Taking a bird's-eye view: infrastructuring bird-turbine relations during wind power controversies

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Abstract

In this paper, we explore bird-turbine relations, which are becoming a point of contention in controversies over local windfarm projects. We conceptualize potential wind farms, together with the planning process preceding them, as a single 'infrastructural arrangement' that organizes how environments are known and affected by wind farms. Within the context of this infrastructural arrangement, we trace how two groups – opponents and developers of wind farms – discover birds as potential allies in defining specific bird-turbine relations that will help in either stopping or promoting wind farm projects. We observe two types of bird-turbine relations. In the first, which is present in current environmental regulations and is mobilized by wind farm opponents, birds are considered fragile and endangered by turbines. The second, proposed by a developer, problematizes current regulation through an alternative relationship of co-existence between birds and turbines, according to which birds are more robust and turbines less dangerous. This account of birdwatching leads us to discuss the many forms of politics that occur within or against the infrastructural arrangements of wind farm planning. We find that these politics have important consequences for whether or not wind farm projects are realized and for the way wind farms affect their surrounding environments.

Keywords

Introducing bird-turbine relations

What can wind turbines do to birds? What can birds do to turbines? And how may bird-turbine relations alter the actions of actors engaged in wind farm projects? In this paper, we trace how two groups of actors – opponents and developers of wind farms – come to discover and mobilize birds and change their own courses of action accordingly in order either to combat or create wind farms. We do so through a lens of 'environmental infrastructures' (Blok et al., 2016; Jensen, 2015; Jensen & Morita, 2017) as a means to explore how wind turbine infrastructures affect their surrounding environments, including birds.

In this study, we focus on how bird-turbine relations come to be known before the wind farms are built. Here we turn to the planning process for wind energy handled by the Danish authorities, which coordinates how proposed wind farm projects are scrutinized before they are approved or rejected. In part, this process organizes how wind farms are debated and assessed in public hearings, especially through the Environmental Impact Assessment (EIA) document (Clausen et al., 2021, pp. 735f). The developer must commission the EIA in order to establish that the project does not have intolerable effects on the environment, including birdlife, especially in relation to particular species of birds that are categorized as protected through the EU's Birds Directive due to their threatened or endangered status. Denmark's implementation of this regulation has been described as strict and as an obstacle to the further expansion of wind energy (Anker & Olsen, 2023). Dealing with birds in EIAs is highly dependent on the production of knowledge on collisions and the displacements of birds that turbines cause, as well as the integration of this knowledge into models for predicting the environmental impact of a given wind farm (Lee et al.,

2018). With our infrastructural lens in mind, we wish to view this planning process as an infrastructure in order to emphasize how this system organizes fixed practices and procedures for how information on new wind farms is generated and debated – not least with regard to birds (cf. Asdal & Hobæk, 2016; Bowker & Star, 1999). Hence, we see that the energy infrastructure of wind turbines extends into this planning infrastructure and becomes an integrated infrastructural arrangement that has specific ways of knowing and affecting environments, including birdlife. It is with this infrastructural backdrop that we follow how opponents and developers seek to explore and define bird-turbine relations.

This paper departs from our own realization that birds have certain relations with wind turbines. We are conducting ongoing fieldwork on local wind turbine controversies, exploring several cases of wind farm developments by interviewing stakeholders (local community members and opponent groups, municipal planners, politicians, developers), collecting documents (EIAs, hearing responses, news in local media) and attending public meetings. Our research project, 'Co-Green', is focused on the role of wind turbine sound/noise, which has previously appeared to be the major issue in wind farm controversies in Denmark (cf. Borch et al., 2020; Munk, 2014). Meanwhile, in the cases that we have studied, though noise issues are prevalent, they never stand alone, and one of the recurrent issues, apart from noise, is the question of whether wind farms create unacceptable conditions for birdlife. The impression that birds are rising on the agenda in wind farm debates is backed up by a growing number of news stories about considerations for the impact on wildlife leading to the wind farms being cancelled. Thus the headline from one of these news stories reads: "Noise used to be the problem: now geese, bats and birds of prey are also taking out wind turbines" (Jungersen & Røjle, 2021).

However, relatively little research has been done to explore the controversies that are caused by the co-presence of birds and turbines (for exceptions, see Lee et al. 2018; Nadaï and Labussière 2010; Solli 2010). To our knowledge, indeed, no work has been done on this matter in Denmark. Below, we take some first steps in describing how concerns about birds and turbines become entangled in Denmark. The significance of this research topic is that it opens up the core question of whether it is possible to care for the environment while solving the climate crisis, or whether greater environmental impacts should be accepted in order to reduce CO_2 emissions. Further, we consider that this case shows how the politics of public engagement around environmental and climate issues can be played out in unexpected ways.

