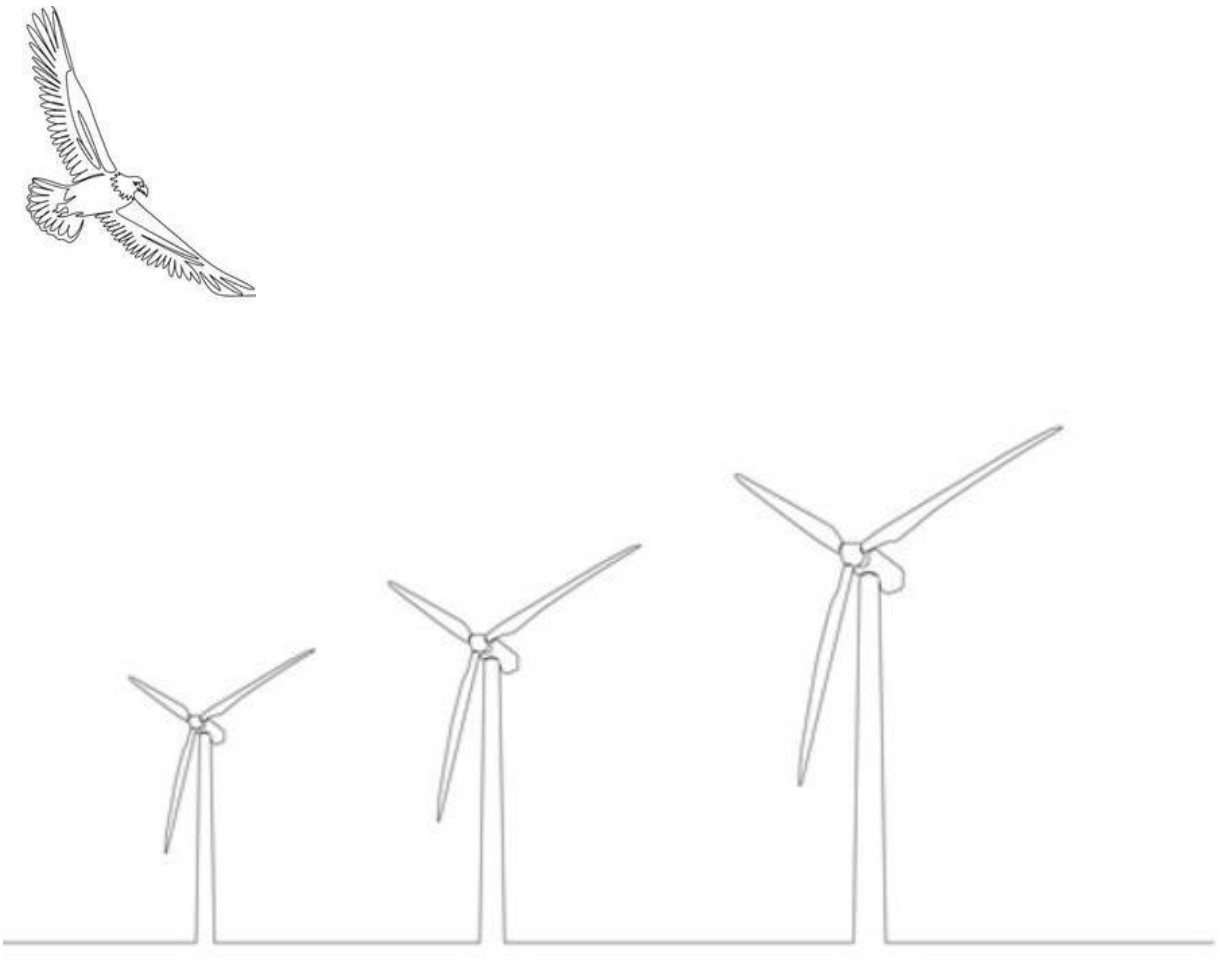
From Concerns to Engagement

How experts address citizen concerns about birds through engagement in wind farm projects

Britt Dossin



June 2024

From Concerns to Engagement

How experts address citizen concerns about birds through engagement in wind farm projects

Britt Dossin

Student number: 1049381

Master thesis

Environmental Policy Group

Environmental Sciences

Wageningen University & Research

Supervisor: Dr Helena Solman

03-06-2024

Pictures front page: Adobe Stock (n.d.) and Shutterstock (n.d.)

Abstract

Onshore wind farms in the Netherlands are increasing. While this provides a renewable energy source, it also has side social and environmental impacts, with impacts on bird populations being one of the main issues. The public is concerned about bird strikes, habitat loss and bird migration, which in turn can affect the social acceptance of wind farms. Experts increasingly engage citizens in setting up these wind farm projects in order to remove these concerns. This thesis focuses on how experts engage with citizen concerns about birds. To answer this question, this thesis used documentation- and literature research as well as interviews with experts from energy companies, ecological consultancy firms and governmental organisations. These experts were interviewed as they are involved in carrying out wind energy projects. To explore citizen engagement, this thesis focused on three different engagement modes: information sharing, co-production and citizen science, which were chosen based on literature research. The modes of engagement are aimed at different groups of citizens and include or exclude expert and citizen knowledge in different ways. In practice, it was found that information-sharing and co-production were used by experts. Experts most commonly relied on information-sharing. Furthermore, they considered citizen science to be not feasible. This thesis also shows that wind energy experts generally think citizen engagement has many benefits (including commitment and enriched knowledge) but also has several obstacles (including knowledge, time and efficiency). This thesis ends with recommendations for experts in practice including experts working with smaller groups, providing accessible materials to citizens, clearly defining roles, and reaching a broader audience. Further research should focus on digital platforms, the role of local nature organisations and how citizen empowerment programmes can be applied.

Contents

1. Introduction

1.1 Problem description

Although wind farms provide a clean source of energy, they can also have negative effects on wildlife and become a subject of concern for people. Wind turbines cause collisions with wildlife, create noise pollution for both animals and people, cause habitat loss for several types of wildlife and can cause problems with reproduction and caring for young of different mammals and birds (USGS, n.d.; Dotinga 2020; Rijksdienst voor Ondernemend Nederland, 2018).

This thesis will focus on birds as this is one of the main animals that experience negative side effects from wind turbines (Rijksoverheid, n.d.). Some of the most vulnerable species of birds, according to Vogelbescherming Nederland are birds of prey, owls, larks, storks, lapwings and plovers, cranes and gulls (Dotinga, 2020). Since there are plans to build more onshore wind farms, knowing the impacts on birds is essential for assuring the ecological sustainability of wind energy (Rijksoverheid, n.d.). This in turn affects the social acceptance of wind energy as several studies have shown that the public is concerned about these ecological effects (Vuichard et al., 2022; Rand and Hoen, 2017). This is because citizens feel they are not being involved in discussions about the impacts of wind farms on birds and how these impacts can be mitigated (Klok et al., 2023).

Therefore, experts must engage citizens in wind energy governance to increase social acceptance and trust, ensuring wind energy is as sustainable as possible. In this context, experts are people from organisations who are involved in setting up wind energy projects. They are important because they have the necessary knowledge to carry out these projects and are the organisations that can choose to engage with citizens. Currently, it is not well known how they address concerns that citizens have about birds and how they engage citizens within wind farm projects.

Citizen engagement is a term used to describe interactions between citizens and their governments, during the creation or implementation of public policy and the provision of services to the general public, or it may be brought on by localised events (Huttunen et al., 2022; Institute of Development Studies, n.d). The new 'Omvevingswet' that was introduced in January 2024 states that citizen participation is mandatory, but does not ensure that it is also carried out well (Smarticipatie, n.d.). This means that different ways, or 'modes', in which experts engage citizens around their concern about birds can have different impacts on wind energy governance.

1.2 Research aim and scope

For this research, 'citizens' are defined as the general public and the residents living around wind farms. 'Experts' are defined as people who are part of an organisation that focuses on bird watching/monitoring or knowledge sharing concerning bird populations or who are involved in wind farm projects. This includes people with knowledge of wind energy, ecology and policies. I will be focussing on onshore wind parks in the Netherlands (Figure 1) as there is increasing public concern about bird strikes in the Netherlands (Straatsma, 2021; NOS, 2021).

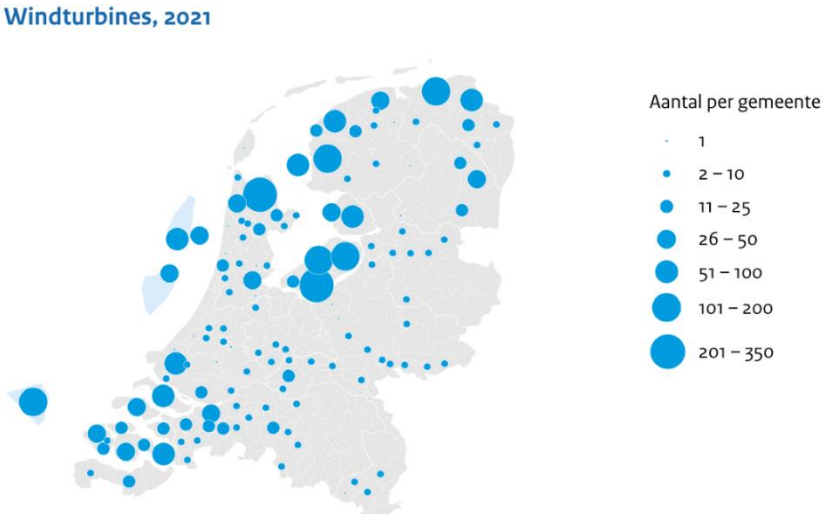


Figure 1: Location and number of wind turbines per province in the Netherlands, in 2021 (Rijksoverheid, 2022)

This research aims to explore, from an expert's perspective, what concerns citizens currently have about birds and wind farms and which modes of engagement experts use to engage citizens to address these concerns. This thesis focuses on the perspective of the experts as there is not much known about how they actively engage citizens in wind farm projects, and they are also the ones who can address the concerns that citizens have. The nature of this research is therefore more exploratory (Kumar, 2011), as there are still many unknowns surrounding the governance of concerns about birds, wind farms and citizen engagement.

1.3 Research questions

To find out how experts engage citizens within the context of wind farms and birds this thesis asks: 'How do experts address citizen concerns about birds through citizen engagement in wind farm projects in the Netherlands?'. The research question has been split into two sub-research questions:

1. What do experts indicate are current concerns of citizens related to birds and wind farms?
2. How do experts engage citizens in wind farm projects in the Netherlands?

2. Conceptual Framework

The chapter below defines the key concepts and underlying theories of this research.

2.1 Theoretical Framework

2.1.1 Citizen concerns

In this research citizen concerns are defined as worries or hesitations that citizens have about wind farms (or turbines), specifically relating to birds. The exact concerns that citizens have about birds and wind turbines will be researched. By listening to citizen concerns experts can increase trust and legitimacy leading to better governance. Citizen concerns also need to be addressed by experts so they can be incorporated into decision-making processes, which means that future policies or measures are better. In this way, the needs of the community will be met (Hussey, n.d.). Citizen concerns therefore drive citizen engagement as citizen engagement is needed to address these concerns (Marres, 2012).

2.1.2 Experts

Experts mainly have scientific knowledge, whereas citizens usually have lay knowledge. Lay knowledge is a term used to describe non-scientific or local knowledge and is often seen as inferior to scientific knowledge. This is because scientific knowledge is considered universal and objective, which is the opposite of lay knowledge (Turnhout et al., 2019). Experts are normally deemed 'legitimate' as they have credentials or formal training (Epstein, 2023).

For this thesis experts are therefore defined as people from organisations who are involved in setting up wind farm projects. These organisations include project developers or organisations that focus on bird watching/monitoring or knowledge sharing concerning bird populations. These experts have scientific knowledge of wind energy, ecology and policies. Since these experts are involved in wind farm projects they can potentially decide whether or not citizens are engaged in the process of setting up these projects. They also can address any concerns that citizens have about birds and wind farms. Experts in the context of this thesis include organisations such as ecological consultancy firms, energy companies, and provinces or municipalities.

2.1.3 Citizen Engagement

The terms 'citizen engagement' and 'citizen participation' are often used interchangeably. However, although they are similar, based on an article by Lodewijckx (2020) there is a slight difference between the two. Citizen participation is initiated by citizens and is more informal. Examples include petitions and neighbourhood networks. Citizen engagement, on the other hand, is often initiated by the government/experts and is more formal. Citizen engagement examples include ideation or intentional dialogue between the citizens and experts. For this thesis, I will be using the term citizen engagement to refer to how experts engage with citizens.

To answer my main research question, I will be looking into how experts engage citizens in wind farm projects and how they address concerns about birds. Research has shown that citizens can be engaged in various ways. Citizen engagement is a term used to describe interactions between citizens and their governments, during the creation or implementation of public policy and the provision of services to the general public, or it may be brought on by localised events (Huttunen et al., 2022; Institute of Development Studies, n.d). For this research, citizen engagement will therefore refer to the engagement of citizens by experts mentioned in chapter 2.1.2. 'Citizen engagement' is the umbrella term for different types of engagement which include: citizen science, citizen co-ownership, co-production and different types of communication with citizens (iBabs, 2023).

