysis

Frame analyses can be carried out to examine which perspectives on a problem are presented in the media and which actors convey them [40]. Accordingly, the analytical departure for this study builds on research regarding the role of the news media and actors in the media as well as theories of framing [41–43]. It is well known that media reflects agendas and attitudes among the public, but according to Stephens et al. [24] it also plays an important role in developing the public's perceptions, not least by providing a channel for information that may increase the political or social salience of specific issues. In addition, different actors use news media as a platform to try and influence policy [19].

However, a "frame" is not a universally defined concept, and there is much research discussing different conceptual, ontological, and methodological approaches to what constitutes a frame [44] p. 156. Moreover, frame analysis is used in different disciplines, such as psychology and sociology [45], communication and media studies [46], collaboration [47], and policy research [48]. Nisbet [49] states: *"Framing—as a concept and an area of research—spans several social science disciplines. Frames are interpretive storylines that set a specific train of thought in motion, communicating why an issue might be a problem, who or what might be responsible for it, and what should be done about it"* p. 15. Based on frame theory and the three different elements of Benford and Snow [50], Feindt and Kleinschmit [51] developed a framework to study different frames through media analysis. The first frame element is diagnostic and used to pinpoint the *cause* of the problem, the second a prognostic element used to pinpoint the *solution* to the problem, and the third a motivating element used to identify the person(s) or object(s) suffering from the problem, that is, *victim* [51]. Here, we apply these three elements to identify, delineate and display the different frames that are prevalent in news media in relation to large-scale wind power. Depending on the actor (i.e., the framer) who frames the issue, the perceived cause, solution, and/or victims might differ. In addition, actors can also be perceived and framed as a cause, solution, and/or victim by other actors. These elements are further discussed in the Materials and method section.

Studies of wind power in both news and social media [52] that use different forms of qualitative content analysis or discursive approaches [53] have gradually gained international attention. Many of these studies focus on North American media e.g. [54], comparative state-level media, and frame analysis of critical climate change mitigation technology e.g. [24]. Other frame analyses focusing on energy policy include a deductive quantitative approach to identifying dominant frames (economic, environmental, science, political, social society, and technology) in Sweden and Australia [55], as well as a study on nuclear energy in relation to climate change in Dutch print media [56]. In contrast to previous research, our study is the first to our knowledge that departs from Feindt and Kleinschmit's [51] conceptualization of the three elements developed by Benford and Snow [50] and focuses on how wind power is framed in the media either as a cause, solution, or victim, and if there is a change over time. Similarly to Hallberg-Sramek et al. [40] who studied framings of woodland key habitats, we use this conceptualization as an analytical tool and sorting instrument when analyzing how large-scaled wind power is framed over time in the media. In a similar manner we also include both actor and non-actor categories. The reason for including non-actor categories was that we were not only interested in which actors are highlighted in the frames of other actors (that is crucial in studies of social movements, mobilization, and collective action, e.g. [57]. We also wanted to see what role the actors are assigning to, for example, the environment, localization, energy transition or large-scale wind power. This approach aims at contributing to an emerging field of research by examining how the frames on large-scale wind power have developed over time and what framers are active in the Swedish public debate. This in turn can advance our knowledge on the shifts regarding energy transitions and national planning initiatives for wind power.

3. Materials and method

3.1. Case description and selection of newspapers

From the beginning of the 21st century, there has been a rapid increase in the number of wind turbines built and effect installed all over Sweden (Fig. 1). In the beginning of 1999 Sweden had 486 wind turbines with an effect of 220 MW, and by the end of 2019 these numbers were 3 967 wind turbines with a total of 8 681 MW installed [38]. As previously stated, national interest areas for wind power were introduced for the first time in 2004 when the Swedish Energy Agency identified 49 areas across the land base. However, following technological advances (mainly turbine height), it soon became apparent that more areas than previously identified have potential to be suitable for wind power production. These areas were mainly in north Sweden and on forestland. Therefore, in 2007–2008, the Swedish Energy Agency carried out a revision of national interest areas for wind power, and then in 2013 the Swedish Energy Agency appointed a total of 310 national interest areas for wind power (281 onshore and 29 offshore/in lakes). Three onshore wind power areas were added in 2015. Currently, the onshore national interests for wind power cover a net area of 3,671 km^2, equal to 1.5 percent of Sweden's surface area including inland waterbodies [39].

Our study was based on newspapers, since this allowed us to analyze a longer timeline compared to social media. We included four newspapers: one national, and three regional titles covering different geographical areas in Sweden, all within areas of national interests for wind power and with already established and ongoing wind power developments, see Fig. 1.

We selected *Dagens Nyheter* (DN), as the largest national newspaper (in terms of coverage and subscribers) for the national view, and three regional papers (from south to north) – *Smålandsposten* (SP), *Göteborgs Posten* (GP), and *Västerbottens Kuriren* (VK) – for regional views and coverage. All four are politically liberal, but this is mostly visible on the editorial page, and not in the reporting articles. To account for this, we were conscientious in coding the articles into "argumentative" (debate articles, written either by editorial staff or other contributors, e.g. members of the public, researchers) and "descriptive" (reporting articles where the framing actors' claims are presented or retold by a journalist). In doing so, we wanted to have a clear separation between articles with purely opinion-building aims and those that had a more informative function, see Table 1. This separation is also relevant because of the crucial role that journalists can play in providing certain actors and viewpoints with more space than others [21,22].