Asking the research question of *how birdwatching construes a certain politics within the infrastructural arrangements of wind farm planning,* the paper is structured as follows. In the next section, we introduce our conceptual lens of environmental infrastructures. We suggest that this lens can be fruitfully combined with notions of alliance-making in order to trace the ways in which opponents and developers relate to birds in order to interact with the infrastructure of the planning system. Departing from these theoretical components, we trace empirically how opponents and developers try to build alliances with specific bird species. We end the article by discussing the political and infrastructural implications of bird-turbine relations, including their emergent politics and shifting relations of power, with sometimes surprising roles being taken up by different actors. Further, it is discussed if the perspective of this article can add to the conception of politics in the literature on the social acceptance of renewable energy technologies.

Concepts for understanding bird-turbine relations

In this section, we introduce our concepts for studying bird-turbine relations and their political consequences. Our way of tracing such relations is to view them through the lens of infrastructure, drawing on work centering on relations between infrastructures and environments (Blok et al., 2016; Jensen, 2015; Jensen & Morita, 2017). After introducing this overarching lens of infrastructure, we show how this can be fruitfully combined with classical notions of alliance-making drawn from Actor-Network Theory (ANT) in order to describe concretely

how opponents and developers try to establish certain infrastructured relations between birds and wind turbines.

Environmental infrastructures

'Environmental infrastructures' have been proposed as an important site for studying how both 'nature' and 'society' are made and related to each other through 'infrastructural arrangements' (Jensen & Morita, 2017, p. 618). Infrastructural arrangements affect these relations in complex ways as they simultaneously allow for the 'controlling' and 'knowing' of the environments in which they are embedded (Harvey et al., 2016b, p. 2). As infrastructure (and the environment for that matter) has a tendency to disappear into the background once it has been implemented, studying infrastructure depends on *inversions* – making the infrastructural consequences visible either through analytical work or by attending to breakdowns, crises and design processes where the presence of infrastructure becomes evident to the social actors (Blok et al., 2016, pp. 10f; Harvey et al., 2016a). When turning to the ongoing work of making, adjusting and stabilizing infrastructure, the verb 'infrastructuring' is favored by some authors (Blok, 2017). Using the notion of 'infrastructuring environments', Blok et al. (2016, p. 2) propose to follow how:

> [...] 'the environment' changes shape and multiplies, especially as we look more closely at variable material infrastructures and situated practices of infrastructure making.

Infrastructures knowing turbine-environments

The lens of environmental infrastructures is appealing to us, since constructing wind farms is obviously a way of infrastructuring the local environments in which turbines are emplaced. Attending to the planning stage of wind farms also constitutes an *infrastructural inversion* that makes it easier to study how actors evaluate the effects of the infrastructure of wind turbines. However, when turning to bird-turbine relations, we find another potential inversion matters to the actors we study: dead birds lying next to turbines after colliding with their blades. The possibility of collisions is a major point of contention that actors seek to sort out when birds are brought into wind farm controversies. In order to follow the path of actors trying to sort out how turbines may impact birdlife, we need to shift the view from *infrastructures controlling environments to infrastructures knowing environments*. Relying on the foundational work of Bowker & Star (1999) the conceptualized information and classification systems as forms of infrastructure, Blok et al. (2016) note:

> Drawing on Bowker and Star's contribution, in turn, we extend our notion of infrastructure to include all the technologies and organizations – of sensors, databases, research stations, protocols, accountability systems, and so on – which enable scientists, policy-makers, environmentalists, and citizens to know their resultant natural (or rather techno-natural) environments in specific ways, sometimes helping to stabilize particular orderings, sometimes opening up to contestation and change. (Blok et al., 2016, p. 3).

In line with this perspective, the process for planning wind farms can be viewed as a form of infrastructure. To view the planning system as infrastructure helps to emphasize how this system stabilizes a certain way of organizing debates about wind farm projects, as well as producing knowledge on the environmental impact of a wind farm in its EIA. Zooming in on an EIA's section on the impacts on birdlife, the infrastructural lens stresses how a series of regulations, classifications (lists of protected birds) and routinized practices (methods for sighting birds, predicting collisions) are brought together here. Just as Asdal & Hobæk (2016, pp. 98ff) describe parliamentary procedures and

their related 'document work' as infrastructures, we view planning procedures as they revolve around, for example, the EIA document, as infrastructure.

In the empirical section, we trace how actors tap into the planning infrastructure and try to use it. We stress that engaging with the planning infrastructure and its many entangled regulations and procedures requires skill and knowledge. Hence, we follow the 'technification' of both opponents and developers – that is, their strategies for learning the techniques, methods and arguments of relevant experts (Tironi, 2015). Further, we stress how infrastructures have ethical-political implications (Blok et al., 2016, pp. 14f.) since the ways in which society-nature relations are infrastructured organize the inherently moral matter of how humans and non-humans are interrelated and treated.