The website of The Netherlands Enterprise Agency or Rijksdienst voor Ondernemend Nederland (RVO) uses the term participation (even though based on the above definition I would consider this engagement) to explain some different ways in which experts can interact with citizens. The RVO focuses on three types of participation to engage with citizens and their concerns in wind energy projects. The type and depth of this participation, however, depends on the project developer (6). The types of participation are 'policy participation', 'process participation', and 'financial participation'. Policy participation is when a policy has not been formed yet at a municipal or provincial level, and this is then jointly created with local residents and businesses. This can include a panel of citizens who help make decisions or a meeting that is organised to inform residents. Together they can come up with what kind of policy they want and what they need to pay attention to, for example. Policy participation is about shaping the policies. Process participation takes place at the project level. It is when the initiator of the project goes through a process together with the local residents and surrounding community to come to agreements about the design and financing of the project. This type of participation focuses on the content of the policies. Financial participation is when citizens can own or invest money into the project (Rijksdienst voor Ondernemend Nederland, 2021; 6).

The above-mentioned examples of citizen engagement can have several benefits. It is necessary to make a more effective and fair environmental policy, which is aimed at creating large societal changes and a sustainable future (Planbureau voor de Leefomgeving, 2023). To improve the sustainability of wind energy, citizen engagement can incorporate the needs of the individual, organisations, and society as a whole in order to get past societal divides and build trust between different parties (Lodewijckx, 2020; Pierce and The Synergos Institute, 2002). Citizen engagement develops relationships between citizens and the organisations they are working with as the organisation can ensure citizens have a voice (Baum, 2001; Irvin and Stansbury, 2004). Citizens might also better understand why certain policies are created or why certain decisions are made if they have been involved in the process, enhancing the legitimacy of the policies (Fung, 2015; Irvin and Stansbury, 2004). In general, citizens become more involved in the decision-making process, making citizen engagement a transformative tool for social change.

2.1.3.1 Modes of engagement

The term 'mode' is used in this thesis as a way of saying another type of engagement. Each mode of engagement can be visualised on a spectrum, where the different aspects of how concerns are addressed by experts shift from the involvement of the community to more individual involvement and the inclusion of professional knowledge to the inclusion of citizen knowledge.

Chilvers and Longhurst (2016) suggest that outcomes of citizen engagement in energy transitions emerge from the process of engagement. The interactions and dynamics between the different actors lead to the outcomes, rather than there being predetermined outcomes of citizen engagement. This can also indicate that these interactions and inclusion or exclusion of different types of knowledge can affect where on the spectrum the type of engagement falls, and what effect this has on the actors. Chilvers et al. (2018), state that subjects (people), objects (what) and models of participation (how) influence how collective participatory practices are made up. This also indicates that engagement is on a spectrum, and can have very nuanced differences.

So whilst there are many different modes of citizen engagement on this spectrum, this thesis will only focus on three main types. This is because the way that these modes engage citizens is very different between the three, making them easier to identify rather than modes of engagement which

are very similar. These modes of engagement also seem the most likely to be used by experts in the context of birds and wind farm projects.

Information sharing

One of the ways in which citizens can be engaged is through information evenings or community meetings. Information evenings don't have a lot of active involvement from the citizens but still enable them to be engaged in the process of a project. They allow the experts to inform citizens about any upcoming projects and allow for questions or remarks. These information evenings also potentially allow for some citizen input which could alter the upcoming plans. These information evenings increase the transparency and responsiveness of a project (Instant Input, 2023). With this type of engagement, citizens are involved at a community level. Information evenings are planned so they reach multiple people at once, aimed at informing the community of upcoming projects. It is a good way to reach a larger audience and address multiple concerns at once. Different types of experts can be involved to inform the citizens on different aspects of the project.

Another way that information can be shared with the citizens is through legal objections, social media, phone calls or e-mail. These ways allow experts to engage with citizens and reply to any concerns they may have (Instant Input, 2023). Through this type of engagement, experts can respond to individual citizen concerns, with specific knowledge needed to reply to the citizen's concerns. It is also a way in which citizens can alert the experts on any information they may have missed.

Co-production

The concept of co-production provides a foundation on which more involved forms of citizen engagement are based. In this mode of engagement, citizens have a larger role than in information sharing, and the level of input is much higher. Citizens can also apply more of their own knowledge and ideas as the aim is to work together with the experts. This type of engagement includes things such as discussion groups with experts and citizens or experts working together with citizens to come up with research questions to find any missing information there may be withing a project. Co-producing projects and making decisions together with citizens means that they can get more involved in the governance process, which increases transparency, participation, and inclusion (Yu, 2017). When done well, it can increase trust between actors, which is important when making public policy and completing projects successfully (Gaventa & Barrett, 2010; National Center for State Courts, n.d.). A paper by Chilvers and Longhurst (2016) also mentions that co-production and bottom-up approaches can be an effective way of meeting the needs of the community, as predetermined solutions can be very technocratic and exclusive.

Another way to include co-production is by adding it to the citizen science process. Roche et al. (2020) mention that including a co-production component in citizen science projects increases the likelihood that the project's scientific and educational objectives will be achieved. This is because citizen science on its own can mean volunteers are told what to do by experts, but including a co-production aspect means that volunteers work together with the experts to come up with a project.

It is therefore key that any pitfalls of co-production are taken into account to make co-production as efficient and meaningful as possible (Turnhout et al., 2010). The original theory by Elinor Ostrom states that sustainability, security and education were a product of collective work by government, institutions and societies. Ostrom's theory also states that coproduction is the "synergy between what a government does and what citizens do" (Ostrom, 1996, pg.1079; Miller & Wyborn, 2020). The main message from this is that all parties need to work together in a way that benefits them both.

To answer my research question it is also necessary to know that there are various types of co-production which could have different effects on the outcome of a project. The theory of co-production by Turnhout et al. (2020) differs slightly from Ostrom's and states that to create societal change and ensure that unequal power relations are mitigated, co-production processes need to be (re)politicised. It is necessary to allow pluralism and ensure that different groups can exchange knowledge and learn from each other, which means including citizen knowledge as well as expert knowledge. Turnhout et al. (2020) describe pluralism as highlighting differences and making it possible for opinions, interests, and knowledge claims to be contested. This can then lead to unintended outcomes, which according to Turnhout et al. (2010), provides an opportunity for learning and new ideas. This demonstrates that whilst it can be difficult to get different groups with diverse norms and values to work together, there is also an opportunity for this to have positive outcomes in the co-production process.

To critically analyse the usefulness of co-production it is furthermore crucial to note that there are limitations and risks to the co-production process, which again can influence the governance of wind energy. It takes a lot of time, is challenging ethically and is emotionally demanding. Power relations between the participants can also contribute to frustrations during the process (Flinders et al., 2016). Should the process fail, it could also make relationships between parties worse, instead of improving them (Irvin & Stansbury, 2004). Different people from different disciplines each have their own knowledge, which can make it hard to integrate into a specific idea or method for example (Turnhout, 2019).

Citizen Science

Citizen science is another mode of citizen engagement that can affect wind energy governance, as it actively involves citizens in research projects. Citizen science enables the general public to (voluntarily) collect and analyse different types of data, in collaboration with scientists (both in a bottom-up or co-produced way) (NWO, n.d.). This means that citizen knowledge can be used during this process. It still (at least partially) relies on experts when setting up the project, but they are not necessary when carrying out the research, allowing citizens to get involved in field research.

Not only can citizen science provide useful data, but it also has both social and economic benefits. It can be advantageous for the volunteers because it can improve their physical and emotional health (Kaptein, 2020; European Commission, n.d.). This is because citizen science actively involves volunteers in everyday problems that affect their health or their environment and helps them understand how science works, giving people a sense of purpose and belonging (Ceccaroni et al., 2021; Wageningen University & Research, n.d.). Furthermore, citizen science promotes mutual learning between citizens, scientists and the government and increases participation in the scientific process (National Institute for Public Health and the Environment, n.d.; European Commission, n.d.).

When putting citizen science into the context of this research, it could suggest citizens carrying out bird monitoring projects near wind farms or looking into bird victims underneath wind turbines. Several studies have shown that citizen science projects do provide useful data for scientists (Ding et al., 2022; Randler, 2021), which demonstrates the potential that these projects can have in the Netherlands. The use of surveillance monitoring, which is monitoring conducted without a predetermined hypothesis, is also one of the only ways of dealing with unforeseen risks to biodiversity.

However, experts also have some concerns about citizen science. One of the main concerns is that the participants' skills are not up to the same standard as professional scientists. Citizen scientists have different levels of training and experience, which could lead to measurement errors or bias. It

can also take some time before the participants become better at collecting the data, leading to less accurate data collected in the first year. Yet, some of these concerns can be overcome with proper training by professionals beforehand or assistance from professionals during the monitoring and clear methods and standardised protocols, though financing can still present a barrier (Dickinson et al., 2010; Roche et al., 2020; Cooper et al., 2012).

3. Methodology and Method

3.1 Methodology

The main research question can be best answered through a qualitative approach. To do so, a case study design has been chosen. A case study focuses on a phenomenon that can be explored in a specific context using a range of data sources (Baxter & Jack, 2015).

3.1.1 Case study description

The climate has been changing over the last few decades, leading to rising global temperatures (Lindsey & Dahlman, 2023; The Royal Society, 2020). The Netherlands plays a role in the climate change debate, as the country has previously committed to international climate change agreements and is also one of the countries that have signed the UN Climate Agreement, also known as the Paris Agreement (Government of the Netherlands, n.d.-a). One of the main solutions being implemented to fight climate change is renewable energy (Turrentine, 2022). In the Netherlands, gas reserves are running out and the goal is to reach zero net (CO_2) emissions by 2050, whilst electricity use is expected to increase by 180-250% by 2050 (Government of the Netherlands, n.d.-c; Netbeheer Nederland, 2023). This increases the need for renewable energy production. The Netherlands is currently undergoing an energy transition, which focuses on different ways in which energy production and consumption in the Netherlands will change (Rijksoverheid, n.d.; Ministry of Economic Affairs, 2016). The Netherlands often provides optimal conditions for wind energy due to the landscape and climate, hence why onshore wind energy is currently the country's largest source of renewable energy. At the end of 2020, the Netherlands counted 2144 wind turbines on land, with another 462 wind turbines offshore (CBS, 2022). Since then, these numbers have already grown, and there are even more plans to increase wind energy production. This mainly includes offshore wind projects but also some onshore (Brandenburg et al., 2023; Government of the Netherlands, n.d.-b).

Wind farms have ecological impacts, which creates concerns among citizens about birds. This in turn can affect the social acceptance of wind energy. Experts therefore increasingly engage citizens in setting up these wind farm projects to take away these concerns. In the case of this research, I have studied how experts engage citizens in wind farm projects, specifically relating to bird concerns. A case study design is best suited for answering 'how' and 'why' questions and when the context is relevant to the phenomenon, both of which are true for this research. It focuses on a 'how' question and the context of wind energy is relevant to the bird projects and citizen engagement. As mentioned in the introduction, this research is focused on 'citizens' and 'experts' which are respectively defined as the general public and residents who live around wind farms, and people who are part of an organisation that focuses on bird watching/monitoring or knowledge sharing concerning bird populations or are involved in wind farm projects. These groups of people are the most relevant to this study as they have the knowledge, insights or opinions regarding this topic. According to Kumar (2011), a case study is also a very useful design when exploring a topic area where little is known, which is also the case for this research as it is exploratory. This research is focused on wind farms in the Netherlands as there is still a lack of information on how experts engage citizens in wind farm projects relating to birds, which consequently makes this a singular case study.

With a case study design, it is necessary to make use of multiple sources of information, which often include interviews. The data can then be triangulated and used together to get a holistic view of the case (Baxter & Jack, 2015; Kumar, 2011). I have conducted interviews during my research to get access to the opinions and expertise of experts from organisations. Moreover, I have carried out documentation and literature research to learn more about citizen engagement projects relating to

birds in the Netherlands and how experts engage citizens. By combining both documentation and literature research with interviews the data is triangulated, which enhances the validity and reliability, as potential weaknesses in one source can be compensated with the other sources.

3.2 Documentation and literature Research

Documentation research was used at different stages throughout the research process. It was firstly used to provide a 'baseline' for the interviews on what projects exist and what an organisation does. Documentation research was also used to find any relevant information to answer my sub-research questions. Lastly, literature research was used to give further insights into the interpretation of the results in the discussion.

I used different sources, including academic papers, news(paper) articles, organisations' websites and reports to look into what current citizen concerns are and the different citizen engagement projects that focus on birds surrounding wind farms. When searching for this documentation and literature keywords such as 'bird monitoring', 'bird mortality', 'citizen engagement', 'citizen science', 'public participation', 'wind energy governance', 'expert knowledge', 'lay knowledge' and 'wind farms' were used.

3.3 Interviews

Interviews with relevant experts were carried out to give a clear idea of what experts define as citizen (bird) concerns and how these experts engage citizens in wind farm projects. As well as this, if it was not clear on the organisation's website, the interview provided insights into how a certain citizen engagement project is carried out and how the experts engage citizens. The interviews were therefore vital in providing answers to the sub-research questions. The interviews took place between January 18th and February 27th 2024. When the point was reached that I was receiving many similar answers, I took this as an indication that a saturation point had been reached.