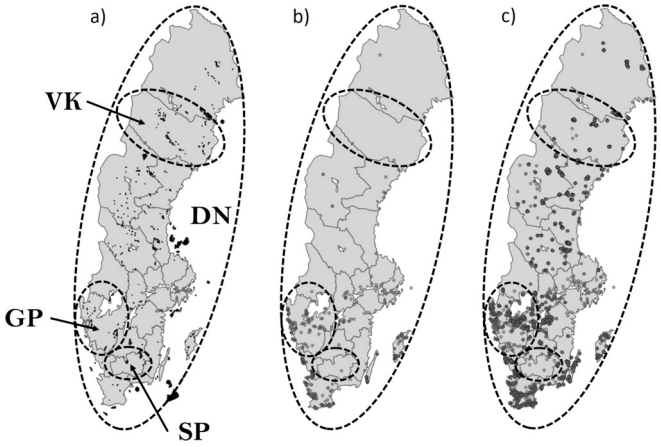

Fig. 1. Maps displaying a) national interest areas for wind power, b) the development of wind power in terms of the amount of wind turbines installed in the beginning of 1999 and c) in the end of 2019. The darker the dots are on the maps (b and c) the more wind turbines allocated on that spot. The coverage of regional newspapers (SP, GP and VK) is illustrated in all three maps. The national newspaper DN covers the entire country.

Table 1
Number (N) and percentage (%) of descriptive and argumentative articles in the newspapers.

Type of article Newspaper	Descriptive, N (%)	Argumentative, N (%)
DN	95 (68)	45 (32)
SP	170 (81)	41 (19)
GP	184 (70)	80 (30)
VK	119 (69)	54 (31)
Total N	*568 (72)*	*220 (28)*

3.2. Inclusion and exclusion criteria for selecting articles

Using our longer time period from 1999 to 2019 allowed assessment of whether there was a shift within existing frames, as well as whether new frames appeared. It also made it possible to identify frames and possible changes before and after the enactment of the national interest areas for wind power. We used Retriever's text database "*Mediearkivet*" to access articles, applying the search strings: ("wind power" OR "wind use") (in Swedish: *vindkraft** OR *vindbruk**) AND ("national interest" OR "large-scale" OR "wind farm") in the field "any of the words" (in Swedish: *riksintress** OR *storskalig** OR *vindpark**). These search terms were used to gain access to all potential articles covering wind power establishments while at the same time limiting them to only those that concern large-scale establishments. After downloading all identified articles, we removed obvious duplicates (articles published both in paper format and electronically with a maximum of one day between them), see Table 2. We kept the latest version, and in cases when the latest had been shortened, the longer version of the article was retained. In cases where the title of the articles did not match or the two versions (paper and electronic) were published more than one day apart, we removed the duplicates after close reading. Next, when reading and coding the articles, we added some additional articles that did not appear in the search but were referenced in the downloaded articles (inclusion and exclusion of articles will be displayed in detail in Appendix A).

3.3. Conducting frame analysis: coding, analysis, limitations and generalizability

Our search produced 1366 articles, with 594 being excluded according to the selection criteria and 16 added, with a net result of 788 articles left for analysis. To capture implicit content, we searched for expressions of ideas, value statements, and/or general assumptions about frames, actors, or similar in relation to the three elements cause, solution, and victim. When conducting our frame analysis, we combined deductive and inductive approaches, since using solely a deductive approach risked missing new, emerging frames [58]. We had some given frames derived from previous research [55] that we based the initial exploration on. Given the explorative character of our study, we added additional frames (e.g. collaboration, cooperation and dialogue as solution) as we went through the material based on what was stated in the articles by different framers. In this process, codes were edited, merged,

Table 2
Overview of hits, excluded and added articles and the number left for analysis for each of the newspapers.

Newspaper	Hits	Excluded	Added	Left for analysis
DN	315	178	3	140
SP	310	106	7	211
GP	487	224	1	264
VK	254	86	5	173
Total N	*1366*	*594*	*16*	*788*

or deleted in their respective nodes depending on their prevalence in the material, as well as their relevance for the research questions and frames. A coding manual was developed and used to ensure that the identification and categorization of the actors and their statements was done consistently. The manual contained questions in line with the three elements developed by Feindt and Kleinschmit [51] that helped to identify the different frames as well as provide descriptions for all categories (in NVivo named "nodes"). Each actor (or framer) framing the subject in an article, either as a direct or indirect speaker, was coded. It is important to keep in mind that in the case of descriptive articles, the framer's words and framings have been chosen and presented by journalists who can act as "gatekeepers" by having direct power over the framing of problems, as well as indirect by deciding on whose framings are to be included and made visible [21]. In other words, the interpretation of framers' visibility in descriptive articles should only be made when considering the central role journalists play in it. In some cases, there was more than one actor framing. If an actor framed another actor or subject as a cause, solution, or victim multiple times in the same article, *and* in the same way, we coded that frame only once. However, if the actor framed the same actor or subject in a different way, then we coded that frame too. Accordingly, the outcome of this procedure was more frames than articles in total; i.e., 2685 frames in 788 articles and a mean of 3.41 frames per article. In addition to coding data regarding the actor and their framing, we coded some other background data (e.g., year of publication, publication source, and if the article was argumentative or descriptive).

The material was classified and coded according to the categories presented in Table 3 (see also Appendix B). Before actual coding, and similarly to Smith et al. [25], two persons in the research group worked together by testing and developing interpretations for the content analysis, as well as calibrating the codes. One researcher was then responsible for coding the rest of the articles, while the other validated the coding regularly during the coding process [58] by coding and comparing random articles to ensure similar interpretations of the material. Data management and coding was performed by using QSR International's NVivo 12 Plus software [23,25,59]. A sample of analyzed articles was continuously re-examined to ensure that the analysis did not change over time. To support our interpretations of the implicit content/frames and increase credibility of the analysis, we describe the line of thought and provide quotes or paraphrasing. All quotes presented were translated by the researchers.

