Community Engagement in Wind Energy: Innovative approaches to achieving a social license to operate (CoWind)

Final Report

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Acknowledgements

This work was supported by the Sustainable Energy Authority Ireland, Research, Development & Demonstration Funding Programme 2018. [Grant number 18/RDD/281]. The research team were very grateful for this funding and the opportunity to conduct this research.

The research team would also like to extend our thanks to the ongoing support of members of the CoWind steering committee. Their time and guidance are very much appreciated.

We would also like to extend our thanks to all the persons who agreed to participate in the developer sector interviews. Your time and insights are truly appreciated.

We also extend out thanks to all those who took the time to complete the national and wind farm community surveys undertaken as part of this research.

We are very grateful to Michael O'Connell, Cork University Business School, who assisted us in reviewing the Third-party appeals to An Bord Pleanála.

Thank you also to others who met with us informally and shared their knowledge and experience with us.

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Abstract

This report presents the findings of the CoWind research project which examines community acceptance of onshore wind energy developments in Ireland. The research focused on the different factors that impact acceptance via community-developer relationships more specifically participative decision making, benefit sharing and community/co-ownership. How these aspects are perceived by the public and how they are experienced by local communities was examined using a national survey and a wind farm community survey, respectively. The experience and opinions of respondents at different setback distances was examined. The experience and opinions of respondents throughout the different development stages of pre-planning/planning, construction and operation was also examined. In addition to the two surveys, the research employed choice-based experiments to uncover the relative importance of factors in respondent's decision-making on onshore wind farm development acceptance and their willingness to invest in developments. A social licence to operate framework examined the community-developer relationship in depth. Here, we provide some high-level findings.

Looking at engagement, it was found that the quality of engagement in the early pre-planning/planning stage has an immediate impact but also a long-term impact on respondents' support for onshore wind farms in their community. Feeling powerless or feeling excluded from having an influence on the project were strong motivators for negative action. Near neighbours of wind farms are the group most likely to take action opposing a proposed wind farm and most likely to withhold the social license to operate in the pre-planning/planning stage though this dissipates as the project moves through the stages. Respondents believed that a neutral third-party intermediary was the most efficient mechanism to influence the design of the project. The choice-based experiment showed that wind farm ownership and setback distance were the two most important attributes for willingness to accept an onshore wind farm in their community. Ongoing engagement and good relationships between the wind farm operator and the community are also beneficial.

Looking at community benefit-sharing, it was found in the national survey that the benefits with the strongest impact on acceptance were direct payments to near-neighbours for 15 years and a community benefit fund for green and sustainable initiatives for 15 years. However, when examined further in the community survey, it was found that non-monetary community benefits have the most positive effect on acceptance across all stages of development. The development of amenities in an area was the most impactful benefit on acceptance of a wind farm in the pre-planning/planning and construction stages and was a high impact benefit in the operation stage. There is some evidence that the community benefit fund can be perceived by a minority in a negative context. For example, 20% in the pre-planning/planning stage, 25% in the construction stage and 9.7% in the operation stage stated that a community benefit fund would reduce their acceptance of a wind farm. The majority of respondents in all wind farm development stages feel that the current minimum €1,000/annum near-neighbour payment is too low. The choice-based experiment showed that the governance of the community benefit fund was relatively more important than how the fund is distributed for willingness to accept an onshore wind farm in their community.

Looking at community ownership and co-investment, it was found that community ownership/co-ownership arrangements would have a positive impact on local residents' acceptance of wind farms. However, such arrangements are not a panacea for improving acceptance of planned wind farms among people who are opposed to the projects or among those who would live in close proximity. Citizens have a strong appetite for investing in local wind farms that are in construction or operation. It was found that it will be difficult for communities to raise the required finance within the locality. Their willingness to invest falls substantially if the investment is risky or they are required to invest for a long period. Citizens are generally only willing to invest low sums of money. Non-local investment would be needed for large-scale community owned/co-owned projects to be financially viable. In addition to financial hurdles, addressing the regulatory requirements on investor protection will be necessary to make the offer suitable for local investors. It will involve guidance to the individual prospective investors and de-risking of the offer. Notwithstanding these issues, community ownership and co-investment does occur in other EU jurisdictions. Capacity building programmes that would

educate and advise communities on how to develop wind farms would be critical for encouraging citizen participation in community owned/co-owned projects. Developers are generally willing to facilitate co-ownership arrangements. However, developers tend to prefer more shallower forms of co-ownership such as shared revenue arrangements over joint ventures and split ownership agreements. Building trust between communities and developers would help to promote citizen participation in co-ownership arrangements.

The study highlights the challenging nature of improving community relationships particularly in the pre-planning/planning stage and for residents that are very near-neighbours. The insights are used to provide some recommendations for improving the community-developer relationships. For example, early and transparent community engagement, seeking out concerns, acknowledging and mitigating disruption are important measures for building trust. Participatory approaches should be adopted where possible such as in identifying community needs and aspirations, the design of amenities and joint problem solving in the mitigation of disruption. Developers should feel more confident in discussing benefit sharing in pre-planning stages as the RESS regulations have removed some of the contentious issues surrounding the provision of a community benefit funds. Non-monetary benefits, such as local amenities, or improved local infrastructure, have a positive impact on acceptance.

1 Introduction

1.1 Background

Surveys consistently demonstrate that the public is very supportive of wind energy in principle. However, public approval of wind power does not translate into social acceptance at the local level. In Ireland, and elsewhere, specific wind energy projects have faced opposition from local inhabitants (Jones and Eiser, 2010; Avila, 2018; Bertsch et al., 2017; Cashmore et al., 2019; Leiren et al., 2020; Jorgensen, 2020).