Before any interviews took place I created a guide to ensure I was able to conduct each interview effectively, efficiently and ethically. All the interviewees signed a consent form, so they are aware of what they are taking part in and so that the data can be used. All of the interviews were carried out via Microsoft Teams and took between 20 to 60 minutes to complete. The interviews were then transcribed using Microsoft Teams and manually edited to correct mistakes and errors.

The interviews were semi-structured. This meant that there was a specific set of questions prepared in advance, but also allowed for some flexibility since follow-up questions during the interview were asked if necessary. The guides were created by keeping the goals of the research in mind, as well as using documentation research as a base. Some questions overlapped between interviewees whilst others were stakeholder-specific questions that leaned into their expertise/opinion. Having similar questions per interview allowed for easier comparison between the results, but since follow-up questions were asked it also meant that there was an opportunity to gather even more insights on information that was not mentioned in the literature (Kumar, 2011; Yin, 2009).

Once the interview was completed it was coded and analysed. Coding the interviews made the data structured and organised which allowed for conclusions to be drawn and interviews to be compared (Gibbs, 2012). The coding of the interviews was done inductively, which meant that I did not have pre-defined codes but decided on these as I was processing the interviews. I chose to do this inductively instead of deductively as there is no existing theory I am testing when analysing the interviews and I am doing exploratory research (Dovetail Editorial Team, 2023b). I coded the interviews manually using the programme Atlas.ti. The categories I used to code the interviews were

related to the sub-research questions. This way I was easily able to find the information necessary to answer a specific question.

3.3.1 Interviewees

I identified my interviewees using purposive sampling. Purposive sampling signifies that I chose specific groups to interview and gather in-depth data on. I wanted to research experts who are involved in birdwatching or -monitoring projects in the Netherlands or involved in wind farm projects as I wanted their expertise and opinions on these projects. This meant that I needed informants from those groups that have knowledge on this topic and who can form a clear opinion, which is considered expert sampling (Dovetail Editorial Team, 2023a). Once I found initial people to interview I used snowball sampling to lead me to any more potential interviewees that could be useful to my research (Nikolopoulou, 2023). However, I researched them first before asking to interview them to see what exactly the organisation/person does and why it was necessary to interview them. For my research, I have at least one interview within each 'category'. These categories include ecological organisations, a citizen expert, a governmental institute that focuses on wind farm projects and wind farm owners/developers as this gives different perspectives and a more holistic overview of the topic of birds and wind farm projects and how experts engage citizens.

Below, in Table 1, I have listed the people that I was able to interview and the organisation they're from.

Table 1: Conducted interviews

Interview reference number	Organisation	What does the organisation do?	The function of the interviewee
1	NLVOW	The NLVOW is a small group that aims to help citizens surrounding wind farms in the Netherlands, by sharing different types of information and protecting their interests (NLVOW, n.d.)	Board Member
2	Sovon	Sovon is an organisation that focuses on bird research, aiming to document bird numbers, locations, breeding habitats, etc in the Netherlands. They have a network of volunteers to help them carry this research out (Sovon, n.d.-a).	Senior Communications Officer
3	Waardenburg Ecology	They are a large, independent ecological consultancy firm in the Netherlands (Waardenburg Ecology, n.d.).	International Business Developer
4	Eneco	Eneco is an international energy company that aims to work towards the energy transition (Eneco, n.d.-b).	Ecologist Sustainable Energy Projects
5	Altenburg & Wymenga	Altenburg & Wymenga is another independent ecological firm, that also has a focus on sustainability (Altenburg & Wymenga Ecologisch Onderzoek, n.d.).	Ecologist
6	Ministery of Economic Affairs and Climate Policy	Responsible for economic and climate policy (Ministry of Economic Affairs and Climate Policy, n.d.).	Policy Officer
7	International Institute for Applied Systems Analysis	They are the organisation behind the WIMBY project. It is an international research institute that carries out several research initiatives intending to address complex issues that affect people worldwide (International Institute for Applied Systems Analysis, n.d.).	Research Scholar

8	Province Groningen	Responsible for projects and policies in the province of Groningen (Provincie Groningen, n.d.).	Wadden Ecologist
9	Vogelbescherming Nederland	Vogelbescherming Nederland is an organisation that aims to protect birds and their habitat in the Netherlands. They have several bird protection projects (Vogelbescherming Nederland, n.d.).	Senior Policy Officer
10	Witteveen & Bos	An engineering and consultancy firm, working on sustainable projects (Witteveen en Bos, n.d.).	Project Engineer Wind Energy and Energy Infrastructure
11	Vogelbescherming Nederland	Vogelbescherming Nederland is an organisation that aims to protect birds and their habitat in the Netherlands. They have several bird protection projects (Vogelbescherming Nederland, n.d.).	Policy Officer Ijsselmeer
12	Natuur en Milieu Gelderland	Natuur en Milieu Gelderland focusses on trying to make all kinds of different projects more nature-inclusive and biodiverse, in the province of Gelderland (Natuur en Milieu Gelderland, n.d.).	Policy Officer and Project Leader, Participation, Energy and Water
13	Eneco	Eneco is an international energy company that aims to work towards the energy transition (Eneco, n.d.-b).	Community Engagement Expert
14	Municipality Alphen aan den Rijn	Responsible for projects and policies in the Municipality of Alphen aan den Rijn (Gemeente Alphen aan den Rijn, n.d.).	Energy Transition Consultant

4. Results

4.1 Current citizen concerns about birds and wind farms according to experts

Based on both the interviews and articles it is clear that there are still many differing opinions and concerns relating to birds surrounding wind farms, which can quickly change over time. Some of the experts mentioned that especially once a specific article was published that discussed the topic of birds and wind farms containing a negative viewpoint, they would then get questions or concerns based on this new information, often asking what was being done about it. According to the experts, these types of articles can cause anger or frustration among citizens about the topic (2, 4, 6), as they can exaggerate or spread misinformation. This can be seen in comments underneath online articles which demonstrate how some citizens can still be hesitant or critical of new information whilst others defend it. There are questions and concerns about whether birds avoid wind turbines in all wind parks, questions about the monetary gain of wind parks, and people who do not believe the article. But, there are also comments defending the need for wind farms and some that state sacrifices are needed for sustainable energy (BNNVARA, 2023; BNNVARA, 2024).

Most of the experts stated that they receive concerns about birds and wind turbines regularly through citizens who attend information evenings, talk with citizens on the street, via email or by submitting an objection (3, 4, 5, 6, 8, 9, 10, 13, 14). Often, these concerns about birds go together with other concerns about wind farms. In some cases, concerns about birds are a major issue, and in other cases, they are not. This can depend on various things, including the distance that citizens live to the wind turbine. The closer that wind turbines are to citizens and their living environment, the more self-interest they have. For example, they will likely prioritise noise or shadow disturbance if they can physically feel those effects, before bringing up effects on nature (13).

In practice, the main concern received by the experts related to birds was that citizens are concerned about bird strikes. They are afraid the birds will fly into the wind turbine or will be hit by the blades (3, 4, 5, 8, 9, 10, 14). This coincides with documentation research. Several articles show that one of the main concerns citizens and nature organisations have is that wind turbines are considered ‘gehaktmolens’ (translated: ‘meat grinders’). This causes there to be protests against the wind parks, and people signing petitions to try and stop them from being built as they are worried about the mass mortality of birds (Straatsma, 2021; KRO-NRCV, 2018). This also corresponds with documents regarding parliamentary questions and objections, which all contain concerns regarding bird strikes (Ministerie van Landbouw, Natuur en Voedselkwaliteit & Van der Wal-Zeggelink, 2022; Ministerie van Algemene Zaken & Schouten, 2021; Gedeputeerde Staten, 2024; 6).

In the eyes of the experts, however, there is a split opinion about the degree to which bird collisions are a valid matter of concern. Whilst most agree birds are being killed by turbines, this argument is not necessarily an urgent one. The amount of bird deaths from wind turbines is a lot lower compared to other causes of bird deaths, such as cats and transport. According to experts, wind farms are needed for a successful energy transition and wind energy is therefore still a viable and sustainable alternative to fossil fuels (RTL Nieuws, 2019; Kerpel, 2024; 3; 4).

Furthermore, experts mentioned that both citizens and local nature organisations also have more general concerns about whether the impact of wind turbines on birds is being considered (5, 10). These concerns can be specific to certain bird species, including the White-tailed Eagle and the European Honey Buzzard, which are rare birds and therefore require protection. But, this can also relate to habitat protection, though this seems to be less prevalent among citizens and more so from local nature organisations (9).

Other concerns mentioned by the experts were that some citizens are concerned about birds being too scared or unable to fly past the wind turbines (3), or citizens wanting to know how an organisation is addressing impacts on birds (9).

On the other hand, two experts stated they received very few concerns regarding birds and wind turbines. One of these was the board member from the NLVOW. They stated that although there are some concerns these are very low on the priority list when compared to other topics, such as noise or shadow disturbance (1). Some citizens can also be hesitant to voice their concerns regarding wind farms as they feel that people who do this are often put in a negative light. They feel as though they are seen as boycotters of the energy transition and therefore are not listened to anymore (1). This suggests that good relationships between the stakeholders need to be built so that each party feels comfortable sharing their opinions and concerns.

Some organisations also have volunteer bird watchers. Whilst they care about birds, this doesn't necessarily mean they have specific concerns about birds around wind farms. One of these organisations is Sovon. The expert from Sovon states that in general, the people who become volunteers at Sovon want to contribute to the protection of birds or have a specific bond with the area where they work. However, according to the expert, this doesn't seem to translate into protection from wind turbines specifically. They only receive a very small number of concerns relating specifically to birds surrounding wind farms. If people outside the organisation are concerned they can call or contact Sovon via email, but through these points of contact, they also receive minimal concerns about birds surrounding wind farms (2).

Another point is that several of the experts have noticed or experienced that a small group of people seem to use the argument of birds and wind turbines only as a way to try and prevent wind turbines from being built (1, 2, 3, 5, 10). Although this is oftentimes difficult to differentiate from people who use these arguments for bird protection (12, 13), Sovon has stated that there are action groups who sometimes contact them to ask for information to support that wind turbines lead to bird injuries, to use this information to delay the construction of turbines (2).

4.1 How experts engage citizens in wind farm projects in the Netherlands

Documentation research showed that although there are wind farm projects that engage citizens it is often unclear whether this is related to both birds and wind turbines, and unclear to what degree citizens are involved. The interviews have been able to provide some clarity on this. The following chapter therefore describes different modes of engagement that experts use to engage citizens in projects regarding bird and wind farms, based on both the documentation research and interviews. The sub-chapters will start with some general information on the mode of engagement before describing specific points and examples.

It is also important to note that the project developer (often a province, municipality or an energy company) can differ between wind farm projects. The project developer decides how to organise the citizen engagement process and which other experts will be invited to help (6). The stakeholders that are involved in the process also largely depend on the location of the project. Some projects are closer to citizens' homes whilst others are further away, and if the plans are more concrete the sphere of influence is smaller (4, 13). This means that the way the citizen engagement process is carried out can vary greatly between different companies and projects. Some companies care much less about the surrounding people and environment and only want to build as many wind turbines as possible for profit, whereas others take a much more holistic approach (10).

4.1.1 Information sharing

The interviews found that the most common mode of engagement among the experts was information sharing. This is one of the first ways in which project developers let citizens know about a potential or future wind project. Though the amount of involvement can vary between projects, transparency is key to avoid negatively surprising citizens. It is essential in helping to take away any questions or concerns they have regarding the project, and regarding birds. It creates a sense of understanding between groups and leads to less resistance, preventing any potential conflicts (5; the Department of Agricultural Economics, Sociology, and Education of Penn State University, n.d.). This is especially important considering that the majority of citizens understand and see the need for wind energy but they are not happy about it. When something changes in their living environment they are often critical and worried about what it will mean for them (5, 10, 12, 13, 14). Therefore, clear communication from the experts ensures that citizens know what is going on and know what to expect (9). Acceptance of wind farm projects also seemed to increase if ecology was taken into account (14). This further emphasises that if this is the case, this should be clearly communicated back to the citizens as it will help increase acceptance of projects.

Several of the experts stated that they only get involved in information evenings if the project developer decides it is necessary, and otherwise do not have much direct contact with citizens (5, 10). Consultancy firms such as Altenburg & Wymgenga and Witteveen & Bos can be hired by the project developer to carry out ecological research and impact assessments of wind farms, as well as the monitoring of birds after those turbines have been built (5). They can also help with other aspects of the project, such as setting up participation plans (10). They will then only be present at information evenings if asked by the project developer, to inform people on the ecological perspective of a project for example (5). This increases transparency and highlights the role of expert knowledge in this mode of engagement.

Other ecology or policy experts will also be asked by project developers or energy corporations to help bring different interests together. Natuur en milieu, for example, can join a project to try and ensure a balance between the necessity for the energy project and ensuring nature is kept in mind during the execution of the project (12). Lastly, the NLVOW sometimes gets asked by the project developer to lead information evenings, which they appreciate taking part in as it gives people with less knowledge an opportunity to speak (1).