In our content analysis, we first investigated and quantified the presence or absence of certain frames to account for trends and shifts over time [25,26]. We then looked for patterns of relationships between frames and/or framers by conducting a structural analysis of the data [51], again accounting for potential changes over time. We are aware that the local coverage and presence of newspapers has diminished in recent years, and that the Swedish media landscape has changed, but still, even today daily newspapers substantially influence public opinion [60]. Since our analysis is limited to media content and thus to the perspectives and agenda of the sources used [61], our results do not have the ambition to be representative of an objective public opinion [22] nor to generalize how that opinion has developed over time. The generalizations can only be made in relation to how the portrayal of wind power has changed over time in media. However, media is an important forum for public discussion and media content analyses can help investigate emerging social perceptions [25] and thus guide decision-making [23].

4. Results

4.1. How is wind power framed?

Wind power was framed almost equally as a cause of a problem (n = 669) and as a solution to one (n = 648), with a slight difference observed in argumentative articles. There, wind power was framed more often as a cause than a solution (Table 4). In regional newspapers, wind power

Table 3
The categories/nodes used for classifying actors (i.e., the framers) as well as their frames (i.e., what is perceived to be the cause, solution, victim) when it comes to large-scale wind power.

Categories/nodes	Coded as framers	Coded as frames: i.e., cause, solution, and/or victim	Description and operationalization of the categories/nodes used for coding framers and the three elements that identify cause, solution, and victim
Journalists	X	X	Includes reporters and editors
Researchers	X	X	Includes researchers from various disciplines
State actors	X	X	Includes the national government, national politicians, County Administrative Boards, defense sector, government agencies (i.e., Swedish Energy Agency, National Board of Housing, Building and Planning, Swedish Environmental Protection Agency)
Judicial actors	X	X	Includes courts (land and environmental courts) and lawyers
Municipal actors	X	X	Includes local government and local politicians
Landowners	X	X	Includes individual landowners and landowner organizations or forest owner organizations
Wind entrepreneurs	X	X	Includes both private and state-owned companies
NGOs	X	X	Includes non-government environmental organizations and other organizations
Sámi indigenous population	X	X	Includes both reindeer herders and non-reindeer herders
Fishermen	X	X	Includes both individuals and corporations
Individuals	X	X	Includes people who are not affiliated with any organization – citizens/locals and second home owners, taxpayers, and electricity consumers
Large-scale wind farms		X	Both large-scale establishments as well as planned/decided wind farms. Here, even small-scale wind power is considered, as it is sometimes framed as a solution or cause in relation to wind power use in general. It also includes the role of wind energy in relation to water and nuclear power plants, as well as the possibility of it providing a stable energy source
Conflicts/synergy with other national interests		X	Includes references to national interest areas in general and national interest areas for national defense, nature conservation, outdoor recreation, valuable materials, expansion of cities, etc. Forestry is not a formal national interest but is included here
Localization aspects		X	Includes geographical placement south to north, spatial distribution, i.e., sea,

(*continued on next page*)

Table 3 (*continued*)

Categories/nodes	Coded as framers	Coded as frames: i.e., cause, solution, and/or victim	Description and operationalization of the categories/nodes used for coding framers and the three elements that identify cause, solution, and victim
			coastal, inland, forest, mountains, urban, or rural context, within national interest areas for wind power or where wind farms already exist
Environmental aspects		X	Includes nature conservation, i.e., formal protection, clean water and air, biodiversity, animals (reindeer, birds, fish, etc.), and the environment in general
Economic aspects		X	Includes profitability, property values, financial compensation, job opportunities
Social aspects		X	Includes welfare, social development, and social values such as landscape views, recreation, hunting, tourism, cultural heritage, aesthetics (untouched nature), etc.
Laws and agreements		X	Includes national and international laws and agreements, i.e., national targets for 100 percent renewable electricity system by 2040 and net zero emissions of greenhouse gases by 2045
Research and technology		X	Includes research about the effects of wind power and technological development, as well as inventories of areas appropriate for wind power
Collaboration, cooperation and dialogue		X	Includes collaboration, cooperation, coordination, and planning between different government levels, interests, and stakeholders, etc.
Other	X	X	Used as a starting point; later divided into new/added categories (see Appendix B)

Table 4
Frequency and percentage of top 5 framings per element category: cause, solution, victim, including subcategories. Note: For cause and solution, the frequency and per cent of framings are provided collectively for "wind power as a cause" and "wind power as solution", but also separately.

Framings	Newspaper				Total N = 2685 (% of total frames)
	DN N = 407 (%)	SP N = 888 (%)	GP N = 791 (%)	VK N = 599 (%)	
Cause					
Wind power as a cause	95 (14)	213 (32)	208 (31)	153 (23)	669 (25)
In conflict with other national interests	8 (5)	17 (10)	72 (43)	69 (42)	166 (6)
Not effective energy solution	25 (26)	40 (41)	18 (18)	15 (15)	98 (4)
Leads to environmental destruction	16 (19)	20 (24)	33 (40)	14 (17)	83 (3)
Causes noise	7 (12)	27 (47)	14 (25)	9 (16)	57 (2)
Cause in general	5 (11)	25 (54)	6 (13)	10 (22)	46 (2)
Location as a cause	17 (16)	28 (26)	33 (30)	31 (28)	109 (4)
Solution					
Wind power as a solution	136 (21)	187 (29)	190 (29)	135 (21)	648 (24)
Good for economy	16 (12)	55 (42)	26 (20)	34 (26)	131 (5)
Effective solution for energy needs	29 (24)	31 (26)	37 (31)	22 (18)	119 (4)
Good for environment	13 (18)	20 (28)	30 (42)	8 (11)	71 (3)
Collaboration, coordination and dialogue as solution	10 (12)	36 (43)	23 (27)	15 (18)	84 (3)
Location as solution	28 (15)	65 (35)	55 (30)	37 (20)	185 (7)
Laws and agreements as solution	14 (19)	19 (26)	22 (30)	18 (25)	73 (3)
Victim					
Environment as victim	16 (9)	63 (36)	54 (31)	43 (24)	176 (7)
Social values (e.g. landscape, quite nature, cultural heritage) as victim	7 (4)	64 (37)	53 (31)	47 (28)	171 (6)
Wind power as victim	20 (26)	28 (36)	17 (22)	12 (16)	77 (3)
National interest as victim	2 (15)	4 (31)	2 (15)	5 (38)	13 (>1)
Economy as victim	0 (0)	5 (56)	0 (0)	4 (44)	9 (>1)