Birds at the center of the moral implications of infrastructure

A series of studies with birds as important actors highlights this moral component of environmental infrastructures, while also allowing us to move towards our empirical object. In Blok & Meilvang's (2014, pp. 30ff) study of activists engaged in criticizing an urban development project in Copenhagen called 'Nordhavnen', one of their examples is a birdwatcher who goes to the area to be developed. This site constitutes a good place for birdwatching in the city, and he documents his affection for the place with pictures and stories on a blog, which is used as a device to inform the local government what will be lost if the site is developed. Realizing how none of the birds spotted in the area are classified as protected, the birdwatcher turns his attention instead towards the green toads living in the area, which are protected by the EU's Habitats Directive and hence can be made an object of contention in the planning process for Nordhavnen. Bird-oriented activism may thus emerge from affective relations to birds and the places where they can be sighted. However, this account also highlights how birds' political capacity is contingent on how they fit with the systems that classify

species as endangered and worthy of protection. In another piece on activism revolving around birds, Rodríguez-Giralt (2015) studies the aftermath of the Aznalcóllar disaster in Spain, where excessive amounts of mine tailings containing heavy metals spilled into a natural park. The article traces how environmental groups examined birds, their deformation and deaths as a way to 'know' the extent of the disaster. Here birds are used by activists as 'indicators' of environmental damage (Rodríguez-Giralt, 2015, p. 162). Furthermore, we see how the activists problematize the risk of contamination spreading by pointing to the birds' 'wild' character, emphasizing their ability to fly freely. Nadaï & Labussière (2010) also pinpoint the uncontrollable nature of birds: Illustrating the challenges of composing a landscape with space for both wind turbines and birds, they turn to a French birdwatching organization engaged in the planning of wind farms in order to achieve acceptable conditions for birds. This is done especially through a method called 'micro-siting', that is, obtaining the birds' perspective as they fly around the area where the turbines are planned (Nadaï & Labussière, 2010, p. 219). Such sightings are translated into maps showing the movements of birds, which in turn inform the siting of turbines so that they are compatible with the birds' movements (Nadaï & Labussière, 2010, p. 228). In turn, Solli (2010) describes how birds enter into the arguments of opponents of specific wind farm projects in Norway. It is emphasized that the efficacy of such arguments is highly dependent not only on the legal capacities of birds (classified as protected or not), but also on their cultural status. Solli describes the forging of these arguments as a process of 'enrolling' birds into 'hybrid collectives' (cf. Callon et al., 2009) of opposition groups and birds.

Alliance-building

The ANT-based (ANT) vocabulary of alliance-building is useful, we argue, when tracing how actors discover birds and try to establish specific bird-turbine relations in order to develop or criticize wind farm projects within the infrastructural arrangements of wind farm

planning. Hence, we end this section with a brief note on enrolment.

The notion of enrolment is unfolded in Callon's (1984) study of three marine biologists attempting to refill St Brieuc Bay, Brittany, with scallops. For humans like the biologists to gather non-human allies like the scallops, Callon contends that 'interessement' as well as 'enrollment' is needed. 'Interessement' is a way of circling in and defining an actor, making it an ally by cutting off its relations to other potential allies and their different definitions. In turn, 'enrolment' denotes the strategies, negotiations and tricks employed in order to achieve interessement (Callon, 1984, p. 211). This process of interessement-enrolment often requires devices. In the case of the scallops, the device introduced by the biologists was a towline fitted with special collectors for capturing the larvae of the scallops and allowing them to grow safely into new scallops, hence shielding off the larvae from currents and predators, which would otherwise threaten the aim of domesticating the scallops in the bay (Callon, 1984, p. 209). Yet, the device proves unsuccessful. By and large the larvae refuse to be 'collected' by the towlines, thus turning out to be dissidents rather than allies of the researchers (Callon, 1984, p. 219).

Though Callon's account is about failed enrolment, other accounts present stories of successful enrolment, perhaps most famously Latour's (1983) study of Louis Pasteur's (1822-1895) work to enroll microbes in his laboratory in order to create an anthrax vaccine. In this story of enrolment, Latour notes that "science is politics pursued by other means", generating "fresh power" through new alliances with non-humans (Latour, 1983, p. 168).

In the following analysis, we wish to follow how actors are experimenting with enrolling birds in order to achieve fresh power. In the analysis, we trace how actors are learning to use devices in order to explore how turbines infrastructure the lives and potential deaths of certain bird species. In turn, we explore how these bird-turbine relations affect the realization of particular wind farm projects.

Analysis: Varieties of infrastructuring bird-turbine relations

The analysis is divided into two parts: first, we examine how local activists protesting against specific wind farm projects discover protected birds as potential allies in their efforts to have projects cancelled. Here the activists rely on the existing nature protection law that is embedded in the infrastructural arrangements of wind farm planning. Second, we turn to the case of a wind farm developer who is seeking to establish as fact the idea that birds are robust and can co-exist with turbines. Through this effort, the developer is trying to convince the authorities to alter the bird-turbine relationship by updating the relevant regulation.