An alternative approach to hosting information evenings is to utilize social media platforms or the organisation's website. When scientific experts publish results from research they carry out it can lead to citizen reactions. If new research is being started for a solution, like painting the blade of a turbine black to make it more visible for birds, people often react optimistically. People appreciate that measures are being taken to reduce bird mortality, which often leads to positive feedback (3). This way of engaging citizens emphasises that experts have a leading role in sharing scientific information, to which citizens can only respond (often through legal objections, if they do not agree) (10).

Although not all experts are in direct contact with or regularly work with citizens, they do have to respond to any concerns they may receive through emails for example. Specific examples from the experts can be seen in Table 2.

Table 2: How experts actively respond to concerns they receive from individual citizens. WIMBY is not included as they are not currently operating in the Netherlands.

Organisation	Response to citizen concerns (about birds)
NLVOW	They usually advise citizens to save their time and not get too involved in doing anything about concerns related to birds. This is because it is a time-consuming and complicated procedure and chances are small that they will be able to positively contribute (1).
Sovon	In general, they try and keep good relationships with their volunteers, by staying in touch with them, to keep their interests in mind as much as possible. Any questions regarding the risk maps of wind turbines and birds (Sovon, n.d.-b), are carefully explained to the concerned citizens to ensure they understand what it means. They also stimulate citizens to use the available information that they have published, as long as they interpret it correctly, if they feel that certain information has not been taken into account in a wind farm project (2).
Waardenburg Ecology	If they are invited to join information evenings, and concerned citizens come to them with questions they try to explain everything as best as they can and put it into context. They also try to explain that wind farms are necessary to mitigate climate change and that they also aim to serve positive goals, rather than only having negative side effects. If citizens come to them with data that they might have missed, then they will also try to include that in their reports (3).
Eneco	If approached by nature groups about concerns they have, Eneco will talk with them and discuss what the best options are moving forward. By responding in this way they are not opposing parties but rather two different parties working together towards a common goal. If any citizens have concerns they also listen to them and try to find a solution to this, to avoid bad publicity. If something happens to a bird for example, then the wind energy sector is seen as the one at fault, so they want to avoid this as much as possible (4). They will also talk with the concerned citizens to take away any fears they might have, in an objective manner (4, 13).
Altenburg & Wymenga	All that they can do is gather ecological data and write a report on this. So if they receive any concerns, they respond to this using factual information and data. They stay as objective as possible (5).
Ministery of Economic Affairs and Climate Policy	If the Ministry receives any concerns about birds they explain what kinds of projects they are working on to help prevent bird mortality from wind turbines now and in the future. They also have to respond to any parliamentary questions. If they hear about concerns through the news or in the media this also encourages them to make changes to policies to help prevent these concerns (6).
Province Groningen	They will explain the situation as best as they can, which people usually understand. However, some people do not want to accept anything, and in that case, they do not spend time trying to convince them otherwise. The interviewee stated that this would be a waste of time. Any concerns they receive through objections are handled by lawyers (8).
Vogelbescherming Nederland	They have a 'bird information centre' where they receive any concerns that citizens have, including about birds and wind farms. They mainly handle this by being sympathetic and referring citizens to the viewpoint on their website or to local parties. They do this as the local parties know more about the processes going on at a local scale whereas Vogelbescherming doesn't. If possible they will support any arguments with factual information (9).
Witteveen & Bos	They are obligated to reply to any concerns that citizens have about a project. They also back up all the decisions they make with data and are transparent in what they do. If a citizen disagrees with something they do and Witteveen & Bos think there is a chance that they are correct they ask for a second opinion from another organisation. It is however important to ask whether the citizens will trust the second organisation and will then be satisfied, otherwise asking for a second opinion will be useless. In some cases giving financial compensation is also a way of dealing with people, but this depends on the project developer (10).

Natuur en Milieu Gelderland	They try to be as sympathetic as possible to people who have concerns about future wind parks and any other concerns they have. They understand that the citizens are only fighting for their living environment. They also try to help the citizens understand that wind energy is necessary, which only works if you understand that they're just worried about their living environment (12).
Municipality Alphen aan den Rijn	Most of the time, if citizens have concerns they will refer them to relevant research and inform as much as they can. In one case, however, there was a lot of opposition to a wind energy project. The local council felt the participation process was therefore not done correctly and it was decided that it was necessary to redo the whole participation process. However, the expert mentions that good engagement doesn't guarantee that everyone gets their way. This would be impossible and it is therefore about balancing the different interests and at least making sure people feel heard (14).

When conducting any type of information sharing it is essential that this is carried out efficiently so that citizens can share their concerns and experts can take these into consideration, in an organised manner. In an example mentioned by the expert from the Natuur en Milieu federation, a specific project over a large area had several different project developers. The municipalities told each of them to come up with their own participation process, which meant citizens had to deal with different processes and plans. This made the whole project very unorganised and caused a lot of issues, which meant the project ended up not being completed (12). It would also have been difficult for citizens to share their concerns about birds if they were dealing with three municipalities at once. If the project developers had made a plan for the whole area together this might have been much more organised and efficient, leading to better outcomes.

An example of more efficient information sharing is from the municipality of Alphen aan den Rijn. They mentioned that since wind energy is always a sensitive subject, they have been involving citizens from an early stage in the process, also considering a previous attempt at setting up (large) wind turbines did not work out. For the new project with smaller wind turbines, they went to the citizens without a concrete plan and asked them for input and ideas, as well as listening to their concerns. Experts from the municipality went to villages within the municipality, where some of the requests for smaller turbines came from, to hold meetings with the locals. Some were only attended by as few as 5 people, whilst other meetings were attended by 70 people. The way that the municipality handled this is that for the meetings with fewer people, they were able to ask for much more input, whilst for the meetings with many people they mainly answered questions. They adapted to the situation to get the most input out of the citizens and reassure them, whilst ensuring the least amount of chaos when many people are involved. The interviewee noticed that the citizens appreciated being involved early in the process and also that they were able to share their opinions and concerns (14). This way of addressing different groups also corresponds with what the expert from Witteveen & Bos said: When asking citizens for input, it is not possible to ask everyone as this would be very unorganised and chaotic. Having a small group available that can spend time diving into the complex materials would be most efficient (10). Therefore, depending on the size of the group, it is possible that experts need to gather citizen concerns about birds in different ways. Smaller groups could allow for experts to directly ask citizens, whereas for larger groups a different method of gathering information might be needed.

Additionally, when it comes to information sharing experts need to ensure that it is accessible for citizens to share their concerns or ideas. Physical meetings are often attended by citizens who are already for or against wind energy, according to the experts from the Municipality of Alphen aan den Rijn and Waardenburg Ecology (3, 14). When conducting surveys it is more likely that the 'silent

majority' will contribute. This could be because this way of gathering and sharing information is more approachable for people compared to physical meetings. This would make it easier for different people to share their concerns about birds and be informed about a project (14).

Legal aspects can also form an accessibility issue. It is more likely that citizens won't try to voice their complaints about birds if doing so is too difficult. An example is from the NLVOW. The NLVOW is a small group that aims to help citizens surrounding wind farms, by sharing different types of information and protecting their interests (NLVOW, n.d.). However, the interviewee stated that if there are any concerns relating to birds surrounding wind farms they often advise citizens not to get involved. This is because there are many legal and procedural aspects to go through if they want to say something about any concerns they have, which makes the process very complicated. Citizens who have any concerns about nature are also excluded from taking them to court unless they are part of a nature organisation, which makes sharing their concerns about birds very inaccessible (1,12). It seems as though, legally, experts do not take citizen concerns seriously unless they are provided by someone with more expert, or scientific knowledge.

Furthermore, clear discussions with citizens can be hindered due to their lack of knowledge, which can also be seen as an accessibility obstacle. A lot of knowledge is necessary to be able to understand what is going on when working with wind farm projects. Experts have studied and have experience on the topic, whereas most citizens do not. So if citizens are given a large report to read, this can be very overwhelming for them, and they often do not know where to start or what to think (10). This can make people feel as if they are not empowered as they lack the knowledge or skills necessary for meaningful discussions or participation, including discussions about birds. An example is from the NLVOW. Since the NLVOW is voluntary, the interviewee mentioned it would cost a lot of time and effort to fully understand all the details of a project and all the legalities (1). This could be an indication that experts need to provide materials that are more accessible and easier to understand so that citizens can get a better idea of what is going on and so that they can be empowered to contribute to discussions.

There are however experts that try to empower citizens, so they can contribute more meaningfully to discussions. One of these organisations is Natuur en Milieu Gelderland. Natuur en Milieu Gelderland is an organisation that focuses on trying to make all kinds of different projects more nature-inclusive. The Natuur en Milieu federations have set up a programme which involves training citizens to become citizen experts on nature (birds included) in their region, which they can then input into solar and wind projects. This allows the citizens to become empowered and to contribute better to discussions with project developers and municipalities as they have the knowledge needed to back up their arguments and think critically about the project. These citizens are then called 'energieboswachters' (12; Natuur en Milieufederaties, 2022; European Commission, 2020; The Hague Academy for local governance, n.d.).

Based on the interviews, it is clear that with information sharing there is still an emphasis on the involvement of experts, and the sharing of expert knowledge rather than involving individual citizens and their knowledge. Experts will carry out any necessary research, and communicate this back to the community or citizens with specific questions and concerns. In some cases, citizens will come to them with information they might have missed, in which case they will try to include it in the report. Certain information evenings also allow for some input from citizens, but this doesn't mean that it has to be included in the final project, still emphasising the role of expert knowledge over the role of citizen knowledge.

4.1.2 Co-production

Some of the experts also engage citizens through co-production. This includes actively working together with citizens to learn about the area or creating discussion groups to work together with the citizens on a wind farm project, for example. Below I have mentioned how experts can address concerns about birds and how in this mode of engagement citizen knowledge can be more included.

One of the ways that citizens are involved through co-production is by involving them and discussing with them as much as possible. This can include discussions about which birds are present in the area or which measures can be taken to prevent bird mortality. One of the main reasons for doing this is that involving citizens early in the process gives them a feeling of ownership over the project. It makes them feel that it doesn't only belong to a third party, and creates commitment (4). As soon as experts show that they are willing to listen to what citizens have to say it increases their trust in the experts (13). One specific example is from Eneco. Eneco is one of the energy companies that works on renewable energy and cares about the surrounding people and the environment. They have a set of very ambitious goals, which are listed in their One Planet goals. One of these goals includes positively contributing to biodiversity on all new assets, including wind farms (Eneco, n.d.-a). During this process, they involve citizens as much as possible. The ecologist for sustainable energy projects does this by reaching out to residents surrounding the future wind turbines, and asking them for their input on biodiversity in the area and where they should develop this. This creates room for discussion and makes the citizens more involved in the project (4). When responding to citizen concerns regarding missing information on certain topics Eneco also uses a 'joint-fact finding' method. This is where they work with citizens to set up a research question and find an organisation that answers what the citizens want to know (13). It means they hold themselves accountable and take citizen concerns seriously.

Another way that experts can co-produce with citizens is by working with them in small groups. This allows for the knowledge input from citizens to be greater than when working with many citizens. One example is from Vattenfall, both Witteveen & Bos and the Natuur en Milieu federation said that they do their citizen participation process very well (10, 12). For one of their wind energy projects, Vattenfall decided to choose a couple of representatives from the surrounding villages to work with them on the project. This meant that the citizens could tell the representatives any concerns they had about birds, which the representatives could then pass on to Vattenfall. This way the group of citizens and experts can come up with solutions to ensure that these concerns are addressed. Those same representatives also stay involved throughout the process, which means they can delve deeper into the details of the project and contribute more meaningfully. This can be seen as an advantage as they can communicate and discuss the project better with Vattenfall and the other stakeholders (10), increasing the knowledge they input into the project.

Experts not only work with citizens, but they also co-produce with local nature organisations or NGOs. This is because these nature organisations often have a lot of knowledge of the flora and fauna in the area, which means that the experts can use this to get a better picture of the area, including what birds are present (3, 4, 10). A lot of plans for wind energy projects are created by only looking at existing documents, whilst going into the field and discussing this with the nature groups can provide information not mentioned in these documents, which makes the plans better (4). Involving NGOs or nature organisations is therefore of key importance to the success of a project as they give valuable information to improve models. It also creates networks that allow you to directly contact them which makes it easier to gain access to information necessary for the wind energy project (4, 5).

An important thing to note is that the expert will only ask for input from citizens when it's possible. Whether it is possible can depend on the location of the project, and whether citizens live in the vicinity of the wind farm. If there are no citizens that live in the surrounding area they will not be involved in the project (4, 13). It can also depend on how much citizens know about the area and whether their knowledge is sufficient. Asking citizens for biodiversity input doesn't work if the citizens have very limited knowledge of what flora and fauna are found there (4). If their knowledge is limited it then would not make sense for the citizens to help address any concerns about birds.