Initially, the technical and financial challenges of the low-carbon transition dominated research (Watson et al., 2014; Louche et al., 2019) and the societal challenge required for the transition to net zero and a climate-neutral economy was not addressed. However, a more recent research approach has been developed where the co-evolution of society, technology, the economy, and the environment are examined together (Hirt et al., 2020; Sahakian and Trutnevyte, 2020; McGookin et al., 2022). Wüstenhagen et al. (2007) presented a high-level definition of social acceptance of renewable energy technology consisting of three components or dimensions. Briefly, the dimensions are socio-political acceptance (broad general acceptance at policy, stakeholder, and public levels), market acceptance (market adoption of the technology) and community acceptance (specific acceptance of siting decisions and renewable energy projects by local stakeholders, particularly residents). The three dimensions make up the vertices of a triangle indicating that the three dimensions interact and are required for successful technology diffusion. We focus on the community acceptance aspect of the triangle.

Local-level community acceptance has increasingly become acknowledged as an issue that influences the successful implementation of renewable energy developments and policies (Upham et al., 2015). Although the term acceptance is frequently used to describe both a process of acceptance and an outcome of acceptance, some authors differentiate between acceptability and acceptance (Ellis et al., 2023). Community or local acceptability has been used to refer to the processes of evaluation of the development incorporating many factors including social norms, perceived behavioural control, and personal norms. Acceptance refers to the outcome of the evaluation process of the development which can be rejection, support or on a tolerance scale between rejection and support (Huijts et al., 2012; Fournis and Fortin, 2017; Janhunen et al., 2018).

In this study, we examine the complex process of local community acceptability and the resultant acceptance or nonacceptance of the siting of a local wind farm. In addition to community acceptability and acceptance of a wind farm, we examine the relationship between the developer and the community using a Social Licence to Operate framework. Like the concept 'community acceptance', the social licence to operate is a concept that can be misappropriated by companies when active opposition is lacking or at a minimum. Researchers have developed models to define and measure the concept (Thomson and Boutilier, 2011; Eabrasu et al., 2021). We use the framework as developed by Thomson and Boutilier (Thomson and Boutilier, 2011; Boutilier, 2017). In this context, to have a *Social License to Operate* (SLO) involves gaining and maintaining the support of the people that live and work in the area of impact of the onshore wind development project (Joyce and Thomson, 2000; Thomson and Boutilier, 2011). The advantages of using this social licence to operate framework is that the level of social licence is specifically provided by the community, the social licence to operate is not dependent on a binary acceptance or nonacceptance outcome but quantifies the relationship of the developer and community members. The social licence to operate measure can be applied to one person or aggregated up to community level. Furthermore, the social licence to operate is not restricted to the implementation stage but is ongoing and applicable through all stages of the development. The framework is further explained in Section 2.5.

1.2 Policy Environment

While the European Union has indicated it intends to achieve net-zero carbon by 2050, Ireland is committed to net zero and a climate-neutral economy by 2050 (The Climate Action and Low Carbon Development Act). The interim national target of 51% emissions reduction by 2030, relative to 2018 levels, is challenging and the decarbonisation of our economy requires staying within legally binding carbon budgets, implementation of all measures outlined in the Climate Action Plans and additional measures not yet specified (Climate Action Plan,

2023[1]). Decarbonising electricity generation is key to decarbonising the economy with renewables contributing to emissions reduction by 45% between 2005 and 2020.[2] Renewables provided 42% of electricity demand in 2020. Wind energy provided over 86% of Ireland's renewable electricity and 36% of Ireland's total electricity in 2020.[3] The Irish government's target is to meet 80%, of electricity demand from renewable sources, primarily wind, by 2030. This is occurring in tandem with increasing demand, with electricity demand forecasted to grow by 21% over the next ten years, and the retirement of some current generation sources.[4] Social acceptance has become one of the most policy-relevant social science concepts in the field of energy technologies. Policy around citizen involvement in the energy transition has been developed to address the issue of the societal challenge required for the transition. EU Member States were required to put appropriate enabling frameworks in place for a more socially inclusive energy transition by 2021. In Ireland, the 'Energy Citizen' concept aims to provide citizens with opportunities to participate in energy policy development and to benefit from the energy transition as evidenced by:

1. The Irish Energy White paper (2015);
2. Recommendation 6 arising from the Energy Session held during the Citizens Assembly[5] on Climate Change in 2017 (The State should act to ensure the greatest possible levels of community ownership in all future renewable energy projects by encouraging communities to develop their own projects and by requiring that developer-led projects make share offers to communities to encourage greater local involvement and ownership);
3. The supported network of Sustainable Energy Communities throughout the country providing a path for the emergence of Renewable Energy Communities;
4. Provisions under the Renewable Electricity Support Scheme (RESS)[6] launched in 2019;
    - The inclusion of mandatory community benefit schemes for all renewable developments participating in RESS auctions.
    - The Renewable Energy Communities enabling framework.

Community acceptance of wind energy infrastructure at the local level remains an important challenge for the developers of wind farms, and an implementation problem that hinders the pathway to 80% renewable electricity generation. The recent Renewable Electricity Support Scheme (RESS) introduced a competitive auction-based approach to renewable electricity capacity. The scheme attempts to support wind energy development for national targets while applying downward pressure on electricity costs. The RESS policy incorporates a high level of community participation with the aim of addressing the impact of wind farms on local communities with mandatory community benefits (payments for near-neighbours and a community benefit fund). Some wind farm developments will be built outside the RESS framework. However, in addition to community engagement generally, our research themes are closely aligned with these latest policy measures promoting community participation and benefit sharing. Originally, RESS included favourable conditions in the auction process for community-owned projects. This has been replaced and communities now receive technical and financial support via the Renewable Energy Communities enabling framework included under the RESS umbrella.