was framed more often as a cause than a solution, while the opposite was valid for the national DN. Wind power was more often framed as a cause because it is perceived to be in conflict with other national interests (n = 166): "…such as endangered species or vulnerable ecosystems" (Journalist, VK, Descriptive, 7 August 2008) (see also section 4.4). "Governmental agencies" were found to be the most common framer of wind power as a cause in relation to other national interests.

Of the framings regarding national interest areas (both as cause and solution), we found 51 percent in the regional paper VK, with less than 2 percent in the national newspaper DN. The second most frequent framing of wind power as a cause was done most often by "individuals" and "journalists" in relation to it being perceived as a non-effective energy source (n = 98). The third was that it was framed as leading to environmental destruction (n = 83), most often by "NGOs". A commonly observed conflict in media was between wind power and locals, where wind power is framed as a cause of noise, destruction of the landscape, environment, and sights.

We found 648 framings of wind power as a solution (see Table 4), mostly by "wind entrepreneurs" and "politicians", where wind power was perceived as an effective energy solution (n = 403), with the leading subcategories "effective solution for energy needs" (n = 119), "good for environment" (n = 71), "effective renewable energy" (n = 65), and "alternative to nuclear energy" (n = 51) (see Appendix B for subcategories).

Wind power also had 77 framings as a victim (Table 4), most often by "wind entrepreneurs", "politicians", or "journalists". When wind power was framed as a victim, the most frequently coded cause was "governmental agencies" (n = 26), with the "defense sector" (n = 14) being the most frequent subcategory, due to its right to stop all land-use that is perceived to be potentially in conflict with national defense interests. The next most frequently framed cause in relation to wind power as a victim was "laws, agreements, and policy" (n = 14), followed by "politicians" (n = 8), "limited capacity for energy transfer" (n = 6), and "individuals (n = 6) where "locals" account for most of this latter code (n = 5).

We found an increase of the framings of wind power as both cause and solution with a peak of argumentative articles in 2011 (Fig. 2).

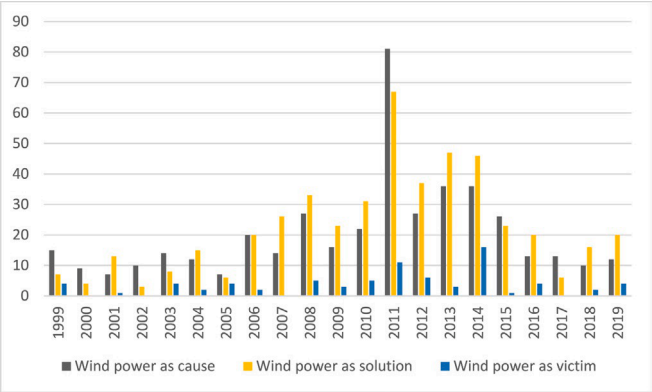

Fig. 2. Wind power framed as cause, solution, and victim over time.

Apart from the fact that these two framings were most prevalent in 2011, we do not observe any significant trends or variations over time in these framings, nor in the framing of wind power as victim (with a peak in 2014). However, post-2011 there is a tendency of more framings of wind power as a solution than in the early years (except in 2017).

4.2. How has media coverage and frames varied over time?

The number of articles framing large-scale wind power has varied over time (Fig. 3). We found an intensification of the debate in relation to very specific events that impacted on media coverage, i.e., decision of national interest areas, general elections, site-specific establishments, international climate conferences, and the adoption of national legislation and policy objectives concerning wind power production and establishments.

Four peaks are found: in 2004, 2008, 2011, and 2014. The 2004 peak is connected to the first time that the Swedish Energy Agency identified national interest areas for wind power. The peaks in 2008 and 2014 can also be related to the Swedish Energy Agency's mapping, revision, and update of national interest areas for wind power. The 2011 peak is much in line with the years where we found the most argumentative articles, while there is peak of descriptive articles in 2014. VK had in 2011 the highest number (n = 16) of argumentative articles published by any of the studied newspapers in a single year. This is partly due to site-specific plans and the Fukushima nuclear disaster opening up the debate on alternative energy sources. The peak in 2014 is mostly due to an increase in articles in SP.

4.2.1. Framing wind power over time – the peaks in 2004 and 2008

Most of the articles from 2004 are descriptive and mainly concern the designation of national interest areas for wind power, and the approval or rejection of permits for the establishments of wind farms at specific sites:

> *"If the Parliament's objective of increased production of renewable electricity is to be met, it is essential that national interests in electricity production from wind power can be weighed against other national interests in planning."* Swedish Energy Agency, VK, Descriptive, 27 October 2004

The argumentative articles from 2004 (GP and DN) focused on the debate around the closure of reactors in one of Sweden's nuclear power plants, as well as on the Swedish Energy Agency's mapping of national interest areas for wind power. In the former cases, wind power was framed as an ineffective energy source in comparison to nuclear power: "The sun, wind and water – the so-called renewable energy sources – have not been able to deliver the amount of cheap energy that northern industries need despite heavy subsidizing" (Editorial, DN, Argumentative, 11 April 2004). In the latter cases, wind power was framed as a threat to other national interests, as well as a threat to democratic values and principles: "[the minister] wants to make it harder for local opinions to appeal against wind power […] which is a part of the democratic process" (Non-specified individual, GP, Argumentative, 13 November 2004).