Additionally, when it comes to the co-production of a project, the experts will still have the final say about any decisions once the process is complete. They are responsible for writing the report and interpreting the data (3, 4). At this point, if a citizen does not agree they have to go through legal proceedings to do anything about this (3). Even though the experts make any final decisions about the project, it would be very unwise for them to ignore the citizens or local nature organisations completely, as this ruins the relationship between them, which makes a project very difficult to execute (4).

Co-production as a mode of engagement therefore generally focuses more on smaller groups of citizens where they can specifically ask for more detailed input into a wind energy project. It also includes both citizen and expert knowledge about birds. Local nature organisations, on the other hand, may play a slightly bigger role than the citizens because they are more likely to be familiar with the local flora and fauna, which makes them even more important for tackling bird-related issues. Their knowledge is therefore likely to be included more than the 'general' citizen.

Something else that can potentially be seen as a form of co-production is certain types of financial participation, as experts and citizens can work together to manage profits created by wind energy. Financial participation therefore takes place once a wind park or wind turbine has already been built. This mode of engagement includes some project developers setting up environmental funds as a way to engage citizens. This mode of engagement focuses on engaging communities by ensuring they can share in the financial benefits of wind energy projects. It involves the project developer investing a part of the profits from the wind park into the local community. The money is managed by an appointed group of locals (an energy corporation) who collectively decide what the money is used for. This can include investments in, among other things, nature areas, or bird protection organisations, for example (3; 10; Rijksoverheid, n.d.). An energy corporation is still in contact with the project developer, even once the project has been completed. They can therefore influence the measures that are taken to help protect the birds, such as ensuring a turbine standstill to protect the birds (10) if organised well (since different energy corporations have different levels of professionalism). This type of engagement therefore has the potential to address or compensate concerns about birds, as it includes citizen ideas.

4.1.3 Citizen science

Based on the interviews, several experts agree that there needs to be more monitoring for birds around wind farms or turbines to see what the impacts are. This is also necessary to test solutions to prevent bird mortality, such as painting a blade black or finding gaps in current knowledge. Results from current experiments are still unclear and data cannot be generalised to every location in the Netherlands. What might work in one place, might not work in another, which makes monitoring very important (3, 5, 9). Fortunately, it is becoming more frequent that monitoring is mandatory after the realisation of a wind park to ensure that the predictions made beforehand are correct (3, 4). Data can also help to improve wind energy policies in the future as any decisions can be based on impact data and policies can be adjusted according to new evidence. Bird impact data, for example, could also potentially mitigate risks to birds (Parkhurst, 2017).

Citizen science is very promising for bird monitoring (Chandler et al., 2017; McKinley et al.,2017). It would allow citizens to contribute necessary data, while they would be able to realistically see how wind turbines affect birds and what impact they truly have (3). It could improve how they view wind projects and even increase their trust in experts (see Chapter 2.1.3).

However, experts argued that this is often not the case. All experts mentioned that citizen science, in the form of actively monitoring birds surrounding wind turbines, is not feasible. Whilst backyard citizen monitoring works, monitoring around wind turbines is much more specific, costly and time-consuming, making it very impractical for citizens to do this and gain valuable results (3, 4, 8, 9). This also corresponds with some of the obstacles of citizen science mentioned in chapter 2.1.3.

According to the experts, the main reason that citizens do not do any monitoring around wind turbines is that they lack the knowledge and skills necessary to execute the monitoring (3, 4, 8, 9). This means that if any dead birds are found people can report it, but it stays anecdotal until viewed by a professional (3). This means that the experts use professionals to carry out any wind-project-specific field research (3, 4, 5, 8, 14). An example from the Altenburg & Wymenga expert is that their fieldwork is almost always carried out by professionals so they can guarantee that their research is of sufficient quality. The fieldwork has to be carried out systematically by people who know how to use the equipment and who have the knowledge to understand what to look for. Very rarely do they work with citizens or nature organisations, where they can discuss with each other or come along with the fieldwork to see how it is being done (5).

The expert from the Province of Groningen even mentioned that if citizens were to see and move any bird victims this would even have negative impacts on bird collision data. This is because it disrupts the research done by professionals. If the bird is moved then they would not be able to see it and count it towards their research, therefore negatively influencing their data (8).

Another reason that citizens do not carry out any bird monitoring around wind turbines is that it would likely be unpaid, which means citizens would need a very high level of motivation to continue to monitor consistently. Furthermore, citizens might not be objective and have an underlying motive for collecting this data, which could make the data less trustworthy (8). As a result, for this mode of engagement, there is still a large emphasis on the inclusion of experts and scientific knowledge, and the exclusion of citizens and citizen knowledge.

Below I have listed a few examples from the experts that engage citizens, but not necessarily specifically for wind energy projects. One of these organisations is Vogelbescherming Nederland. The only way that they engage citizens is that citizens can keep an eye out for new human activities that might impact birds in areas where birds are very prominent, such as wetlands. These citizens are called ‘Wetlandwachten’. Vogelbescherming Nederland, also motivates and mobilises the Wetlandwachten, and some of their other members, to help submit objections for any RES plans that could negatively affect birds. They do not have projects directly involving citizens and birds surrounding wind farms (9). Only if a wind park is being built which is in a very inadequate area for birds do they get involved (11).

Some organisations can also indirectly use citizen science data for bird research surrounding wind farms. One organisation that does this is Sovon. Sovon is an organisation whose main goal is to collect bird data in the Netherlands. They do this with the help of many volunteers who go into the field and collect the data, which Sovon then processes. Everyone can apply to become a volunteer but to collect data they need sufficient knowledge of birds and their behaviour. If Sovon feels it is necessary, they will advise the volunteer to do a course to ensure that the volunteer has sufficient knowledge to go into the field, otherwise, the data is not very valuable. Also, at first, they will be

accompanied by an experienced volunteer to ensure that the data they collect is useful, as the data has to be collected using specific methods. It is important to ensure the data is of good quality as they use this to calculate trends and populations, including impact data of wind turbines on birds. So although Sovon works closely with volunteers, and they sometimes work on projects relating to wind turbines, the volunteers that collect the data are not connected to any specific research relating to wind energy. The data they collect is always separate from a specific goal. If a project developer wants specific data this is carried out by professionals, which as previously mentioned has to do with the knowledge and skills needed to carry out this research (2).

Expert knowledge and the exclusion of citizens seem to be key variables in new projects being established to address the effects wind turbines have on birds. One of the ways that this is being done is through the project 'Natuurinclusieve Energietransitie voor Wind en Hoogspanning op Land' (nature-inclusive energy transition for wind and high voltage on land, or NIEWHOL). This project involves taking several different measures to ensure that nature around wind farms is taken into account (Regionale Energiestrategie, n.d.-a). This translates into measures for the provinces, however, these do not necessarily involve citizens (6, 8), as most field research is, again, carried out by professionals. The only way that citizens can contribute to these tasks is that they can indicate they have seen birds in their environment that are not mentioned in the research conducted by professionals (8). However, the covenant remains unfinished because laws and regulations are constantly changing, making it challenging to develop concrete guidelines for NIEWHOL (11). The aim is however to finalise the project between 2024 and 2026 (Natuur Inclusief Nationaal Overleg, 2023).

Citizens can also be engaged in citizen science relating to birds through the use of digital platforms, which allow the citizens to be engaged at an individual level. An article by Sullivan et al. (2014) describes the eBird enterprise. This combines different aspects of citizen science (bird data), which include data collection, data processing and the use of the data for policy making. eBird works together with many different users that, through using the platform, also improve it due to positive feedback loops. Users of the platform are rewarded for using it which makes them want to use the platform more, which increases data quantity. The collected data is applicable to many different uses, which suggests that it can also be used for research surrounding birds and wind farms. By making the use of the platform more attractive to its citizens, they can get much more involved in bird protection and monitoring, increasing commitment to a project.

Another example of a citizen science platform that is currently being developed is called the WIMBY project (WIMBY, n.d.). It is a platform specifically designed for on- and offshore wind energy, that aims to engage citizens in questions surrounding wind turbines using a holistic approach where many different aspects, including birds, are taken into account. Although not yet available in the Netherlands, the platform has the potential to be applied in many different countries once it's complete. The outputs of the project include a webGIS interface and a 3D immersion experience, which will both be accessible to everyone. The idea of the webGIS interface is that different types of information relating to wind energy in the EU will be displayed, including data on biodiversity impacts, health impacts and job creation, for example. Users will also be able to play games to learn more about wind energy. The aim of the 3D immersion tool is that it can be used during workshops or as a teaching tool. The project can be an interactive and fun way to gain more knowledge on the topic and understand different aspects of wind energy, which can empower citizens and hopefully increase acceptance (7). It would also allow citizens to gain more knowledge on birds specifically, which could empower them to contribute more meaningfully to discussions with experts. This type of engagement also moves away from involving mostly experts, and towards engaging mainly citizens. It

is built on expert knowledge but allows citizens to interact with the platform and try things out to learn independently.

5. Discussion

5.1 Analysis of the results

Based on the results, this thesis shines a light on how experts are using citizen engagement to address concerns about birds and wind energy, highlighting how through different modes of engagement they include or exclude different people and types of knowledge.

Especially since this thesis has shown that the media can influence and increase citizens' concerns about birds, experts must be able to address them well. These results correspond with a paper by Hu and Zhu (2015) which states that the media can influence how people's opinions are formed. Therefore, depending on whether something has recently been mentioned in the media, citizen's concerns or opinions about birds and wind energy can change. Ensuring experts are aware of these issues and concerns will allow them to more effectively take away any worries that citizens might have.

The results show that when possible, experts try to actively engage citizens and include their knowledge of the area and birds in a wind energy project. Experts feel that this gives citizens a sense of ownership over the project and the decisions that are made. This corresponds with a paper by Dobos and Jenei (2013). It states that engagement is not only about informing citizens but also about creating a sense of community within a citizen engagement process. The paper also mentions that increased citizen activity and a better understanding of local issues can increase positive attitudes to government performance, which is also necessary for wind energy projects, and addressing concerns about birds.

Since the results show that many of the experts engage citizens to varying degrees, this relates to Turnhout et al.'s (2020) description of pluralism. Citizens share and discuss their knowledge and concerns, which provides opportunities for learning and new ideas. Even though citizen knowledge is often considered inferior to expert knowledge several experts indicated that working with citizens provided them with knowledge, such as information on local birds, that could improve the project. This is because citizen knowledge is more contextual and is derived from everyday experiences (Turnhout et al., 2019), which makes this information especially valuable when looking at local birds around wind farms. This shows that even though Turnhout (2019) suggests it can be difficult to work together with different disciplines, it can also be beneficial in enriching the knowledge of a specific project.

Nevertheless, some experts also noticed that during discussions, citizens can find it very overwhelming when working on projects relating to birds and wind energy. A lot of information and knowledge is necessary to understand what is going on, so if citizens don't have this knowledge it can make citizen engagement less successful and more difficult for the experts to execute (The Hague Academy for Local Governance, n.d.). A paper by Aitken (2009) states that scientific knowledge is often preferred over citizen knowledge and that this is also internalised by the citizens themselves. Wind energy projects often rely heavily on expert data, which emphasises the use of expert knowledge over citizen knowledge. This suggests that experts should empower citizen knowledge so that they can contribute to wind farm projects and have their concerns addressed.

More broadly, drawing on the case of birds this thesis provides more general points for discussion regarding citizen engagement and wind energy. Whilst most citizens appreciate being involved in the process of a wind energy project (10), there are also several obstacles to successful citizen engagement around the topic of birds. This thesis found that one of these obstacles to citizen engagement is efficiency. Efficiency is necessary when organising citizen engagement processes to

make sure everything goes smoothly and citizens are informed and involved well. This will also allow citizens to know who to go to if they have concerns about birds during a wind energy project. As seen in the results, if this is not the case it can have devastating impacts on a wind energy project. According to Siebers (2019), municipalities face several challenges with citizen participation. These include clearly defining the stakeholders' roles in the process and formulating a clear framework on how the process will take place. It can therefore be suggested that if these aspects are improved, the participation process will be more efficient and successful (The Hague Academy for Local Governance, n.d.). A paper by Van Aalderen and Horlings (2020) suggests that there is not one correct way for experts to organise their leadership and how to execute the citizen engagement processes. Certain frameworks can be used to help identify and allocate leadership capacities, further increasing efficiency.

This thesis also argues that there are specific benefits and obstacles to co-production. The obstacles are in line with some of the obstacles mentioned by Flinders et al. (2016). Co-production takes a lot of time and energy to carry out, both from the experts who need to organise this process, but also from the citizens who need to spend a lot of time being involved in the project. This means that citizens have to be very motivated for it to work, otherwise the benefits can be limited. However, citizen needs can be better met, since the outcomes of a co-production process are not pre-determined (Chilvers and Longhurst, 2016). This allows for discussions between experts and citizens to address concerns about birds.

There are also specific obstacles for citizen science. Citizen science has the potential to increase transparency and allow citizens to see how the research takes place and see the reality of bird fatalities (Weber, 2013). Yet, when discussing concerns about citizen science the experts agreed that there were several obstacles, including the citizen's knowledge and skills, and the time and energy it would take to do this. Several of these concerns overlap with a report by the European Commission (2020) further emphasising this point. Citizens are therefore excluded from this mode of engagement which could make it more difficult for them to trust the results (as they cannot physically see what is going on).