[1] Climate Action Plan 2023: Changing Ireland for the better.
https://www.gov.ie/pdf/?file=https://assets.gov.ie/249626/1c20a481-bb51-42d6-9bb9-08b9f728e4b5.pdf#page=null

[2] Ireland's Provisional Greenhouse Gas Emissions 1990-2021 https://www.epa.ie/publications/monitoring--assessment/climate-change/air-emissions/irelands-provisional-greenhouse-gas-emissions-1990-2021.php

[3] https://www.seai.ie/publications/Energy-in-Ireland-2022.pdf

[4] https://www.eirgridgroup.com/site-files/library/EirGrid/EirGrid_SONI_Ireland_Capacity_Outlook_2022-2031.pdf

[5] https://www.citizensassembly.ie/en/meetings/first-meeting-on-how-the-state-can-make-ireland-a-leader-in-tackling-climate-change.htmlhttps://www.citizensassembly.ie/en/meetings/first-meeting-on-how-the-state-can-make-ireland-a-leader-in-tackling-climate-change.html

[6] https://www.gov.ie/en/publication/36d8d2-renewable-electricity-support-scheme/

1.3 Research Approach

While renewable energy assets comply with the various legal and regulatory frameworks, the 'social licence' to build, own and operate renewable energy projects from the communities in which they are located has not always been forthcoming. In this study, we examine the complex process of local acceptability and acceptance or nonacceptance of the siting of a local wind farm using a Social Licence to Operate framework. Our project examines three themes that are purported to influence residents' acceptance of a local windfarm. They are:

- Community engagement including community engagement quality between the wind farm developer and local communities.
- Benefit sharing which looks at creating effective community benefits, their distribution, and their governance.
- Financial participation which explores the potential of financial structures to support citizen and community participation in wind energy projects.

The results of two large surveys were used to understand the views of the public and of wind farm local communities on all three themes and to evaluate the impact on acceptance of different engagement practices, financial participation, and benefit-sharing approaches. A *National Survey* examined broad societal acceptance of wind farms. A wind farm *Community Survey* examined local community acceptance of wind farms. Field work included *Community Interviews* to validate survey findings. *Developer Interviews* (interviews with actors in the wind energy sector) were conducted to discover their opinions on the three themes. A review of third-party appeals to An Bord Pleanála was conducted. In addition, databases covering the location, number of turbines, planning variables etc. of wind farms in Ireland were generated.

1.4 Objective

The CoWind project seeks to better understand community acceptance of onshore wind energy development in Ireland with the objective to uncover the ways in which broad engagement can be improved and to better understand how wind farm developers can gain and maintain a social licence to operate from local communities. We focus on different aspects of engagement with emphasis on the developer-community relationship, public participation in decision-making, benefit-sharing schemes, and public participation in community-ownership/co-ownership projects. We examine the impact and trade-offs between combined measures to enhance engagement. Our aim is to develop research insights into publicly available research outputs and provide recommendations for policy makers, wind farm developers and communities.

1.5 Report Structure

In the next section, Section 2, the methodology and data sources used within the research project are outlined including the design of two online surveys. The three themes of engagement, financial participation and benefit-sharing are addressed separately in Sections 3 to 5. In each of these sections, findings from the analysis of the *National Survey*, the *Community Survey*, the *Developer Interviews,* and the *Validation/fieldwork Interviews* are presented. In Section 6, the results from two choice-based experiments are presented. In Section 7, the results of an analysis of An Bord Pleanála third-party appeals are presented. In Section 8, we look at policy recommendations arising from the research.

2. Methodology

The methodology underpinning the elements of the research approach is presented in this section. Specifically, the methods underlying the National Survey, the Community Survey, the choice experiments, the industry interviews, the application of the Social Licence to Operate framework and the review of an Bord Pleanála appeals are discussed.

2.1 The National Survey

The *National Survey* was conducted to ask citizens how they would like to be engaged with and how they think benefit-sharing should be organised and to determine the preferred financial structure for citizen investment in wind farm development. The *National Survey* consisted of an online survey of 2,023 respondents. The survey was nationally representative by gender and age but skewed slightly towards regions that were more likely to experience wind farm developments. The key characteristics of the sample are included in Appendix 1, Table A.1. After evaluation by focus groups and initial piloting, the survey was conducted in early summer 2021. As part of the survey, respondents were asked a series of questions about a proposed wind farm. The hypothetical wind farm scenario was developed in collaboration with our industry partners and members of the project advisory steering group to realistically represent the size of wind farms expected in the near future. Depending on the question, the respondents were asked to consider one of the two cases below:

1. "Imagine that a modern wind farm with 15 turbines of 185m height is proposed for development **within a 5km radius of your home**."

2. "Imagine that a modern wind farm with 15 turbines of 185m height is proposed for development and one of turbines would be **within 1 kilometre of your home**."

Previous research has shown that the distance to nearest existing turbines impacts acceptability of proposed wind farms (Jones and Eiser, 2010; Meyerhoff et al., 2010; Brennan and Van Rensburg 2016). Most of the respondents in this survey did not have first-hand lived experience of living near a wind farm; 1,170 (58%) respondents lived over 10km from an existing wind farm. Thus, this cohort in the *National Survey* provided an opportunity to determine attitudes formed prior to a development proposal rather than through experience and familiarity with the technology. For these respondents unfamiliar with a wind farm, the survey examined what respondents think would happen rather than reviewed a process they have experienced. Another 552 (27%) respondents lived over 3 km and under 10km of an existing wind farm and 301 respondents (about 15%) lived within 3km of an existing wind farm. Overall, '*Distance to the nearest existing wind farm turbine*' from the respondents' home is an important factor in the analysis of the results. To set a baseline, the respondents were asked on a scale of '1', very unlikely, to '4', very likely, about their level of acceptance for the proposed wind farm. Table 2.1 shows the proportion of respondents at different setback distances from their nearest existing wind turbine by acceptance level of the proposed hypothetical wind farm.