In search of winged data points

Our empirical account starts in the North Denmark Region, where a group of concerned citizens have formed around fears of how they might be affected by an 'energy park' consisting of both wind turbines and solar cells that is being planned in their vicinity. This citizens' group have told their stories to newspapers, radio and television, they have made video clips with personal stories of their worries to be shared on social media, and they have even hosted a voter's meeting where they invited local politicians to discuss the energy park. In other words, many attempts at turning the energy park into a debated issue have been made, but with limited success, as indicated by an activist who suggests a different strategy instead:

> What we're probably about to rely on – and it's really, really annoying – is that we can find some endangered species that can shut the whole damn thing down. And it is super sad. Instead, the municipality could cooperate with us, so we could scale it [the energy park] down to a level that allows us to be here, too. (Interviewee A)

While the interviewee highlights that she is not against the project, merely wishing to downscale it, she notes that it has been impossible to open up a discussion of scale and of the invasiveness of the planned infrastructure. Consequently, the group turns its attention to endangered and hence protected species (especially birds) and the relevant regulations of the project's EIA. Turning to endangered species marks a shift in the strategies of the activists, having tried and failed to represent their own concerns about the wind farm. Instead, they choose to represent protected birds – an entity that, if observed and counted, can become a powerful ally in stopping the wind farm. To succeed with this strategy, the activists are enrolling more actors: they start collecting money to finance both a biologist and a lawyer with experience in this type of case. The lawyer has also encouraged the locals to do animal sightings, as one of the activists mentions during a public meeting:

> [Name of the lawyer] has recommended this – it is very important, because if we have found a rare species and the municipality has not dealt with it in their EIA report, then we can complain. (Field note)

Another active member of the citizen group having experienced other protests against wind farm projects has shared instructions on how to use 'DOFbasen', an online database for registering bird sightings run by the association BirdLife Denmark. When asked about why he shared DOFbasen, he says:

> We would like some more documentation because one thing is that people see the golden eagle flying out there, and they say they see it often. But getting pictures of it – that's something completely different. It's not that easy to document that it's still there to the extent it is. And that, of course, is one of the things 'DOFbasen' can be used for – to get it registered, right? (Interviewee B)

The quote above highlights how the activists are trying to connect to well-established infrastructure for registering birds in order to make their claims about the existence of endangered and protected birds recognized both by the more experienced birdwatchers of Birdlife Denmark and by the local authorities who are to review the EIA. Meanwhile, as the quote also highlights, doing these registrations well and with high-quality pictures can be difficult and requires learning and specific devices. Accordingly, some of the activists upgrade their devices in order to sight better:

> Well, every single time I'm out with the dogs, I always have my phone with me, and I bought a brand new phone because it had the world's best camera in it (laughs). In the beginning, I had such a bad camera in my phone, so I had to almost stand right next to the animal before I could take a picture, where you could see what it depicts. But with the new camera, it's just amazingly good. (Interviewee A)

Purchasing a new camera-phone and learning to use DOFbasen with the aim of complaining about the contents of the EIA can be viewed as an act of interacting with the established procedures of the planning infrastructure in order to question if the planned wind farm will infrastructure the local environment in acceptable ways. By doing so, the locals operate with(in) the already established frameworks of the planning process, building alliances and mobilizing a range of actors and devices to work in their interest. Whether this citizens' group will have success in recording 'proper' winged allies that are categorized as protected species is too early to say. But to get a glimpse of what might happen when such species are observed, we shall switch to another site in Denmark, where a wind farm project has been put on hold due to the recording of a red kite in the area, which required a revision of the EIA for the project. As one of the local politicians who is against the project sums up:

Unfortunately, that did not happen for the sake of the hundreds of families who had submitted 343 hearing responses. No, it happened for the sake of the red kite! (opinion piece)

When interviewing the politician, he elaborates further:

It's not the red kite or the sea eagle that people are so fond of. It's just the tools they find because the Statutory Order on Wind Turbines doesn't protect the citizens, it only protects the owners of wind turbines." (Interviewee C)

Once again, the sighted birds act as allies in trying to get projects put on hold. However, the words of the politician also highlight a moral ambiguity in enrolling birds, as the legal power of sighting a bird highlights the legal incapacity of many of the human-centered arguments that opponents use. The fact that 343 hearing responses filed by ordinary citizens matter less than a couple of 'special' birds is a thorn in the side of the politician. However, another thorn for the latter is the Statutory Order on Wind Turbines, which is the legal framework regulating wind turbine noise in Denmark. That this framework is intended to promote wind energy rather than protect neighbors of wind turbines is a common position among wind energy opponents, but their calls to radically change this regulation have proved unsuccessful so far. Sighting and recording birds is exactly a move away from articulating such issues to operating within and making the most of the rules of the planning infrastructure, making it work 'for' and not 'against' them. In a talk, a professor of law with a research interest in environmental law, Helle Tegner Anker, confirms that bird-sighting is a powerful device for stopping a wind farm, but that using this device comes with a feeling of injustice:

We have some very strict nature protection requirements in the EU. And I think it is well known among most people

that this is very often the neighbors' strongest card. (…) And that can be very good for the neighbors, but there may also be some neighbors who feel a little offended that it might be the well-being of the bats that matters more in the decision-making process than the well-being of the citizens and the neighbors. (Helle Tegner Anker in ku.dk, 2023)

This quote presents an argument that is very similar to what the local politician stated: birds or nature protection in general is an efficient tool – it is a "strong card" to be played. But embedded in this tool is a feeling of envy of the birds and other protected species which have legal rights that the opponents would like to be granted themselves. We find it extremely interesting how birds can be ambivalent tools to the opponents, giving them the powers to cancel or pause projects while also acting as a reminder of their own relative legal powerlessness.

Until now, this account of opponents enrolling birds as allies may give the impression that these birds are unloved instruments to the opponents. We wish to nuance this by showing how opponents may develop deep affections for the birds in the process of enrolling them. This is evident in the case where a red kite put the wind farm project on hold. After this happened, a few pictures of the red kite were posted in a local Facebook group with the following text:

Thanks Glen. You are our new mascot.
[Name of the municipality's main city] has Finne, we have you, Glen.
Here are some photos from your travels in the local area. There are many of us who see you and derive a lot of joy from you (Facebook post)

In Danish a kite is called a *glente*, and hence naming the kite 'Glen' could be seen as a way of both befriending it and giving it anthropomorphic traits, rather than just treating it like a tool. Yet, there is also

an antagonistic element to inaugurating the local kite into the Glen mascot: as remarked in the quote, the main city of the municipality also has a mascot – a dolphin called 'Finne'. This main city boasts the municipality's most supportive population for wind energy and is also where the city hall is located. Hence, promoting the mascot Glen instead of Finne is also a way of drawing attention to the opposition against the wind energy project that is favored by most politicians and citizens in the municipality's main city. Another example of affection is found in an opinion piece, where a local refers to the area as "kite county" ("Glenteland") and speaks of the kite as "our feathered friend", while the potential wind turbines are referred to as "an unwanted invasive species". Hence, we find that affection for birds can grow in the process of sighting them, turning them into allies in the fight against wind farm projects and their infrastructuring of local environments.

In sum, groups opposed to wind farm projects can find it difficult to voice their own concerns within the infrastructural arrangements of wind farm planning. There are criticisms that this system 'discriminates' against humans, as well as the desire to radically change the Statutory Order on Wind Turbines. When turning to sighting birds, however, people move from criticizing the planning infrastructure to making the most of it by using its strict regulation on the environmental impacts e.g., on birds.

Co-existence: articulating a new bird-turbine relationship

In the previous section, we described how local activists discover birds as potential allies in stopping wind farm projects. As this practice grows more common, it is also turning into a growing problem for wind farm developers. In order to counter and cut off the definition of birds as endangered by wind farms, developers sometimes propose new definitions of resilient birds which can co-exist with less dangerous wind turbine infrastructures. To succeed with this interessement-enrolment process, developers have to suggest updates to the models that predict how birds will be displaced by and collide with wind farms and which

are accepted and used in the current planning infrastructure (cf. Lee et al., 2018). However, in order to change how bird-turbine relations are known in these models, developers must deploy the same practices that the opponents have engaged in, namely sighting and registering birds.

To illustrate this process, we turn to the developer company European Energy, which had been working on the planning of a nearshore wind farm called 'Omø Syd' in Smålandsfarvandet for nearly ten years when they received the news that the area was to be categorized as part of a Natura 2000 area to protect the 'common eider duck', among other species of birds. Within a Natura 2000 area, various forms of human activity are allowed if it can be documented that these activities do not compromise the species that the area protects. However, as noted above, the accepted models predict that wind turbines will cause considerable effects on birds from both collisions and their displacement. When Smålandsfarvandet was re-categorized as a protected Natura 2000 area, it meant the Omø Syd project being put on hold by the authorities. When the news reached the developer, they had to work to get their project back on track: "Well, we try to seize every opportunity" (Interviewee D), an employee of the company says, while noting that such opportunities include going to the media, trying to enter into a dialogue with the politicians and commissioning various reports.