Like in 2004, the majority of descriptive articles in 2008 were either in relation to the revised mapping of national wind power interests or in connection to plans or decisions for the establishment of specific large-scale wind farms. Interestingly, we found more heterogeneity in the frames in 2008 compared to 2004; the articles published in GP generally include more frames than in the other three newspapers, indicating a more nuanced debate and framing of wind power. In 2008, large-scale wind power was framed in relation to national policy objectives, the limitations experienced by inadequate infrastructure, and the opportunities arising from technological advances in wind power turbines. All three regional newspapers (SP, GP, VK) reported on the government's aim to simplify and speed-up the procedures for large-scale wind farm establishments. They display competing framings in descriptive articles containing interviews with different actors who frame wind power either as a cause or as a solution. Among the examples is an interview for SP, where a local politician discussed other party members' framing of

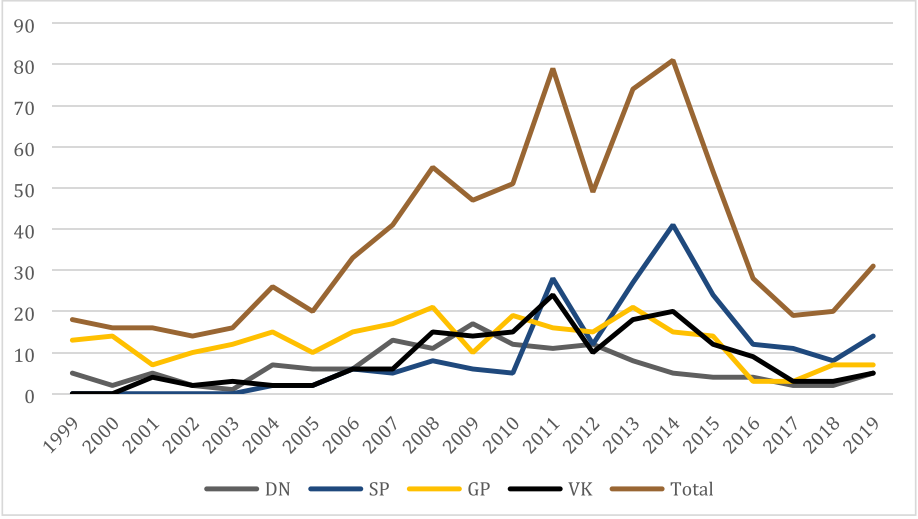

Fig. 3. Overview of number of articles on large-scale wind power 1999–2019.

local actors as victims of wind power, since its revenues do not stay at the local level. The politician proposed that landowners should be allowed to make profit through concession rights as a solution (SP, 15 October 2008). On the other hand, in an interview for VK, the chief executive officer of a wind company framed wind power as "the future" (VK, 6 March 2008). The newspaper also published an article where Sámi reindeer herders express their worries regarding plans to establish wind farms within their traditional pasture grounds in the mountains. They framed wind power as a cause and reindeer and reindeer herders as victims (VK, 7 August 2008). The articles in the national DN from 2008, besides focusing on the mapping of national interest areas for wind power and the establishment of specific wind farms, also framed advances in wind power technologies as a solution, and nuclear energy as the only viable alternative to fossil fuels.

The argumentative articles from 2008 were mostly for or against wind power either as an energy source or in relation to its establishment in specific areas, such as the Swedish mountain region. In half of the articles, the framers had a more positive view of wind power, framing it either as a solution and/or as a victim:

> *"Whether wind power is detrimental to the landscape or not, I leave to the beholder to decide. My opinion, however, is that it is a weak argument. Given that we need to move away from being a fossil-[fuel] based society, where additional electricity production that does not harm the climate in the long term is necessary, we may have to come to terms with an encroachment on the landscape."* Researcher, GP, Argumentative, 9 November 2008

The localization of wind power was also seen as a solution (SP, GP, VK) if placed away from housing and in forest areas (DN, GP) (further developed in section 4.4). In other articles where wind power was framed as a cause, it is seen as in conflict with other national interest areas on land use e.g., outdoor recreation (GP, VK) and reindeer husbandry (VK), and formal nature conservation protections (GP, VK), as well as an ineffective energy source that is expensive (DN), not climate friendly, and environmentally destructive (DN).

4.2.2. Framing wind power over time – Peak 2011

The third peak was in 2011, when we also found the most framings of large-scale establishments per se. The regional SP included a series of articles focusing on the debate on wind power in general, presenting different stakeholder perspectives. This series contained various framings of wind power – both as a cause (n = 54) and as a solution (n = 39), and/or victim (n = 11). Both VK and SP had many articles in relation to specific large-scale wind farm establishments in the region in 2011. In several of these articles, wind entrepreneurs and wind power were framed as causes, while the environment, social values (e.g., hunting, quiet nature, outdoor recreation), and locals were framed as victims. VK contained the most argumentative articles for 2011, including frames in relation to the development of plans for large-scale wind power establishments in northern Sweden following the national interest mapping by the Swedish Energy Agency. In these articles, northern Sweden, the rural population, locals, and the Sámi indigenous peoples were all portrayed as victims. Nature – both "untouched" as well as specific animals, such as eagles – was also framed as a victim of large-scale wind power.