Table 2.1 The proportion of respondents in the National survey in the four acceptance categories for a proposed wind farm with benefits, by distance to nearest turbine.

Acceptance level	Under 3km	4 to 5 km	6 to 10 km	Over 10 km
Very likely	32.6%	34.7%	40.4%	41.2%
Somewhat likely	24.3%	14.7%	15.3%	14.6%
Somewhat Unlikely	36.5%	39.6%	31.8%	29.7%
Very Unlikely	6.6%	11.1%	12.5%	14.4%

During this extensive survey, respondents were asked their preferences with respect to engagement practices, benefit-sharing, and co-investment opportunities. There were also asked questions on attitudes to wind energy, opinions on wind farm externalities, climate change and other green issues that were included in the analysis to determine if they were significant factors influencing acceptability, acceptance, or decisions on investing in a wind farm. Socio-demographic characteristics have been shown to influence an individual's

acceptance level of windfarms. For example, Frantál and Nováková (2019) found that the unequal development of wind energy in Czech Republic could be predicted better by the affluence of an area rather than wind potential. Socio-demographic data under the headings of individual characteristics (e.g., age and gender), household characteristics (e.g., household size, income, tenure) and location characteristics (e.g., if the area is rural) was also collected for inclusion in the analysis. A summary of the survey questions and the section in the report addressing the findings from same is presented in Table 2.2.

Table 2.2 A summary of the questions asked in the National Survey.

Theme	Questions	Findings
Engagement:	How early would you like engagement to begin? Where would you look for information about a proposed wind farm? What is your preferred type of engagement? What is the likelihood that you would participate in different engagement approaches? What barriers would prevent you from engaging?	Section 3.1
Benefit sharing:	What distribution of the benefits do you think is fair? What impact would different benefit-sharing mechanisms have on your willingness to accept? Who do you think should manage the community benefit fund?	Section 4.1
Citizen investment and co-ownership:	What kind of financial experience do you have? What impact would volatile returns have on your investment decisions? How much money would you have for investment? What kind of investment would you invest in? How much would you invest in the different projects? Rank your preferred investment (Government green bond, shares in a renewable energy company, share in a local co-operative owned wind farm, shares in a private project). What is your preferred ownership for a local wind farm (community owned, developer-owned, shared developer and community ownership)? Rank your preferred ownership structure (local landowners, community-owned, joint developer/community, semi-state, private company). Who should get assistance to buy shares in local wind farms? Have you previously invested in wind energy?	Section 5.1
Attitude towards wind energy:	Do you consider wind energy to be unreliable, sustainable, environmentally harmful, key to Ireland's carbon reduction obligations, a negative impact on tourism, good for local job potential, brings discord into communities, or that they should be moved off- shore?	Used as control variables throughout the analysis
Wind farm externalities:	What influence does the following factors have on acceptance of a proposed wind farm? Factors include a community benefit fund, that the construction of wind farm provides 20 jobs local, there is an opportunity to buy shares, the wind farm provides three regional jobs during operation, carbon emission reductions, potential for shadow flicker, the visual impact of turbines, the potential for noise, the potential impact on wildlife, the potential health impact and anti-wind neighbours.	Used as control variables throughout the analysis
Green awareness:	Are you concerned about climate change? Would you like to buy renewable electricity? Have you previously availed of SEAI home energy upgrade? Are you aware of a Sustainable Energy Community in area? Are you active in the Sustainable Energy Community?	Used as control variables throughout the analysis
Sociodemographic information:	Individual: Age, sex, education attainment, employment status, farmer, or landowner. Household: Tenure, household income, number of children in the household, number of adults in the household. Location: County, rural or urban, how long have you lived in the area? Distance to the nearest existing wind farm turbine?	Used as control variables throughout the analysis

2.2 The Community Survey

The *Community Survey* was conducted to determine the experiences and preferences of people that have been exposed to wind farm development. The *Community Survey* was conducted online with respondents recruited via a market research company, Qualtrics, and via a Facebook advertising campaign. When there was more than one wind farm within 10km of the respondent's home, respondents were asked to consider the most recently developed wind farm.

Previous studies have shown that the stage of development can have an impact on community acceptance level. Some studies have found that, compared to pre-construction attitudes, acceptance increases when residents have been living close to a wind farm for some time (Eltham et al., 2008; Wilson and Dyke, 2016; Krohn and Damborg, 1999; Warren et al., 2005; Meyerhoff et al., 2010). 'Distance to the nearest wind farm turbine' from the respondents' home in an existing or planned wind farm is again used extensively in the analysis. To set a baseline, the respondents were asked on a scale of '1', very unlikely, to '4', very likely, about their level of acceptance for the proposed wind farm. Table 2.3 shows the proportion of respondents at different setback distances from their nearest existing wind turbine by acceptance level of the existing or planned wind farm. The respondents participating in the *Community Survey* were asked a series of questions to determine the distance and wind farm stage of wind farm(s) within ten kilometres of their homes. This allowed the respondents to be directed to complete the survey with respect to the most recent wind farm in their area, be it operational, in construction or in the pre-planning/planning stage. The aim was to maximise the number of new wind farms approved through the RESS auction scheme (i.e., pre-planning/planning stage and construction stage) into the sampling framework. The *Community Survey* had 826 respondents across three different wind farm development stages including 409 respondents in the operational stage and 132 respondents in the construction stage. In the survey, the pre-construction stage comprised of two stages; the pre-planning site investigation and design stage (103 respondents), and the planning stage when proposals had been submitted to the planning authorities (144 respondents). There were 38 respondents that were unsure if planning proposals had been submitted or not. The respondents in the pre-planning stage, the planning stage and the respondents who were unsure of which pre-construction stage to select were combined for analysis to ensure an adequate sample size and to include the respondents who did not know which stage to select. Table 2.4 shows the proportion of respondents in the three development stage categories by acceptance level of the existing or planned wind farm.