The results also show that financial participation is a potential way that experts can address concerns about birds. Since financial participation mostly takes place once a wind park or wind turbine has already been built, and if this is the only form of participation, it is unlikely that citizens will have built relationships with the project developers or have had much say in the project. This makes it difficult to increase wind energy acceptance (Knauf & Maitre, 2023). Including citizens in all aspects of wind energy projects, can therefore be very beneficial (Planbureau voor de Leefomgeving, 2023). A paper by Langer et al. (2017) also suggests that citizens prefer informative and deliberative participation over financial participation, which suggests that financial participation should not be the only type of participation that is used when carrying out wind energy projects. Citizens seem to prefer being more actively involved in decision-making and communication rather than only being involved financially.

Based on the results, this thesis also argues that digital platforms are a potential, useful tool that experts can use for citizen engagement and addressing concerns about birds and wind farms. This coincides with Marres (2012) who states that digital platforms can enable citizens to engage in projects and processes. Digital platforms are a way that citizens can connect, share information as well as learn more about the topic. This also relates to a paper by Cegarra-Navarro et al. (2014). The paper explores how technology can play a role in citizen engagement and governance processes. It suggests that digital technologies can enhance citizen engagement and help citizens make decisions in different domains. This could therefore be beneficial regarding birds and wind energy governance,

as it can provide citizens with tools to voice their opinions and contribute to policy-making, helping to empower them.

The benefits of digital platforms, however, can depend on what the platform aims to do. WIMBY aims to improve the knowledge that citizens have about the effects of wind energy on different aspects (including birds). This would empower citizens and further improve the citizen engagement process. However, implementation of platforms such as eBird might be questionable as citizens would still face the same obstacles mentioned previously and lack the skills and knowledge to carry out this field research surrounding wind farms effectively.

A paper that opposes this point is by Randler (2021). Whilst some experts mentioned that any data that citizens would collect for them would be less reliable than professionals, Randler states that birdwatchers using a citizen science platform differ significantly in competence, skill and commitment from those who do not use the platform. This suggests that using a specific platform to gather and collect citizen science data for birds around wind farms is trustworthy.

5.2 Validity and limitations of the research

One of the limitations of this research is the number of people interviewed from specific organisations. This was both due to accessibility and time restraints. This meant that I was not able to contact any people who were recommended to me at the end of the interview process. Furthermore, I only interviewed a small range of experts. This meant that I was unable to further check for comparisons or differences between similar organisation types. The province of Groningen is also a province that is a frontrunner when it comes to wind energy projects which means their situation might be different to other provinces, making it more difficult to generalise these results specifically. However, since in general the different types of organisation seemed to have reached a saturation point, where the main points that were being mentioned across the different types of organisation were similar, it signifies that my conclusions can be generalised to a broader context. However, at an organisational level, this might not be possible (when comparing different provinces or municipalities with each other for example).

Another discussion point is my definition of the term ‘citizens’. What I defined as citizens at the beginning of the paper was the general public, with ‘experts’ being the parties who have knowledge or experience relating to birds and/or wind energy projects. After having carried out the interviews it has become clear that several of the experts refer to local nature organisations as citizens. In my definition, they were defined as experts since they generally have more knowledge than the average citizen. However, it seems that they are an ‘in-between’ group, who are neither simply a citizen nor an expert. This mostly regards the knowledge they have: whilst they have more knowledge than the average citizen about the nature in the local area, this is not enough for the experts I interviewed to also perceive them as experts. Since I became aware of this conflict in definition later on in my research, it was difficult to explore the role they have in addressing bird concerns. This does however leave a gap that can be explored in future research.

6. Conclusion and recommendations

6.1 Conclusion

This research aimed to answer the main research question: 'How do experts address citizen concerns about birds through citizen engagement in wind farm projects in the Netherlands?'. I answered this question using results from expert interviews, documentation and literature research. Overall, this study found that experts address concerns about birds and involve citizens through different modes of engagement. In practice, this includes information-sharing and co-production, with information-sharing being the most common. Citizen science in this context is not seen by experts as feasible. The different modes of engagement are aimed at different groups of citizens and include or exclude expert and citizen knowledge in different ways. Experts have also identified that citizen engagement has many benefits (including commitment and enriched knowledge) but also has several obstacles (including knowledge, time and efficiency).

Firstly, I looked into what experts indicated were citizen concerns relating to birds and wind energy. Based on the interviews, it is apparent that citizens do have concerns about birds and wind energy, though these often go together with other concerns about wind energy. The prevalence of bird concerns can depend on the location of wind energy projects since citizens are likely to care more about other aspects if a turbine is closer to their home. Citizen opinions also change quickly over time, depending on recent articles in the media, which the experts then have to address.

One of the main concerns that experts perceive from citizens is that they are concerned about bird collisions. Citizens are afraid that birds will hit the wind turbine. Experts, however, have a split opinion on whether this is a valid argument as some seem to think this concern is not a problem in the larger context of sustainable wind energy production. Other concerns include concerns about rare birds, bird migration, habitat loss or questions about how organisations are addressing wind energy impacts on birds. The experts also noticed that a small number of citizens will use concerns about birds as a way to prevent wind energy projects.

Secondly, I looked at how organisations involve citizens in wind energy engagement. The results show that depending on who the project developer is, the location and what the project is the citizen engagement process can vary greatly. When experts engage citizens in the development of wind farms, it generally results in a rise in commitment and trust between the citizens and the experts. Based on the results, one of the main obstacles to all the different modes of engagement, that experts mentioned, is the lack of knowledge that citizens have. This can make it difficult for citizens to contribute to discussions and conduct field research.

The main mode of engagement that experts use is information sharing. Experts can inform a wide range of citizens at once and it allows experts to take away some of the main bird concerns that citizens have. Most experts have limited contact with citizens, and often only get involved if invited by the project developer or when sharing information online. With information sharing there is an emphasis on the inclusion of expert knowledge and the exclusion of citizen knowledge. It is also aimed at a broader audience, except for experts responding to specific questions from citizens. Experts will carry out the research and communicate this back to citizens as well as make the decisions regarding the project, which means less commitment to the project is created than when using co-production for example.

Experts however have noticed some obstacles to successful information sharing. One of these is that the process needs to be carried out efficiently so that citizens know who to go to if they have any specific concerns. It is also important to know that there are different types of information sharing

that are both physical and non-physical, which can reach different citizens. Furthermore, there are certain legal aspects which can make it difficult for citizens to share their concerns with the experts. This includes the legal objections that citizens have to go through or that citizens cannot go to court if they are not part of a nature organisation when they have concerns about birds.

The second mode of engagement that was researched is co-production. Citizens have more knowledge input in a project compared to information sharing. This creates a sense of ownership and commitment to the project, allowing concerns about birds to be thoroughly addressed as citizens can actively work on finding a solution that will take their concerns away.

Some experts also work with citizens who have knowledge of flora and fauna in the local area, as this knowledge can improve plans and help to keep in mind local birds. This study found that even in this mode of engagement, experts still have the final say on a project. But, this study also showed that ignoring citizens would likely ruin the relationship between them and make it much more difficult to execute a wind energy project. Co-production also has an emphasis on working with smaller groups, that include both expert and citizen knowledge so that the needs of the citizens can be met.

Moreover, specific types of financial participation can even be seen as a form of co-production, as experts and citizens have to manage the profits of a wind farm project. In this study, experts mentioned that citizens can form an energy corporation. The energy corporation can decide how to use this money and potentially input it into bird protection organisations. The energy corporation can also influence the expert to take measures to protect the birds. In this way, this type of financial participation can compensate for or address concerns that the citizens have about birds. However, a study found that citizens prefer deliberation to only financial participation, so financial participation alone could be less effective than in combination with other types of citizen engagement.

Lastly, according to literature and experts, bird monitoring around wind farms is very important. Several studies have also shown that citizen science in general has many benefits. Yet, the experts agree that it is not feasible for citizens to carry out bird monitoring around wind farms. This is due to the lack of knowledge and skills, as well as the time and motivation that is needed for citizens to carry this out. Therefore, citizen knowledge is excluded from this mode of engagement. However, digital platforms have a lot of potential for experts to address concerns about birds. There are different types of platforms, such as WIMBY and eBird. The goal of the platform can influence how useful it is in the context of addressing citizen bird concerns.

6.2 Recommendations

Based on the results I recommend addressing the following problems in practice and propose an agenda for further research.

6.2.1 Recommendations for Practice

Firstly, since multiple project developers or multiple experts in a wind energy project can confuse citizens, I propose that clearly defining the roles of different stakeholders in the citizen engagement process is very important. This would make the process more efficient and make it easier for citizens to know who they should go to if they have any concerns or ideas. Once the roles are clearly defined it is clear to both the experts and the citizens who is responsible for what, and what they can contribute to the project.

Furthermore, experts from the local municipalities should stimulate citizen councils (or a small group of citizens that want to work closely on a project). Citizens would be able to choose their representatives and enable them to represent their concerns and ideas. These representatives will be involved early on in the process, which will create a feeling of commitment to the project. They

will be able to go deeper into the necessary materials and be more motivated to work with experts, allowing for more organised and meaningful deliberations. This will create more support for wind energy projects by increasing trust, and legitimacy and strengthening integrity (Van Rijsingen, 2021; OECD, 2020).

Another recommendation is for experts to provide citizens with a shortened version of reports and materials necessary to understand the wind energy project. It could enable citizens to participate more meaningfully in discussions, as the results show citizens can become quite overwhelmed.

The results have also shown that local nature organisations can provide valuable insights into flora and fauna in a wind energy project. They have local knowledge of the area which can be very helpful for the project. It is therefore recommended that, when possible, experts should always involve local nature organisations.

Lastly, different types of information sharing reach a different audience of citizens. It could therefore be useful for experts to use different methods (such as surveys, newsletters or information evenings) so that they reach a broader audience. This would enable all types of citizens to respond and share their concerns or ideas relating to birds and wind farms.

6.2.2 Recommendations for further research

One of the recommendations for further research is to research the effect that projects such as WIMBY and eBird can have on citizens and how they can help address concerns about birds. There seems to be potential for them to increase aspects such as transparency, commitment and citizen empowerment in a fun and interactive way, so finding out exactly how they do this would be interesting.

Additionally, further research could be done to see what effect programmes such as the 'Energieboswachters' programme have on citizens and wind farm projects. These programmes are aimed at empowering citizens so it would be useful to measure what effect this has on how citizens contribute to projects (and what knowledge they include) and if experts should work on setting up more of these projects.

Lastly, as mentioned in 6.2.1, it is recommended that NGOs or local nature organisations should be engaged in wind energy projects regarding birds, but their exact role can be further researched. Since this thesis identified a conflict in definition, whether they are experts, citizens or an in-between group, it could be useful to know what their exact role is and how they can contribute to wind energy projects and help to address citizen concerns.

References

Adobe Stock. (n.d.). *Wind turbines in a row drawing*. Google. https://www.google.com/search?q=Wind+turbines+in+a+row+drawing&sca_esv=c45ac3b78b26f176&hl=nl&biw=1280&bih=559&udm=2&ei=-wtGZqqjBoKJi-gP8daG8AE&ved=0ahUKEwjqjMGipZKGAxWCxAIHHXGrAR4Q4dUDCBA&uact=5&oq=Wind+turbines+in+a+row+drawing&gs_lp=Egxnd3Mtd2l6LXNlcnAiHldpbmQgdHVyYmluZXMgaW4gYSByb3cgZHJhd2luZ0irElC0BFiYEXAAeACQAQGYAQCgAQCqAQC4AQPIAQD4AQGYAgCgAgCYAwCIBgGSBwCgBwA&sclient=gws-wiz-serp#vhid=AUnoTggPvjleMM&vssid=mosaic

Aitken, M. (2009). Wind power planning controversies and the construction of 'Expert' and 'Lay' knowledges. *Science as Culture*, *18*(1), 47–64. https://doi.org/10.1080/09505430802385682

Altenburg & Wymenga Ecologisch Onderzoek. (n.d.). *Over ons*. Altenburg & Wymenga. https://www.altwym.nl/over-ons/

Baum, H. S. (2001). Citizen participation. In *International Encyclopedia of the Social & Behavioral Sciences* (pp. 1840–1846). Elsevier eBooks. https://doi.org/10.1016/b0-08-043076-7/04439-9

Baxter, P., & Jack, S. M. (2010). Qualitative case study Methodology: study design and implementation for novice researchers. *The Qualitative Report*, *13*(4). https://doi.org/10.46743/2160-3715/2008.1573

BNNVARA. (2023, March 5). Cameraonderzoek werpt nieuw licht op gevaar windmolens: vogels ontwijken turbines - Joop - BNNVARA. *BNNVARA*. https://www.bnnvara.nl/joop/artikelen/cameraonderzoek-werpt-nieuw-licht-op-gevaar-windmolens-vogels-ontwijken-turbines