> *"Why should wind power be established in areas where it isn't used? The answer is simple. Norrland's inland and mountainous area has a sparse population with a weak voice. The cherry on top must be to pick on the Sámi a little extra and make them look as whiners and reactionists."* Non-specified individual, VK, Argumentative, 12 January 2011

When wind power was framed as a solution in VK and SP it was often in relation to the creation of jobs and municipal population increases, and to being an effective renewable energy source. Wind power was framed as a victim in relation to local resistance or to current rules and regulations complicating and slowing down the establishment of wind farms (i.e., the municipal veto), seen as: "[…] a paradox that the state with one hand pushes for the transition to other types of energy and with the other hand establishes rules that make it take forever to get a permit" (Wind entrepreneur, SP, Descriptive, 25 February 2011).

The Fukushima nuclear disaster was among the common frames in 2011 for both the national and regional newspapers. During that year there was a focus on the positive and negative sides of establishing large-scale wind farms in specific areas, as well as on wind power as an alternative to nuclear power.

4.2.3. Framing wind power over time – Peak 2014

The fourth peak in 2014 was mostly due to an intensification in media coverage of wind power in SP. Here, wind power was framed as a solution in relation to being: efficient as a renewable and non-subsidized clean energy as opposed to fossil fuels (DN, GP, SP, VK); a means to reach regional and national climate targets (GP), if built restrictively (SP, VK); as leading to new jobs and regional development (SP, VK); as efficient in synergy with other energy sources (SP); and as not in conflict with other national interests (GP, SP, VK).

> *"There's hardly any active outdoor life, what do you want to protect? – Tommy Norgren believes that wind power instead can help develop both tourism and the active outdoor life on Holmön."* Wind entrepreneur, VK, Descriptive, 20 March 2014

In 2014, wind power was framed as a cause in relation to the construction of wind turbines having a negative effect on the environment, both the direct effects from the establishments as well as the indirect from the need for mineral resources for the production of turbines (DN, GP, SP, VK). Wind power was also framed as not being climate friendly and having negative synergies with other energy sources (SP, VK), not leading to profit (SP), not being effective (cannot be stored) compared to other energy sources (DN, GP, SP, VK), ineffective for reaching policy objectives (SP), threatening democratic values (DN), being in conflict with other national interests (DN, SP, GP, VK), causing landscape disturbances (causing noise, shadows), and negatively affecting the life quality of locals (GP, SP, VK).

4.3. Actors framing wind power in media

The most commonly coded framer overall was "governmental agencies", with the County Administrative Board being the most predominant framer in this category, followed by the Swedish Energy Agency, and the Government. The next most common framer category was "wind entrepreneurs", followed by "individuals" (which includes the subcategories "non-specified individuals", "locals", and "second home owners"). "Journalists", followed by "governmental agencies" and "wind entrepreneurs", were coded as the most frequent framer within the national newspaper, while at regional level "governmental agencies" were coded most frequently, followed by "individuals" and "wind entrepreneurs" (Table 5).

In the case of argumentative articles, the category "non-specified individuals" was the most frequent framer, especially in GP, followed by "journalists". "Locals" were especially active in writing argumentative articles in SP and GP. Wind power was framed as a cause most often by "individuals" ("locals", "second home owners", or "non-specified individuals"), followed by "journalists", "NGOs", and "politicians". Overall, wind power was by far mostly framed as a solution by "wind entrepreneurs", followed by "politicians". The other large group of actors that framed wind power as a solution was "journalists". "Governmental agencies" come fourth, followed by "other companies", "non-specified individuals", "researchers", and "locals". When it comes to framing victims, most framers – especially "governmental agencies" – identified the environment as a victim, while "journalists", "NGOs", and "individuals" also see locals/second home owners and individuals as victims.

Table 5
Number of times different framers (actors) were coded per newspaper. The "Other" category includes all remaining framers such as commercial actors, judicial actors, the Sámi indigenous population, etc. (see Appendix B for all actor category codes).

Framer	Newspaper				
	DN N = 232 (%)	SP N = 327 (%)	GP N = 389 (%)	VK N = 239 (%)	Total N = 1187 (%)
Government agencies	47 (20)	44 (13)	77 (20)	44 (18)	212 (18)
Wind entrepreneurs	42 (18)	44 (13)	46 (12)	42 (18)	174 (15)
Individuals (non-specified; locals; second home owners)	19 (8)	46 (14)	44 (11)	41 (17)	150 (13)
Politicians	20 (9)	57 (17)	48 (12)	20 (8)	145 (12)
Journalists	50 (22)	31 (9)	38 (10)	25 (10)	144 (12)
NGOs	9 (4)	36 (11)	32 (8)	17 (7)	94 (8)
Municipalities	3 (1)	22 (7)	34 (9)	12 (5)	71 (6)
Researchers	13 (6)	13 (4)	17 (4)	4 (2)	47 (4)
Other	29 (13)	34 (10)	53 (14)	34 (14)	150 (13)

"Governmental agencies" were active in framing wind power throughout the studied period (primarily in descriptive articles). However, we found quite a lot of variation in the number of framings by "governmental agencies". While their activity was stable in the period 1999–2004, they were coded less often in the following years with the exception of peaks in 2007, 2012, and 2015, ultimately reaching the lowest activity level in 2019. "Individuals" as framers, on the other hand, varied substantially over time. In the first year of the study – 1999 – "journalists" were most active as framers. They continued to be active as framers, with the exception of 2001 when they were not coded as framers at all. "Wind entrepreneurs" became active after 2005, reaching a peak as framers in 2011, then leveling out but still remaining active.

4.4. Large-scale wind power in relation to other national interest areas and "location"

The most frequently observed clashes of interests among the identified framings in relation to other national interest areas are those between large-scale wind power and national interest areas for nature conservation, outdoor recreation, cultural environment, national defense (DN, SP, GP, VK), and reindeer husbandry (VK, DN). National interest areas for wind power was framed only on three occasions as in synergy, i.e. with the mutual benefit of coexistence. Two times with tourism (DN, VK) and one with its potentially positive effect on fish populations (GP).