Table 2.3 The proportion of respondents in the Community Survey in the four support categories, by distance from nearest turbine group.

Support for local wind farm	<2km (n = 144)	2-5km (n = 282)	5-10km (n = 400)	Overall (n = 826)
Very opposed	31.94%	7.45%	3.50%	9.81%
Opposed	12.50%	6.38%	6.00%	7.26%
Supportive	34.72%	52.48%	54.00%	50.12%
Very supportive	20.83%	33.69%	36.50%	32.81%

Table 2.4 The proportion of respondents in the Community Survey in the four support categories, by development stage.

Support for local wind farm	Pre-planning/Planning (n = 285)	Construction (n = 132)	Operation (n = 409)	Overall (n = 826)
Very opposed	22.11%	3.18%	3.79%	9.81%
Opposed	9.82%	5.62%	6.82%	7.26%
Supportive	47.02%	53.06%	47.73%	50.12%
Very supportive	21.05%	38.14%	41.67%	32.81%

In addition to the questions asked in the *National Survey*, listed in Table 2.5, additional questions covering the lived experience of living near an existing or proposed wind farm were extensively queried in the *Community Survey*. The respondents were asked questions tailored to either the operational, construction or the pre-

planning/planning stage (i.e., their experience rather than their expectations). A summary of the questions asked in the *Community Survey* is presented in Table 2.5.

Table 2.5 A summary of the questions asked in the Community Survey.

Theme	Questions	Findings
Engagement:		
Initial engagement	How did you hear about the wind farm? What were your concerns? Where did you look for information?	Section 3.1
Engagement during the planning stage	Did you think the process was fair? Did the developer act openly? Was the community able to influence any design aspect? Did you take any actions? Did you think that the developer was going to do what they like anyway? What do you think is the best mechanism for community input into design?	Section 3.2
Engagement during construction	Were you living in the locality during construction? What level of annoyance/disturbance, if any, did you experience during construction? Did the developer do their best to minimise disruption during construction?	Section 3.2
Engagement during operation	How many turbines can you see from your home? Have you ever experienced shadow flicker or excessive noise? For each issue, did you raise the issue with the operator? Did they respond satisfactorily?	Section 3.2
Benefit sharing:	What benefits has the community received? Does your household receive any of the benefits? Do you know the value of the community benefit fund, direct payments, or electricity discounts? How have these benefits influenced your willingness to accept the wind farm? Who do you think should manage the community benefit fund? Would you volunteer to manage the distribution of the community benefit fund? Is the €2/MWhr developer contribution to the community benefit fund fair? Are the rules for distributing the community benefit fund fair?	Section 4.2
Citizen investment and co-ownership:	What kind of financial experience do you have? What is the motivation and freedom (from a normative behavioural point of view) to invest? What are the important factors you consider when investing? Would you invest in a local wind farm? What type of return would be acceptable to you? How much would you be willing to invest? What impact would volatile returns have on your investment decisions? How much money would you have for investment? Would you invest in a local wind energy project, a non-local wind energy project, a portfolio of wind energy projects? How much would you invest in the different types of projects? What type of shared-ownership model would be acceptable (four models presented)? Rank your preference for the four models of shared ownership. How much would you be willing to invest in each shared-ownership model? How much knowledge of aspects involved in wind farm development do you have (raising finance, project management, developing/managing a wind farm, starting/running an SME, construction management)?	Section 5.2

	Would you volunteer your time to help manage the community investment? Who should be allowed invest? Would you extend that to raise enough finance? Do you think investors living further away should get the same rate of return as near neighbours? Have you previously invested in wind energy?	
The Social Licence to Operate status:	Level of agreement with a series of statements relating to the respondent/community relationship with the developer/operator.	Section 3.2
Attitude towards wind energy:	Do you consider wind energy to be unreliable, sustainable, environmentally harmful, the key to Ireland's carbon reduction obligations, a negative impact on tourism, good for local job potential, brings discord into communities, or that they should be moved off-shore?	Used as control variables throughout the analysis
Wind farm externalities:	What influence does the following factors have on acceptance of a proposed wind farm? Factors include a community benefit fund, that the construction of wind farm provides 20 jobs local, there is an opportunity to buy shares, the wind farm provides three regional jobs during operation, carbon emission reductions, potential for shadow flicker, the visual impact of turbines, the potential for noise, the potential impact on wildlife, the potential health impact and anti-wind neighbours.	Used as control variables throughout the analysis
Green awareness:	Are you concerned about climate change? Would you like to buy renewable electricity? Have you previously availed of SEAI home energy upgrade? Are you aware of a Sustainable Energy Community in area? Are you active in the Sustainable Energy Community?	Used as control variables throughout the analysis
Sociodemographic information:	Individual: Age, sex, education attainment, employment status, farmer, or landowner. Household: Tenure, household income, number of children in the household, number of adults in the household. Location: County, rural or urban, how long have you lived in the area? Distance to the nearest existing wind farm turbine?	Used as control variables throughout the analysis.