Our story starts with these reports: One of the first things European Energy does in order to challenge the assumptions that led to the project being put on hold, is to hire a biologist to monitor the relations between birds and wind turbines at a location similar to where the wind farm was planned:

> And there we have had a biologist monitor the number of eiders around the turbines twice. (...) we can ascertain at Sprogø and at other Danish offshore wind farms that eiders abound around the turbines – they are close to the turbines, so that knowledge will simply have to be taken into the future work. And the reason why we do

this is that, when we draw up our EIA for the offshore wind turbines, you have some different models you use to calculate the displacement of birds. And we would like to say that they are not displaced to the extent that has been assumed earlier. We don't have scientific evidence for this in those reports, but we do have some facts to bring to the table in order to support that debate. (Interviewee D)

With the aid of the biologist, European Energy starts to question the interessement of the eiders and suggest adjustments to the infrastructure, knowing the extent to which wind farms displace eiders. Now European Energy engages in collecting knowledge that describes the eider as more robust than the models have previously assumed and hence as more compatible with wind farms. The employee states that these reports do not count as 'scientific evidence'. They are not enough to change the established models, but they are 'facts' which can open a debate and help to problematize the models that are currently accepted and have become institutionalized in the planning infrastructure. European Energy takes this debate in various directions, as they try to 'seize every opportunity'. One attempt is to draw attention to the other threats that the common eider is facing. Here, the actors in European Energy compare the expected number of deaths to common eiders caused by the Omø Syd turbines to the number killed during the hunting season in the same area: "We have looked at the hunting figures, and we can see that 25,000 eiders are shot every year" (Interviewee D). This leads to a campaign to limit hunting rather than windfarm planning. On the web-page of the Omø Syd project, it is stated that:

Hunters shoot more anseriformes[1] in the region every year than the offshore wind farm will displace. Therefore, overall, it will be better for the anseriformes if the hunting of selected types of anseriformes is stopped than if the

offshore wind turbine project is canceled. We think that the obvious solution is to reduce the hunting period in favor of the climate. (European Energy, n.d.)

An intricate argument is at play here: if climate-friendly wind turbines cannot be built due to their negative effects on birdlife, then other activities with negative effects on birds (especially hunting) constitute a threat to the climate, as the restriction of activities such as hunting would allow birds to be killed by turbines instead. By entering into this kind of debate, European Energy is actively attempting to re-infrastructure the local environment around their proposed wind farm by making a space for both birds and wind turbines while regulating another activity that is harmful to birds, namely hunting. This suggestion is complemented by another effort: with the aid of a consultancy firm, European Energy suggests redrawing and extending the Natura 2000 area so that the presence of the wind farm is compensated by designating extra areas with documented occurrences of eiders to protect the birds and "...make room for both wind turbines and birds" (CEO of European Energy, Knud Erik Andersen, 2021).

We see both suggestions, to restrict hunting and to enlarge the Natura 2000 area, as attempts to establish an unproblematic bird-turbine relationship by displacing the problem of the endangered eider to other areas and activities. A recurring word when representatives of European Energy talk about this effort is 'co-existence', which is aligned with the findings of the commissioned reports, perhaps indicating the effect of wind turbines on birdlife is less than previously assumed in the standard models. This notion of co-existence resonates with a concern in the wind energy industry that wildlife issues are an increasing reason for cancelling projects. For that reason, the business associations Danish Energy and Wind Denmark recently came together to launch a so-called 'CO-EX Lab' (that is, co-existence lab) with the aim of

[...] supporting and documenting when renewable energy plants and nature / animal life can co-exist – well,

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[1] Anseriformes form the order of birds that eider ducks belong to.

maybe even contribute positively to biodiversity..." (Wind Denmark & Dansk Energi, 2021).

This initiative originated from the efforts by European Energy, as its employee remarks:

> So, we really managed to raise the debate about the whole co-existence problem. We got Danish Energy and Wind Denmark involved, which ultimately led to the Government setting aside 28 million [Danish kroner] for a laboratory for co-existence. (Interviewee D)

Even though European Energy has not yet succeeded in bringing the Omø Syd project back on track, they have managed to put co-existence on the agenda to the extent that the Danish Finance Act for 2022 allocated money over a four-year period to what was called a "public-private partnership to advance co-existence between infrastructure for the benefit of the climate and the concern for nature and biodiversity" (Finansministeriet, 2021, p. 3443). European Energy's work on redefining bird-turbine relations thus now extends all the way to the Danish parliament: money has been set aside to explore further the possibility that wind turbines can infrastructure environments through modes of co-existence rather than collisions and displacements.

What a sight? Discussing the politics of birdwatching

How should we make sense of the empirical account presented above, in which developers and opponents of wind farms are engaged in relatively similar activities of birdwatching, but with very different goals? In other words: What are the politics of birdwatching in relation to the infrastructural arrangements of wind farm planning that we encountered? In this final part of the paper, we discuss three themes emerging from our analysis: first, the need to develop a lens for capturing the shifting and unexpected roles and political operations of developers and opponents; second, the challenge of governing emergent politics and power in a multiplicity of networked relations; and third, the necessity to move beyond simplified 'gaming' explanations that are often invoked in the social acceptance literature.