However, it is important to keep in mind that national interest areas is a term connected to localization that is not well known and addressed by the general public. Instead, localization was often discussed without it being clearly referred to as a national interest. Thus although the framing of wind power in connection to national interest areas was not frequent, the geographical localization of wind farms was framed as directly connected to wide-ranging landscape values, wind or environmental conditions, or energy needs – aspects that may be closely related to national interest areas. "Location", or the place where wind power is to be established, and not "wind power" nor "national interest area" per se (see Table 4) was framed as a cause (n = 109) or a solution (n = 185). When framed as a solution, it was often in regard to a location that is perceived as problematic:

> *"I think that the County Administrative Board should show greater respect for the archipelago's conditions. Personally, i believe that future wind farms should be located much further out to sea."* Local politician, DN, Descriptive, 11 April 2007

The framing of "location" as a solution was relatively evenly distributed between newspapers, with no obvious prevalence in regional or national newspapers. "Location" as cause, however, was slightly more prevalent in VK as opposed to the other newspapers. The "location" codes included subcategories that concern specific locations (i.e. "south", "north", or "coast"), but also "choosing the right location" – as in placing wind power away from housing or protected areas. "Individuals" (locals, second home owners, or non-specified individuals) most often framed the location of wind power establishments as a cause, followed closely by "government agencies" and "politicians". When "individuals" framed "location" as a cause, it was mostly because the specific placing is seen as "not suitable" (including being outside of national interest areas for wind power) rather than referring to geographical attributes (south, north, coast, mountain, etc.) as being the issue of concern.

> *"The proposed location for this large-scale industry is a good bit away from the areas classified by the Swedish Energy Agency as national interest areas for wind power. Nor has it been pointed out in Växjö municipality's wind farm plan as suitable for wind power establishment."* Non-specified individual, SP, Argumentative, 20 October 2015

This tendency is even more prevalent when "politicians'" and "NGOs'" frame location as a cause. The framing of "governmental agencies", in contrast, is more often due to geographical attributes rather than specific placement.

"Location" as a solution was most frequently framed by governmental agencies, followed by politicians and wind entrepreneurs, with "individuals" being the fourth most common framer. Here again we found some discrepancies between framers and what aspects of "location" they see as important in order for the placement of wind power to be seen as a solution. "Individuals", "politicians", and "NGOs" again see the specific placement of wind power as a solution rather than geographical attributes, while "governmental agencies" and "wind entrepreneurs" highlight specific geographical attributes ("south", "sea", "inland", etc.) as potential solutions to wind power placement.

> *"The potential for wind power in the mountain area is great and the conditions for transferring electricity together with hydropower are fantastic!* […]. [Our wind company] *believes more in wind power produced in the mountains than in offshore projects."* Wind entrepreneur, VK, Descriptive, 17 March 2007

4.5. Similar/or dissimilar framings between national and regional papers?

As expected, we found some variation in framings between the regional newspapers, depending on their geographical context. GP focused more than VK and SP on offshore wind farms and the effects that wind power has on the fishing industry and fish, while VK and SP were more focused on onshore wind power. As a national newspaper, DN covered all types of wind power establishments more or less equally.

A regional difference between GP and the other newspapers is that GP started to cover the issue of large-scale wind power earlier than VK and SP and much more frequently than DN. GP had the most framings of wind power as a solution, followed by SP, DN, and VK. Wind power was framed most as a cause in SP, followed by GP, VK, and DN. There is regional variation in the types of conflicts we observed. The regional newspapers had the most framings in connection to site-specific establishments ("location" as cause or solution), while the national DN had the least. We found the most frames of large-scale wind farm establishments as being in conflict with other national interests in GP, followed by VK, SP, and finally DN. Our results highlight a polarized

discussion in SP about the rural society, and how it has become a victim of economic interests in the face of large-scale wind power developments. When large-scale wind power was framed as a "solution" in relation to creating jobs and regional development, there was an expected concentration of those frames in regional newspapers (SP and VK). SP and VK also stand out in regard to large-scale wind power being perceived as "good for the economy".

5. Discussion

Our study shows that large-scale wind power is framed both as a cause and as a solution in national and regional newspapers. When framed as a cause, it is mostly in relation to conflict with other national interests or as an ineffective energy source that leads to environmental destruction cf. [13]. Whereas when wind power is framed as a solution, it is perceived as an effective energy source for energy needs, good for the environment, and an effective renewable energy source. Interestingly, and in line with recent research findings [17], our results reveal that there are competing views on how effective or ineffective wind power is as an energy source, depending on who the framer is. Wind entrepreneurs, journalists, and politicians often frame it as an effective energy solution, while individuals and journalists again are among the framers who see wind power as ineffective. When perceived as ineffective, wind power is often framed as a victim of limited capacity for energy transfer. This, in turn, relates to the fact that energy needs are greater in the south of Sweden, while many of the large-scale wind farm establishments are planned for the north [28]. There is thus a need for storage and distribution of energy, while storage technologies are still under development. The framing of development of technology as a solution has accordingly become more pronounced toward the end of the studied period cf. [9,36].

Over time, we noted an increase in the number of articles framing large-scale wind power, with an absolute peak reached in 2014 and then a steep drop. The peaks are connected to the Swedish Energy Agency decision on national interests for wind power and the later revisions, the establishment of specific wind farms, as well as in connection to debates on national and international climate change objectives and an energy transition toward a fossil fuel-free future. In addition, the debate on nuclear power, in particular in relation to the Fukushima nuclear disaster and the closure of a national reactor in Sweden, resulted in more media space for large-scale wind power and framings thereof. This connects to the constant competition for space in media, where journalists often act as information gatekeepers, deciding on which issues reach the public and which do not [21,62].