2.3 Choice-Based Conjoint Analysis (CBCA).

Choice-based conjoint analysis is a type of discrete choice experiment where respondents select a preferred outcome from two or more options. The respondent undertakes a series of these selections maximising perceived gain or minimising perceived loss in their choices. Thus, the overall relative importance of different attributes of the choices for the sample population is obtained by aggregating the results. Discrete choice experiments have been used to study different components of wind farm acceptance previously (Brennan and van Rensberg, 2016; Lienhoop, 2018; Sardaro et al., 2019; Dugstad et al. 2023) and solar projects (Vuichard et al., 2021) and wind energy investment (Pons-Seres de Brauwer and Cohen, 2020; Wu et al., 2022).

In the *National Survey* respondents were randomly assigned to either one of two choice-based conjoint experiments. One, with 1,014 respondents, focused on trade-offs between engagement, benefit sharing and co-investment attributes when deciding on willingness to accept a local wind farm. The other, with 1,009 respondents, focused on trade-offs between investment attributes when deciding on willingness to invest in a wind farm. The choice options were hypothetical but realistic options. The data was analysed with hierarchical Bayes. The attributes and attributes levels used in the Willingness to Accept CBCA and the results are presented in Section 6.

2.4 Developer Interviews

Nine people at senior management level in the wind energy industry were interviewed to ascertain their perspectives on the three themes. The interviews were conducted online between the 11th of November 2021 and the 5th of January 2022. The interviews were in-depth, lasting at least one hour and a half. The interviews

followed a semi-structured interview style. A summary of the topics covered, and questions asked to structure the *Developer Interviews* were:

- Wind energy targets and social acceptance.
- Stakeholder management and engagement strategy.
- Benefit sharing.
- The policy environment.
- Community ownership and investment.
- Site specific externalities; Impact on project success.

2.5 Application of the Social Licence to Operate Framework

In the *Community Survey* we examine community acceptance from the social licence to operate (SLO) framework developed by Thomson and Boutilier (2011). Their methodology for measuring an organisation's social licence is based on the community-developer relationship, underpinned by trust and legitimacy dimensions. The main insight is that stakeholders can summarise "how they feel about the project when they describe their perceptions of their relationship with the company." (Boutilier, 2017, p.16). The correspondence between the social licence score (community-operator relationship) and project acceptance has been validated by the correlation with the sentiments expressed in the interviews with stakeholder group leaders indicating approval or disapproval (Boutilier, 2017).

The four dimensions underpinning the Thomson and Boutilier framework are:

Economic legitimacy is a perception that the project offers a benefit to the citizen (i.e., the project provides a benefit that outweighs any harm). The perception that the project will inflict harm leads to the social licence being withheld. The project needs to be at least neutral in this regard to gain tolerance.

Socio-political legitimacy represents culturally embedded perceptions (i.e., acceptance of policies and technologies by the public). Socio-political legitimacy is the perception that the project/company/sector contributes to the well-being of the region, respects the local way of life, meets expectations about its role in society and has good governance.

Interactional trust is the perception that the company and its management listens, responds, keeps promises, engages in mutual dialogue, and exhibits reciprocity in its interactions with the community. That the company treats people fairly. Socio-political legitimacy and interactional trust develop together, although you can't have interactional trust without socio-political legitimacy.

Institutionalised trust represents the case when the relations between the project/company and the citizens are based on an enduring regard for each other's interests. The welfare of both parties is intertwined. Psychological identification with the project is built up through collaborations, shared experiences and vulnerabilities.

To assess the social licence status community members are asked to respond to twelve statements relating to these four dimensions. The statements have been slightly modified to suit the Community Survey and are presented in Table 2.6. The participants are asked to respond on a scale of '1' (strongly disagree) to '5' (strongly agree).

Table 2.6 The four dimensions and twelve statements used to measure the Social Licence dimensions

Dimension	Statement	Response				
		1	2	3	4	5
		Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree
Economic legitimacy dimension	1.We can gain from a relationship with the project/company.	o	o	o	o	o
Interactional trust dimension	2. We are very satisfied with our relationship with the company.	o	o	o	o	o
	3. The presence of the company is a benefit to us.	o	o	o	o	o
	4. The company listens to us.	o	o	o	o	o
Socio-political legitimacy dimension	5. The company contributes to regional well-being.	o	o	o	o	o
	6. The company treats everyone fairly.	o	o	o	o	o
	7. The company respects our way of doing things.	o	o	o	o	o
	8. Our community and the company have a similar vision for the future of this region.	o	o	o	o	o
Institutionalized trust	9. The company gives more help to those who it affects more.	o	o	o	o	o
	10. The company shares decision-making with us.	o	o	o	o	o
	11. The company takes account of our interests.	o	o	o	o	o
	12. The company openly shares information on matters that affect us.	o	o	o	o	o

Adapted from Boutilier (2017)

Table 2.7 The Social Licence score corresponding to the Social Licence levels.

Social licence measure	Social licence level	Project acceptance level
>4.3 to 5.00	Full trust	The relations between the company and the community are based on an enduring regard for each other's interests.
>3.93 to 4.3	High approval	These are higher levels of approval representing support for a project.
>3.56 to 3.93	Low approval	
>3.08 to 3.56	High acceptance/tolerance	These are low levels of acceptance representing tolerance.
>2.4 to 3.08	Low acceptance/tolerance	
1.00 to 2.40	Withheld/withdraw	Represents active attempts to prevent the project from proceeding.

Adapted from Boutilier (2017). The score is derived from the respondents' responses to the statements in Table 2.6.