BNNVARA. (2024, January 12). Vogels halen schouders op over windmolens maar verafschuwen olie- en gasboringen - Joop - BNNVARA. *BNNVARA*. https://www.bnnvara.nl/joop/artikelen/vogels-halen-schouders-op-over-windmolens-maar-verafschuwen-olie-en-gasboringen

Brandenburg, K., Brummelkamp, S., Chan, H. S., Geurts, L., Linders, M. J., Muller, G., & Segers, R. (2023). Hernieuwbare energie in Nederland 2022: Windenergie. *Centraal Bureau Voor De Statistiek*. https://www.cbs.nl/nl-nl/longread/rapportages/2023/hernieuwbare-energie-in-nederland-2022/4-windenergie

CBS. (2022). *Hoeveel windmolens staan er in Nederland?* Nederland in Cijfers 2022. https://longreads.cbs.nl/nederland-in-cijfers-2022/hoeveel-windmolens-staan-er-in-nederland/

Ceccaroni, L., Woods, S., Sprinks, J., Wilson, S., Faustman, E. M., Bonn, A., Tzovaras, B. G., Subirats, L., & Kimura, A. H. (2021). Citizen science, health, and environmental justice. In *The Science of Citizen Science* (pp. 219–239). https://doi.org/10.1007/978-3-030-58278-4_12

Cegarra-Navarro, J. G., García-Pérez, A., & Moreno-Cegarra, J. L. (2014). Technology knowledge and governance: Empowering citizen engagement and participation. *Government Information Quarterly*, *31*(4), 660–668. https://doi.org/10.1016/j.giq.2014.07.001

Chandler, M., See, L., Copas, K., Bonde, A. M., López, B. C., Danielsen, F., Legind, J. K., Masinde, S., Miller-Rushing, A. J., Newman, G., Rosemartin, A., & Turak, E. (2017). Contribution of citizen science towards international biodiversity monitoring. *Biological Conservation*, *213*, 280–294. https://doi.org/10.1016/j.biocon.2016.09.004

Chilvers, J., & Longhurst, N. (2016). Participation in Transition(s): Reconceiving Public Engagements in Energy Transitions as Co-Produced, Emergent and Diverse. *Journal Environmental Policy Planning/Journal of Environmental Policy and Planning*, *18*(5), 585–607. https://doi.org/10.1080/1523908x.2015.1110483

Chilvers, J., Pallett, H., & Hargreaves, T. (2018). Ecologies of participation in socio-technical change: The case of energy system transitions. *Energy Research & Social Science*, *42*, 199–210. https://doi.org/10.1016/j.erss.2018.03.020

Cooper, C. B., Hochachka, W. M., & Dhondt, A. A. (2012). The Opportunities and Challenges of Citizen Science as a Tool for Ecological Research. In J. L. Dickinson & R. E. Bonney Jr (Eds.), *Citizen Science: Public Participation in Environmental Research* (pp. 99–113). Cornell University Press. https://books.google.nl/books?hl=nl&lr=&id=8S9KDwAAQBAJ&oi=fnd&pg=PA99&dq=challenges+of+citizen+science&ots=g8OF1l1s47&sig=T4gX8XNS6BD9V0ZFfdgyhoNxuGI#v=onepage&q&f=false

Department of Agricultural Economics, Sociology, and Education. (n.d.). *Why community engagement matters*. Penn State College of Agricultural Sciences. https://aese.psu.edu/research/centers/cecd/engagement-toolbox/engagement/why-community-engagement-matters

Dickinson, J. L., Zuckerberg, B., & Bonter, D. N. (2010). Citizen Science as an Ecological Research tool: challenges and benefits. *Annual Review of Ecology, Evolution, and Systematics*, *41*(1), 149–172. https://doi.org/10.1146/annurev-ecolsys-102209-144636

Ding, Y., Xiong, L., Ji, F., Lu, J., Zhu, X., & Huang, H. (2022). Using citizen science data to improve regional bird species list: A case study in Shaanxi, China. *Avian Research*, *13*, 100045. https://doi.org/10.1016/j.avrs.2022.100045

Dobos, Á., & Jenei, Á. (2013). Citizen engagement as a learning experience. *Procedia: Social & Behavioral Sciences*, *93*, 1085–1089. https://doi.org/10.1016/j.sbspro.2013.09.335

Dotinga, H. (2020, December 17). 5 vragen over windenergie en vogels. *Vogelbescherming Nederland*. https://www.vogelbescherming.nl/actueel/bericht/5-vragen-over-windenergie-en-vogels

Dovetail Editorial Team. (2023a, February 5). *What is purposive sampling? Technique, examples, and FAQs* (C. Heath, Ed.). Dovetail. https://dovetail.com/research/purposive-sampling/#:~:text=Purposive%20sampling%20is%20a%20technique,judgmental%20sampling%20or%20selective%20sampling.

Dovetail Editorial Team. (2023b, March 9). *What is inductive coding in qualitative research?* (J. Kaluza, Ed.). Dovetail. https://dovetail.com/research/inductive-coding/#:~:text=Inductive%20coding%20is%20a%20data,via%20interpretations%20based%20on%20data.

Eneco. (n.d.-a). *One Planet Plan*. https://www.eneco.nl/over-ons/wat-we-doen/one-planet-plan/

Eneco. (n.d.-b). *Wie we zijn*. https://www.eneco.nl/over-ons/wie-we-zijn/

Epstein, S. (2023). The Meaning and Significance of L ay Expertise. In *The Oxford Handbook of Expertise and Democratic Politics* (Vols. 76–93). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780190848927.001.0001

European Commission. (2020). Best Practices in Citizen Science for Environmental Monitoring. In *European Commission*. https://data.consilium.europa.eu/doc/document/ST-9973-2020-INIT/en/pdf

European Commission. (n.d.). *Citizen Science – importance and benefits*. Maritime Forum. https://maritime-forum.ec.europa.eu/contents/citizen-science-importance-and-benefits_en#:~:text=Citizen%20science%20can%20bring%20a,%2C%20direct%20involved%2C%20and%20concerned.

Flinders, M., Wood, M., & Cunningham, M. (2016). The politics of co-production: risks, limits and pollution. *Evidence & Policy: A Journal of Research, Debate and Practice*, *12*(2), 261–279. https://doi.org/10.1332/174426415x14412037949967

Fung, A. (2015). Putting the Public Back into Governance: The Challenges of Citizen Participation and Its Future. *Public Administration Review*, *75*(4), 513–522. https://doi.org/10.1111/puar.12361

Gaventa, J., & Barrett, G. (2010). So What Difference Does it Make? Mapping the Outcomes of Citizen Engagement. *IDS Working Paper*, *2010*(347), 01–72. https://doi.org/10.1111/j.2040-0209.2010.00347_2.x

Gedeputeerde Staten. (2024). *Nota zienswijzen en adviezen ontwerp-besluiten Windpark Eemshaven West* (0.5) [Dataset].

Gemeente Alphen aan den Rijn. (n.d.). *Home*. Gemeente Alphen Aan Den Rijn. https://www.alphenaandenrijn.nl/

Gibbs, G. R. (2012). *Thematic Coding and Categorizing*. SAGE Publications. https://doi.org/10.4135/9781849208574

Government of the Netherlands. (n.d.-a). *Dutch vision on global climate action*. Government.nl. https://www.government.nl/topics/climate-change/dutch-vision-on-global-climate-action#:~:text=The%20Netherlands%20was%20one%20of,no%20more%20than%201.5%20degrees.

Government of the Netherlands. (n.d.-b). *Offshore wind energy*. Government.nl. https://www.government.nl/topics/renewable-energy/offshore-wind-energy

Government of the Netherlands. (n.d.-c). *Renewable energy*. Government.nl. https://www.government.nl/topics/renewable-energy#:~:text=The%20Netherlands%20is%20using%20more,on%20this%20must%20start%20now.

Hu, H., & Zhu, J. J. H. (2015). Social networks, mass media and public opinions. *Journal of Economic Interaction and Coordination*, *12*(2), 393–411. https://doi.org/10.1007/s11403-015-0170-8

Hussey, S. (n.d.). *Why is Community Engagement Important?* Granicus. https://granicus.com/blog/why-is-community-engagement-important/

Huttunen, S., Ojanen, M., Ott, A., & Saarikoski, H. (2022). What about citizens? A literature review of citizen engagement in sustainability transitions research. *Energy Research & Social Science*, *91*. https://doi.org/10.1016/j.erss.2022.102714

iBabs. (2023, March 22). *9 Citizen Engagement Examples To Inspire Your Strategy*. https://www.ibabs.com/en/local-authorities-and-governments/citizen-engagement-examples/#Types_of_citizen_engagement

Instant Input. (2023, July 12). *Citizen Engagement vs. Participation: What is the Main Difference?* https://www.instantinput.com/blog/citizen-engagement-vs-participation

Institute of Development Studies. (n.d.). *Citizen Engagement*. Participatory Methods. https://www.participatorymethods.org/glossary/citizen-

engagement#:~:text=Citizen%20engagement%20is%20a%20form,by%20events%20in%20local%20areas.

International Institute for Applied Systems Analysis. (n.d.). *The institute*. IIASA. https://iiasa.ac.at/about-iiasa/institute

Irvin, R. A., & Stansbury, J. (2004). Citizen participation in decision making: Is it worth the effort? *Public Administration Review*, *64*(1), 55–65. https://doi.org/10.1111/j.1540-6210.2004.00346.x

Kaptein, L. (2020). *Citizen science and nature volunteering in the Netherlands: Threats and opportunities in a changing field.*

Kerpel, M. (2024, January 20). Ondanks vogelsterfte blijft turbine duurzaam. *Reformatisch Dagblad*.

Klok, C. W., Kirkels, A. F., & Alkemade, F. (2023). Impacts, procedural processes, and local context: Rethinking the social acceptance of wind energy projects in the Netherlands. *Energy Research & Social Science*, *99*. https://doi.org/10.1016/j.erss.2023.103044

Knauf, J., & Maitre, J. L. (2023). A matter of acceptability? Understanding citizen investment schemes in the context of onshore wind farm development. *Renewable & Sustainable Energy Reviews*, *175*. https://doi.org/10.1016/j.rser.2023.113158

KRO-NRCV. (2018, April 26). *Natuurclubs in verzet tegen windmolens IJsselmeer: 'Een wand van gehaktmolens.'* Pointer. https://pointer.kro-ncrv.nl/natuurclubs-in-verzet-tegen-windmolens-ijsselmeer-een-wand-van-gehaktmolens

Kumar, R. (2011). *Research Methodology: A Step-by-Step Guide for Beginners* (3rd ed.). SAGE. https://rauterberg.employee.id.tue.nl/lecturenotes/DBB150/references/Kumar-2011%20Research%20Methodology-ed3.pdf

Langer, K., Decker, T., & Menrad, K. (2017). Public participation in wind energy projects located in Germany: Which form of participation is the key to acceptance? *Renewable Energy*, *112*, 63–73. https://doi.org/10.1016/j.renene.2017.05.021

Lindsey, R., & Dahlman, L. (2023, January 18). *Climate change: global temperature*. NOAA Climate. https://www.climate.gov/news-features/understanding-climate/climate-change-global-temperature

Lodewijckx, I. (2020, February 20). *How citizen participation helps to rebuild trust within communities*. CitizenLab. https://www.citizenlab.co/blog/civic-engagement/how-citizen-participation-helps-to-rebuild-trust-within-communities/

Marres, N. (2012). *Material participation: Technology, the environment and everyday publics*. https://doi.org/10.1057/9781137029669

McKinley, D. C., Miller-Rushing, A. J., Ballard, H. L., Bonney, R., Brown, H., Cook-Patton, S. C., Evans, D. M., French, R. A., Parrish, J. K., Phillips, T. B., Ryan, S. F., Shanley, L. A., Shirk, J. L., Stepenuck, K. F., Weltzin, J. F., Wiggins, A., Boyle, O. D., Briggs, R. D., Chapin, S. F., . . . Soukup, M. A. (2017). Citizen science can improve conservation science, natural resource management, and environmental protection. *Biological Conservation*, *208*, 15–28. https://doi.org/10.1016/j.biocon.2016.05.015

Miller, C. A., & Wyborn, C. (2020). Co-production in global sustainability: Histories and theories. *Environmental Science & Policy*, *113*, 88–95. https://doi.org/10.1016/j.envsci.2018.01.016

Ministerie van Algemene Zaken, & Schouten, C. (2021, October 6). *Antwoorden op Kamervragen over de dood van een lammergier na botsing met een Nederlandse windmolen*. Rijksoverheid. https://www.rijksoverheid.nl/documenten/kamerstukken/2021/10/06/beantwoording-kamervragen-over-de-dood-van-een-lammergier-na-botsing-met-een-nederlandse-windmolen

Ministerie van Landbouw, Natuur en Voedselkwaliteit, & Van der Wal-Zeggelink, C. (2022, December 23). *Antwoorden op Kamervragen over dode vogels door windmolens in Flevoland*. Rijksoverheid. https://www.rijksoverheid.nl/documenten/kamerstukken/2022/12/23/beantwoording-kamervragen-over-vogelgehaktmolens-in-flevoland

Ministry of Economic Affairs and Climate Policy. (n.d.). *Ministry of Economic Affairs and Climate Policy*. Government.nl. https://www.government.nl/ministries/ministry-of-economic-affairs-and-climate-policy

Ministry of Economic Affairs. (2016). Energy Report: Transition to sustainable energy. In *Government of the Netherlands*.