Already in 2008, we observe an increased heterogeneity of the frames. This is seen in relation to policy objectives, technological advances and limitations, and to wind power being in conflict with other national interests, as well as in connection to the placement of wind farms in the mountains or forests in rural areas. In this respect, we see similarities to the study of Delicado et al. [63]. When focusing on rural Portugal they concluded that the existing frames are often attached to a dichotomized cultural appreciation of wind farms either as technological tools for progressive landscape transformation or as a threat to its pristine image. The framing in the newspapers presents both prospects and concerns of large-scale wind power in relation to locals and the local environment but also in relation to global climate objectives. Thus, wind power is often framed in competing manners, i.e., as leading either to environmental destruction or regional development through the creation of jobs cf. [37]. Further, the tension between global/national policy objectives and the local implementation thereof is an aspect that research suggests requires an inclusive and participatory planning process locally/regionally cf. [16,31,33,35]. In this respect, the framing of wind power as threatening democratic values, i.e., the questioning and possible abolition of the municipal veto, has the potential to delegitimize wind power establishment and increase local resistance rather than make large-scale wind farms more accepted.

The framing of conflicts between national interests for wind power areas and other national interests is evident in the studied newspapers, but it is possible to detect a few synergies that reflect the importance of reconciling the human attachment to cultural and physical landscapes, the urban–rural divide, and indigenous peoples' rights when planning and deciding on large-scale establishments cf. [14]. Over time, the framings of wind power have become more complex, with many examples focusing on wind power in relation to its establishment in specific areas, such as in the Scandinavian mountains. In this respect, in addition to specific framings regarding national interest areas that is rather a technical tool, "localization" more generally, is framed by several actors as both a solution and a cause when it comes to large-scale wind power establishments. However, technological development and other considerations now make many areas outside of the designated national interest areas for wind power possible for large-scale wind farm establishment, and today more wind parks have been established outside than inside the national interest areas for wind power [64]. This underlines the importance of transparency and prioritizations between different land-uses when planning and deciding on the localization of large-scale wind power establishments. Making localization more predictable will also make it more legitimate in the future.

The most common framers in national and regional newspapers are governmental agencies, with the exception of SP, where politicians are most common, pointing to a higher degree of politicization of the issue in southwest Sweden. Governmental agencies stay active as framers throughout the whole period, while individuals such as locals, and wind entrepreneurs are active framers especially after 2005. Politicians are most active in framing wind power in 2014 – a general election year where we observe an intensification of the debate around the effects of large-scale wind farm establishments on the environment. This is also in line with the national ambition to fulfill climate objectives and obligations. Our results confirm the conclusions from previous research that actors use news media as a platform to influence policy [17,19,23]. Not surprisingly, politicians and wind entrepreneurs frame large-scale wind power mostly as a solution, pointing to the connection that wind power as a renewable energy has to the achievement of policy objectives. Individuals and governmental agencies (i.e. County Administration Boards and the defense sector) frame it mostly as a cause, since they focus more on the local effects rather than on overarching policy objectives. Wind entrepreneurs see wind power as the victim of governmental agencies, laws, and agreements, which feeds into the debate on which political and policy objectives should be prioritized.

Frames on wind power may differ between newspapers at the national and regional levels due to different relevance across spatial, social, and environmental scales. Our results also indicate that there is some variation in prevalent framings between the regional newspapers, mainly due to their geographical context, while the national newspaper has a more general focus. The regional newspapers have more framings of wind power as both a cause and a solution as opposed to the national newspaper. In the national newspaper, wind power is more often framed as a solution than a cause, indicating that national policy objectives for renewable wind power production may be better established and accepted at national level than at local. Also, in regional newspapers the localization of large-scale wind farm establishments is framed more extensively, and in conflict with other national interests. The discussion in regional newspapers regarding the benefits and the downsides of wind farm establishments in relation to locals' interests is also more polarized.

When it comes to local opposition, we did find more expressions of this in the regional papers compared to the national DN. Overall, it is clear that specific large-scale establishments of wind farms cause and fuel intense debates regarding wind power as shown by the identified peaks. However, this is not to be seen as resistance against wind power per se. Rather, it indicates the importance of discussing its localization. In this respect, local knowledge and viewpoints – including those of objectors – should be engaged with and taken on board in the planning

and development of large-scale wind power by planners and politicians cf. [35].

6. Conclusion

Our frame analysis has departed from Feindt and Kleinschmit's [51] framework based on the three elements of Benford and Snow [50] for investigating how wind power has been framed as a cause, solution, and victim over time in news media. It has proved to be a promising approach to capturing changes in terms of both framers and framings over time. Our work emphasizes that the framings of wind power across two decades (between 1999 and 2019) have gradually become more complex and diverse. There is an overall tendency for more framings of wind power as a solution to a problem toward the end of the period. Our analysis also displays competing views on how effective or ineffective wind power is as an energy source, depending on who the framer is. Similarly to previous findings, our results highlight that certain actors such as wind entrepreneurs, tend to underline the economic and environmental (climate) benefits of wind power. One important conclusion is that policy objectives regarding climate change and renewable energy that are established at the international and national level have not resonated to the same degree with other actors at the local level as they have with politicians and governmental agencies. Unless local actors are convinced about the broader benefits for society and the environment of establishing large-scale wind power, the issue of localization and conflicts with other land-uses will continue to stand in the way of energy transitions and national planning initiatives for large-scale wind farms.

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.

Acknowledgment

This work was supported by the SEA as a part of the project "Land-use synergy, integration or conflict in sustainable land-based wind power", grant 47419-1 (2019-2022). We are grateful for input on an early draft by colleagues in the Environmental Research Group, at the Department of Political Science, Umeå University. We would also like to thank Camilla Thellbro who prepared Fig. 1, and three anonymous reviewers for their constructive comments.

Appendices A and B. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.erss.2021.102337.

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