The responses to the statements are aggregated and can provide a social licence score for each statement and an overall social licence to operate score. Higher scores reflect dimensions of the relationship that are better developed. With this framework, the SLO score corresponds to one of six levels of acceptance, see Table 2.7. The levels range from withheld, through two levels of tolerance, two levels of approval, and the highest level, of full trust, see Table 2.7. For this study, the distribution of the overall social licence level and the social licence levels within the three developmental stages are examined.

2.6 Review of An Bord Pleanála Appeals

Developers, policymakers, and researchers are interested in uncovering the issues that are most important for planners and communities. A review of An Bord Pleanála wind farm data was conducted to determine how project specifics, institutional processes, and third-party appeals impact on wind farm planning approvals. Cases that were appealed to An Bord Pleanála, after initially receiving planning permission at local authority level, were examined. The time frame was from 1999 to 2020 inclusive and involved the examination of 111 appeals. The sample included appeals lodged between 1999 and 2020 which had concluded with a decision. Therefore, these are preliminary results and further work, incorporating future appeal outcomes, will be conducted with a view to publication. The review examined the number of appellants, the most widely cited reasons for third party appellant submissions, project specifics (e.g., number of turbines), and institutional processes (e.g., inspector recommendations), to determine the impact of these factors on appeal outcomes. The work builds on an earlier study by Van Rensburg et al. (2015) that examined 354 wind farm applications and planning authority decisions between 1990 and 2011.

3.Community Engagement for Wind Farm Developments

Highlights
• Near-neighbours prefer very early engagement. Developers prefer to wait until they are committed to a site. • Residents living close to an existing wind farm are less likely to participate at meetings. • Lack of time was a key barrier in engaging with developers. • Feeling powerless or feeling excluded from having an influence on the project were strong motivators for negative action. • A larger proportion of near-neighbours of wind farms took, or plan to take, opposition action during planning, compared to those living further away. • Respondents believed that a neutral third-party intermediary was the most efficient mechanism to influence the design of the project. • Near-neighbours believed an objection to the planning authority was more effective to influence the development than working through the community liaison officer. • The social license to operate was most likely to be withhold in the pre-planning/planning stage although this dissipates as the project moves through the stages. • The social license to operate was most likely to be in the Tolerate level stage in the construction and operation stages.

Public engagement can vary on a scale from one-way communication from developer to community via token consultation, to deliberative participatory approaches where community members are invited in early and can influence the project (Arnstein, 1969). International studies reveal a strong link between quality community engagement such as early and increased community consultation with increased local acceptance of wind farms (Gross, 2007; Ek and Persson, 2014). Ek and Persson (2014) found in Sweden, an extended consultation process was preferred to a non-extended mandatory process. However, empirical evidence comparing the effect of very early pre-planning engagement to early engagement occurring once the decision to progress with the development on a site is scarce in the literature. Brennan and Van Rensburg (2016) found that enhanced community consultation (appointment of a community liaison person) tended to increase citizens willingness to accept wind farms in Ireland. Studies have found that projects with high levels of participatory planning are more likely to be publicly accepted and successful in planning applications in England, Wales, and Denmark (Loring, 2007) and in Greece (Dimitropoulos and Kontoleon, 2009).

However, the optimum 'when' and 'how' of onshore wind-farm community engagement in Ireland has received little examination. In this section, the expectations, and experiences of the survey respondents with regard to engagement between the developer and communities is examined. Although focusing mainly on the period when relationships are established in the pre-planning and planning stage, the study also examined engagement during operation, an aspect of engagement rarely investigated. Both the activity of the developer and the community members are examined.

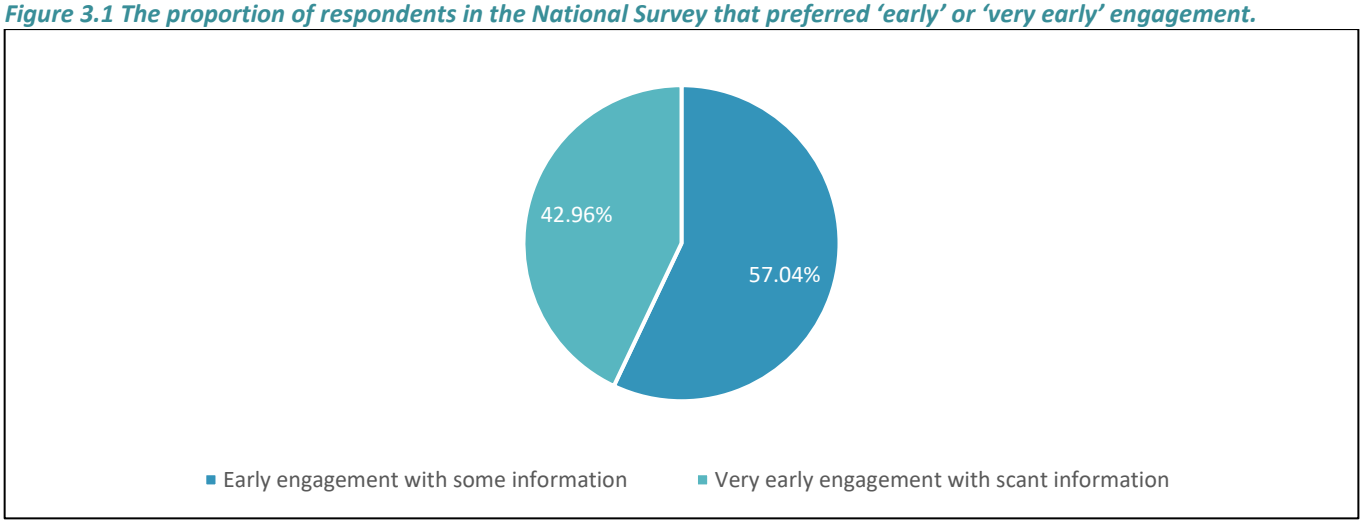
3.1 Engagement: National Survey Insights

Understanding why and when people form negative or positive attitudes towards wind projects will help develop effective engagement strategies. To examine engagement preferences, respondents of the National Survey were asked to a series of questions regarding their preferences or potential actions if "a modern wind farm with 15 turbines of 185m height is proposed for development **within a 5km radius of your home**."