The shifting roles of opponents and developers

In this paper, we have proposed to view the planning process surrounding wind farm development as an infrastructure. However, we suggest a need to distinguish between two forms of politics occurring in relation to this planning infrastructure: a politics that operates *within* the existing infrastructure and starts out from agreed regulations, procedures, models etc.; and another politics that seeks to problematize the business-as-usual character of this system to articulate new ways of infrastructuring the planning of wind farms. Starting out from these two political modes – working with(in) the planning infrastructure, or working to problematize and change it – can help us to sum up our empirical account and open up the politics we see in it.

Usually, local resistance to wind farm plans problematize the planning system for not taking local ideas, opinions, attachments and concerns into account (Aitken, 2010; Devine-Wright, 2009; Papazu, 2017). This was also evident in our empirical material, in which opponents sometimes try to affect the planning process locally or nationally by criticizing the Statutory Order on Wind Turbines and calling for major changes to this piece of regulation. However, we found these efforts to problematize the current planning infrastructure to have been largely unsuccessful. As the opponents shift their attention to enrolling birds through the deviced practices of sighting, recording and counting them, they also make a political shift from problematizing the planning infrastructure to working within its confines. As a result, opponents sometimes help sustain the planning system they are critical of.

In the case of the wind farm developer turning to birds as potential allies, we see a movement in the opposite direction: when faced with

criticism from local residents, developers are known to stress that they are following the rules and regulations of the planning system (Clausen et al., 2021; Corvellec & Risberg, 2007; Cronin et al., 2015; Haggett, 2012; Kirkegaard et al., 2021). In these cases, it is favorable to developers to work with the planning infrastructure. However, our account highlights how this mode of operation becomes increasingly difficult for the developers, as opposition groups also move to work with the planning infrastructure and its regulation of bird protection, mobilizing it to their own advantage. In response, as a developer, European Energy has tried to problematize the planning infrastructure by questioning whether wind turbines are affecting birds to the extent previously assumed in regulation and its related models. Through various expert reports, the developer starts to articulate alternative bird-turbine relations of co-existence, where birds are less fragile and where wind energy may benefit them by combatting climate change. We find that, while opponents and developers work on the interessement of birds – defining them as more or less fragile – they also actively redefine their own positions and roles, respectively to preserve the planning system, or to change it.

Hence, we find that, not only are there similarities between the way opponents' and developers' sight, record and count birds, these two groups' engagement with bird-turbine relations also produces parallel but somewhat surprising political displacements compared to 'common knowledge' on how opponents and proponents act. In our examples, opponents move from problematizing the planning infrastructure to working with it, while the developer moves from working within the planning infrastructure to problematizing it. Hence, by turning attention to bird-turbine relations, both activists and developers are led to rethink and experiment with their usual ways of operating politically in relation to the planning infrastructure.

Although we describe these political processes in parallel, we wish to stress that opponents and developers act out their bird-turbine politics with quite different financial means that reflect the unequal power relations between them. This difference can be highlighted by comparing the opponent's purchase of a new camera-phone to make better records of birds to the developer's purchase of several reports from biologists and consultancy firms in order to document bird sightings.

Politics and its devisings

The uneven distribution of power leads us to our second point, namely how politics and power are not only an effect of institutionalized structures, but also an effect of 'little' devices like cameras or new classification schemes. Such 'little p(olitics)' – or technologies of politics – often escape conventional studies of politics ('Politics with a big P') (Asdal et al. 2008; Barry 2002; Kirkegaard et al., forthcoming) that attend to structures of "... institutions, agencies and practices broadly associated with international, national and local government." (Barry, 2002, p. 268). While the public hearings of the planning system would usually be regarded as 'Politics with a big P', we find that seeing the planning system as an infrastructure brings into view the many instances of 'politics with a little p', that plays into this system. By following the little p(olitics) of actors relating and categorizing birds and wind turbines through devices (cameras, reports, DOFbasen etc.), we show how the public hearing process is used in unintended ways, as both opponents and developers try to forge alliances with birds in order to claim that wind farm projects are acceptable or unacceptable. Hence, our account illuminates some of the many 'invisible' little p(olitics), which plays into and potentially changes the big P(olitics).

How politics are played out in intricate relational ways also affects how power can be exerted: in our case, we saw how the hearing responses of 343 citizens enacted in the institutionalized 'big P' space of the hearing system was unsuccessful compared to the sighting of just one little bird with big legal powers[2]. Thus, what our analysis also underlines is that politics and power around wind turbine

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infrastructures are exercised through multiple alliances and relations, which tend to overflow the existing frames of public engagement in the public hearing system by using this system in unintended ways, such as bringing in birds as critical voices. Thus the "… fixed, pre-given meanings of what it means to participate…" (Chilvers et al., 2018, p. 199) that are apparent in mainstream approaches like public hearings are transgressed. While such 'overflowing' forms of participation and collective experimentation can be said to democratize the planning process and the green energy transition in general, they also represent a challenge in terms of the urgency of a response to climate change – a classic tension between the ideals of inclusion (Stirling, 2008) and the need to take swift action (Stilgoe et al., 2013; Willis, 2020). What our research may suggest, nonetheless, is that current politics 'with a big P' conducted through the planning system fails to acknowledge deliberately other forms of political engagement, although they are always present, ceaselessly playing into big P(olitics). How to develop (P)olicies in the governance of the energy transition in this light remains a challenge. Future research should inquire into ways of (re)configuring big P(olitics) to acknowledge the little p(olitics) that is performed by a wide range of actors, including citizens, developers and their non-human allies like birds.