National Center for State Courts. (n.d.). *Why public engagement could build trust*. NCSC. https://www.ncsc.org/consulting-and-research/areas-of-expertise/communications,-civics-and-disinformation/community-engagement/toolkit/why-to-use/the-promise-of-public-engagement/why-public-engagement-could-build-trust

National Institute for Public Health and the Environment. (n.d.). *10 benefits of citizen science*. RIVM Magazines. https://magazines.rivm.nl/en/2018/10/citizen-science/10-benefits-citizen-science

Natuur en Milieu Gelderland. (n.d.). *Natuur en Milieu Gelderland*. Natuur En Milieu Gelderland. https://www.natuurenmilieugelderland.nl/

Natuur en Milieufederaties. (2022, August 1). *Energieboswachters succesvol opgeleid tot "bewakers" van natuurinclusieve wind- en zonneparken - Natuur en Milieufederaties*. Natuur En Milieufederaties. https://www.natuurenmilieufederaties.nl/nieuws/eerste-energieboswachters-succesvol-opgeleid-tot-bewakers-van-natuurinclusieve-wind-en-zonneparken/

Natuur Inclusief Nationaal Overleg. (2023). Agenda Natuurinclusief 2.0. In *Overheid.nl*. https://open.overheid.nl/documenten/ef4ae588-f750-4259-b8e9-338634788d09/file

Netbeheer Nederland. (2023). Transition of the Dutch energy system: scenario's 2030-2050: II3050 Management Summary. In *Netbeheer Nederland*. https://www.netbeheernederland.nl/_upload/Files/Management_summary_Transition_of_the_Dutch_energy_system__scenario_s_2030-2050_272.pdf

Nikolopoulou, K. (2023, June 22). *What is snowball sampling? Definition & Examples*. Scribbr. https://www.scribbr.com/methodology/snowball-sampling/#:~:text=Also%20known%20as%20chain%20sampling,sample%2C%20or%20a%20saturation%20point.

NLVOW. (n.d.). *NLVOW - De belangenvereniging voor omwonenden windturbines*. https://nlvow.nl/

NOS. (2021, April 13). Verzet tegen windmolens leidde tot meer inspraak, maar het gaat toch weer mis. *NOS*. https://nos.nl/nieuwsuur/artikel/2376535-verzet-tegen-windmolens-leidde-tot-meer-inspraak-maar-het-gaat-toch-weer-mis

NWO. (n.d.). *Citizen science*. https://www.nwo.nl/en/citizen-science

OECD. (2020). Innovative citizen participation and new democratic institutions: Catching the deliberative wave. In *OECD*. https://www.oecd.org/gov/open-government/innovative-citizen-participation-new-democratic-institutions-catching-the-deliberative-wave-highlights.pdf

Ostrom, E. (1996). Crossing the great divide: Coproduction, synergy, and development. *World Development*, *24*(6), 1073–1087. https://doi.org/10.1016/0305-750x(96)00023-x

Parkhurst, J. (2017). *The Politics of Evidence: From evidence-based policy to the good governance of evidence*. Taylor & Francis. https://eprints.lse.ac.uk/68604/1/Parkhurst_The%20Politics%20of%20Evidence.pdf#:~:text=URL%3A%20https%3A%2F%2Feprints.lse.ac.uk%2F68604%2F1%2FParkhurst_The%2520Politics%2520of%2520Evidence.pdf%0AVisible%3A%200%25%20

Pierce, S. D. & The Synergos Institute. (2002). *Bridging Differences and Building Collaboration: The Critical Role of Leadership*. https://www.synergos.org/sites/default/files/media/documents/2004-bl-c_1_b_bridging_leadership_concept_paper_by_%20steve_pierce.pdf

Planbureau voor de Leefomgeving. (2023, March 21). *Betrokken burgers onmisbaar voor een toekomstbestendige leefomgeving*. PBL. https://www.pbl.nl/nieuws/2023/betrokken-burgers-onmisbaar-voor-een-toekomstbestendige-leefomgeving

Planbureau voor de Leefomgeving. (2023, March 21). *Betrokken burgers onmisbaar voor een toekomstbestendige leefomgeving*. Planbureau Voor De Leefomgeving. https://pbl.nl/nieuws/2023/betrokken-burgers-onmisbaar-voor-een-toekomstbestendige-leefomgeving

Provincie Groningen. (n.d.). *Provincie Groningen*. https://www.provinciegroningen.nl/

Rand, J., & Hoen, B. (2017). Thirty years of North American wind energy acceptance research: What have we learned? *Energy Research & Social Science*, *29*, 135–148. https://doi.org/10.1016/j.erss.2017.05.019

Randler, C. (2021). Users of a citizen science platform for bird data collection differ from other birdwatchers in knowledge and degree of specialization. *Global Ecology and Conservation*, *27*, e01580. https://doi.org/10.1016/j.gecco.2021.e01580

Regionale Energiestrategie. (n.d.-a). *Natuurinclusieve Energietransitie voor Wind en Hoogspanning op Land*. https://www.regionale-energiestrategie.nl/leefomgeving/res+natuur/1888743.aspx

Regionale Energiestrategie. (n.d.-b). *Participatie*. Nationaal Programma Regionale Energiestrategie. https://regionale-energiestrategie.nl/participatie/default.aspx

Rijksdienst voor Ondernemend Nederland. (2018, June 12). *Soortenbescherming bij windprojecten*. RVO. https://www.rvo.nl/onderwerpen/windenergie-op-land/ecologie/soortenbescherming

Rijksdienst voor Ondernemend Nederland. (2021, December 6). *Participatie bij zonne-energie en windenergie op land*. RVO. https://www.rvo.nl/onderwerpen/zonne-energie/participatie

Rijksoverheid. (2022, December). *Windturbines op land en op zee, 1990 - 2021*. Compendium Voor De Leefomgeving. https://www.clo.nl/indicatoren/nl1475-windturbines-in-de-groene-ruimte

Rijksoverheid. (n.d.). *Windenergie op land*. Duurzame Energie. https://www.rijksoverheid.nl/onderwerpen/duurzame-energie/windenergie-op-land

Roche, J., Bell, L., Galvão, C., Golumbic, Y., Kloetzer, L., Knoben, N., Laakso, M., Lorke, J., Mannion, G., Massetti, L., Mauchline, A. L., Pata, K., Ruck, A., Taraba, P., & Winter, S. (2020). Citizen Science, Education, and Learning: Challenges and opportunities. *Frontiers in Sociology*, *5*. https://doi.org/10.3389/fsoc.2020.613814

Shutterstock. (n.d.). *Eagle line drawing Shutterstock*. Google. https://www.google.com/search?q=eagle+line+drawing+shuttershock&sca_esv=c45ac3b78b26f176&hl=nl&biw=1280&bih=559&udm=2&ei=-A1GZp2gGbGA9u8P1PiNqAo&ved=0ahUKEwid_K6Vp5KGAxUxgP0HHVR8A6UQ4dUDCBA&uact=5&oq=eagle+line+drawing+shuttershock&gs_lp=Egxnd3Mtd2l6LXNlcnAiH2VhZ2xlIGxpbmUgZHJhd2luZyBzaHV0dGVyc2hvY2tIrilQzQNY-ydwAHgAkAECmAEAoAEAqgEAuAEDyAEA-AEBmAIAoAIAmAMAiAYBkgcAoAcA&sclient=gws-wiz-serp#vhid=cJQKlSAjM-doxM&vssid=mosaic

Siebers, V. (2019). How to Organise Citizen Engagement: Experiences of Dutch Municipalities. *Administratio Publica*, *27*(3), 128–143. https://journals.co.za/doi/epdf/10.10520/ejc-adminpub-v27-n3-a8

Smarticipatie. (n.d.). *Omgevingswet*. https://www.smarticipatie.nl/omgevingswet

Sovon. (n.d.-a). *Over Sovon*. https://sovon.nl/over-sovon

Sovon. (n.d.-b). *Windenergie gevoeligheidskaart*. https://www.sovon.nl/onderzoek/onderzoeksthemas/energietransitie/windenergie-gevoeligheidskaart

Straatsma, E. (2021, June 10). Vogelwerkgroep pleit voor windturbines bij containerterminal Alpherium: 'Windmolens langs N11 zijn gehaktmolen. *Leidsch Dagblad*. https://www.leidschdagblad.nl/cnt/dmf20210610_39069360?utm_source=google&utm_medium=organic

Sullivan, B. L., Aycrigg, J. L., Barry, J. H., Bonney, R., Bruns, N. E., Cooper, C. B., Damoulas, T., Dhondt, A. A., Dietterich, T. G., Farnsworth, A., Fink, D., Fitzpatrick, J. W., Fredericks, T., Gerbracht, J., Gomes, C. P., Hochachka, W. M., Iliff, M. J., Lagoze, C., La Sorte, F. A., . . . Kelling, S. (2014). The eBird enterprise: An integrated approach to development and application of citizen science. *Biological Conservation*, *169*, 31–40. https://doi.org/10.1016/j.biocon.2013.11.003

The Hague Academy for Local Governance. (n.d.). *7 Conditions for Successful Citizen Participation*. The Hague Academy. https://thehagueacademy.com/news/7-conditions-successful-inclusive-citizen-participation/

The Royal Society. (2020, March). *Is the climate warming?* https://royalsociety.org/topics-policy/projects/climate-change-evidence-causes/question-1/#:~:text=Earth's%20average%20surface%20air%20temperature,%2D1970s%20%5BFigure%201a%5D.

Turnhout, E. (2019). Interdisciplinarity and the challenge of knowledge integration. In W. Tuinstra & W. Halffman, *Environmental Expertise* (pp. 152–163). Cambridge University Press. https://doi.org/10.1017/9781316162514.013

Turnhout, E., Metze, T., Wyborn, C., Klenk, N., & Louder, E. (2020). The politics of co-production: participation, power, and transformation. *Current Opinion in Environmental Sustainability*, *42*, 15–21. https://doi.org/10.1016/j.cosust.2019.11.009

Turnhout, E., Tuinstra, W., Halffman, W., & Neves, K. (2019). Lay Expertise. In *Environmental Expertise: Connecting Science, Policy and Society* (pp. 184–199). Cambridge University Press. https://doi.org/10.1017/9781316162514

Turnhout, E., Van Bommel, S., & Aarts, N. (2010). How Participation Creates Citizens: Participatory Governance as Performative Practice. *Ecology and Society*, *15*(4). https://doi.org/10.5751/es-03701-150426

Turrentine, J. (2022, December 13). *What are the solutions to climate change?* NRDC. https://www.nrdc.org/stories/what-are-solutions-climate-change#renewable-energy

USGS. (n.d.). *Can wind turbines harm wildlife?* https://www.usgs.gov/faqs/can-wind-turbines-harm-wildlife#:~:text=A%20key%20challenge%20facing%20the,and%20reduced%20survival%20or%20reproduction.

Van Aalderen, N., & Horlings, L. (2020). Accommodative public leadership in wind energy development: Enabling citizens initiatives in the Netherlands. *Energy Policy*, *138*, 111249. https://doi.org/10.1016/j.enpol.2020.111249

Van Rijsingen, H. (2021, April 24). *Veel verzet tegen windmolens en zonneparken, maar er is ook een oplossing: het burgerberaad*. EenVandaag. https://eenvandaag.avrotros.nl/item/veel-verzet-tegen-windmolens-en-zonneparken-maar-er-is-ook-een-oplossing-het-burgerberaad/

Vogelbescherming Nederland. (n.d.). *Bescherming bij jou in de buurt*. Vogelbescherming. https://www.vogelbescherming.nl/bescherming/in-de-buurt/beschermingsproject

Vuichard, P., Broughel, A., Wüstenhagen, R., Tabi, A., & Knauf, J. (2022). Keep it local and bird-friendly: Exploring the social acceptance of wind energy in Switzerland, Estonia, and Ukraine. *Energy Research & Social Science*, *88*. https://doi.org/10.1016/j.erss.2022.102508

Waardenburg Ecology. (n.d.). *Over ons*. https://waardenburg.eco/over-waardenburg

Wageningen University & Research. (n.d.). *Citizen science*. WUR. https://www.wur.nl/en/dossiers/file/citizen-science.htm

Weber, E. U. (2013). Seeing is believing. *Nature Climate Change*, *3*, 312–313. https://doi.org/10.1038/nclimate1859

WIMBY. (n.d.). *About*. https://wimby.eu/about/

Yin, R. K. (2009). *Case study research: Design and Methods* (4th ed., Vol. 5). SAGE. https://handoutset.com/wp-content/uploads/2022/06/Case-Study-Research-Design-and-method-Robert-K.Yin_.pdf

Yu, K. (2017). Governance and Good Governance: A new framework for Political analysis. *Fudan Journal of the Humanities and Social Sciences*, *11*(1), 1–8. https://doi.org/10.1007/s40647-017-0197-4