Beyond gaming explanations

How does our account of the politics of bird-turbine relations fit with other accounts of the politics of wind farms? In the literature on the social acceptance of renewable energy technologies (e.g., Wolsink, 2018; Wüstenhagen et al., 2007), the focus has been on the attitudes that lead to opposition to, or acceptance of, wind farm developments. Through the lens of 'social gaps' (Bell et al. 2005), the field has attempted to explain the disjunction between general public support for renewables and widespread local opposition to renewable energy projects. A related gap that has occupied the field is that between people's attitudes and the claims they make during local debates: several studies suggest that negative attitudes towards specific wind farm projects are shaped especially by people's impressions that the turbines will not fit in the landscape. Yet it is observed that, in the planning process, opponents' arguments center on, for example, noise or birds. This gap is explained as a process of 'rationalization' whereby opponents abandon visual arguments or arguments relating to the landscape in favor of 'stronger' arguments that refer to the more highly regulated matters that are taken into account in the planning system (Wolsink, 1989, 2000). This tendency to choose the arguments one believes to be strongest in the planning process, rather than expressing one's actual concerns, has also been termed 'gaming' (van der Horst, 2007, p. 2711) or 'proxy' complaints (Hill & Knott, 2010).

One could argue that our case exhibits the same opportunistic tendencies, where opponents turned to criticizing the impacts on birds because their other strategies failed. Yet, our empirical account adds a nuance to how arguments are forged in the course of local controversies: while notions of 'gaming' can give the impression that complaints about noise or birds are easy quick fixes for opponents, our empirical story emphasizes how enrolling birds into one's cause is a demanding task. As we have shown, making birds allies requires hard socio-material work and investments in time and equipment. Hence, we have highlighted alliance-making as a process of learning in which the actors need to acquire knowledge of technical, 'natural' and legal matters, as well as bodily and equipped competences in e.g., watching and photographing birds (cf. Shove et al. 2012). Indeed, the 'gaming'-argument, like social acceptance research in general, pays little attention to the embodied skills and expertise that 'lay people' need to learn in order to mobilize the planning system to their advantage.

This process of learning, which starts by following birds, also leads actors to encounter infrastructural inversions: by turning to birds and their relations with turbines, actors come to explore the impacts and consequences of this infrastructure on the environment. Attitudes may change in this process. Hence, we do not think that the distinction between authentic attitudes and rational arguments as put forward in

the 'gaming' explanation of the social acceptance literature is adequate. As we showed in the analysis, while birds may first be treated as unloved instruments, in the process of enrolling them, opponents may come to feel and care for these animals in new ways, as the example of Glen the mascot illustrates. We find that opponents can treat birds as both allies and friends at once. Hence, our empirical story can be seen as a critical comment on the social acceptance literature, where the propensity to explain the acts of opponents as mere strategizing (as in the 'gaming' explanation) entails a risk of overlooking the complex processes involved in making alliances – and friendships – with birds. In a similar vein, we wish to avoid reading the developer's story as purely a strategy in which birds are redefined as robust in order to get their wind farm project back on track. Rather, we see the formation of a bigger political vision of infrastructure and environments co-existing that goes beyond the strategy of getting the specific wind farm project approved.

Concluding remarks

Our account of opponents and developers discovering birds as potential allies highlighted how the politics of wind farm development is multifaceted: sometimes actors work within the infrastructural arrangements of wind farm planning and at other times act to change it. We have shown how opponents' and developers' work on bird-turbine relations is a process of acquiring and learning how to use devices and how strategies, attitudes and affections develop and change together in this process. Overall, our study has traced two types of bird-turbine relations – one where turbines are a threat to fragile birds, the other where birds are robust enough to co-exist with wind turbines. At present, the planning infrastructure favors the first relation. As shown, this relation can be mobilized to work in the interests of opponents rather than developers. Meanwhile, we observed how the co-existence relation made it into the Danish Finance Act, indicating that this way of defining the relation may be gaining traction. We find that at the

heart of this debate over how to define the bird-turbine relationship are the ethical-political questions of how turbines *infrastructure* their surrounding environments and what sort of impact is deemed acceptable in order to forward the transition to renewable and low-carbon sources of energy.

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