3.1.1 Timing of engagement

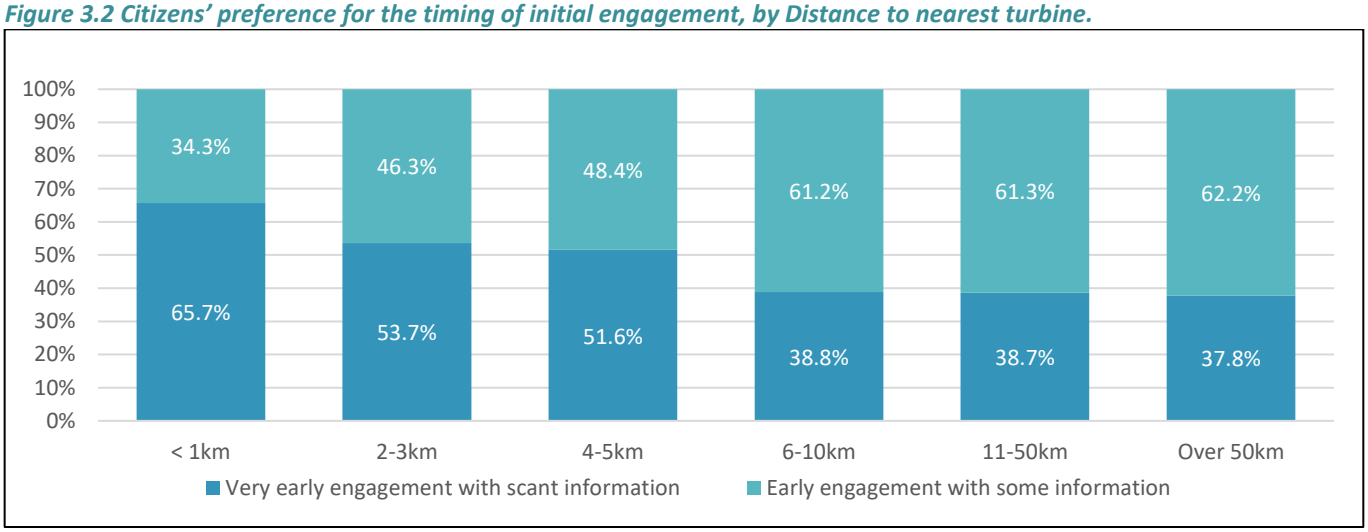
The respondents were asked how early they would prefer pre-planning engagement with the developer to begin. The timing of engagement was linked to the amount of information available and the ability to influence the project. Respondents were asked, if a wind farm were to be developed within 5km of their home, would they prefer 'very early' engagement where not much is known but they could express their views to the developer or 'early' engagement when the design is being developed and they, and their community, could influence the design. The results are presented in Figure 3.1. We find overall that there is a small but significant preference for 'early' engagement with some information (57%) rather than 'very early' engagement with very scant information (43%), $\chi 2(1) = 40.15$, (p-value<0.01).

Figure 3.1 The proportion of respondents in the National Survey that preferred 'early' or 'very early' engagement.



Note: 'Very early' engagement was described as when not much is known but respondents could express their views to the developer and 'early' engagement was described as when the design is being developed and they, and their community, could influence the design

Figure 3.2 Citizens' preference for the timing of initial engagement, by Distance to nearest turbine.



Note: 'Very early' engagement was described as when not much is known but respondents could express their views to the developer and 'early' engagement was described as when the design is being developed and they, and their community, could influence the design. Significant differences in proportions were found among the six distance groups.

Looking more closely at the influence of living near an existing wind farm on respondents' preferences for very early engagement, Figure 3.2 shows that the preference for 'very early' engagement with *Distance from nearest turbine* stratified into five categories. For those respondents living near a wind farm, the preference for 'very early' engagement is high and reduces with increasing *Distance from the nearest turbine*. For those that have not experienced a wind farm development in their locality (no turbine within 6km) the preference is to wait a little longer and engage when there is information available.

The Code of Practice for Wind Energy Development in Ireland Guidelines for Community Engagement (DCCAE, 2016) state that engagement should start at the feasibility stage and the Wind Energy Development Guidelines 2006 (DHPLG, 2006) discuss developer engagement with the community beginning at the concept stage. However, the *Developer Interviews* revealed that the developers' preference is to begin engagement when there is a commitment to the site, after the feasibility stage. For developers, it is worth considering that with the benefit of hindsight, the preference of respondents with experience is for engagement at the earliest time.

3.1.2 Participation in engagement activities

Studies in community engagement mainly focus on the behaviour of the developer. Conversely to this, the respondents of the *National survey* were asked how likely they were to participate at different types of meetings on a scale from '1', very unlikely to '4', very likely. The results are presented in Figure 3.3. The likelihood of attending a meeting organised by a developer (very likely = 26%) or by a community group (very likely = 27%) was similar with a slightly higher proportion of respondents 'very likely' to attend a small meeting restricted to local residents organised by the developer (29%). The proportion of respondents that indicated that they were 'very likely' to participate at a meeting organised by an anti-wind farm group was lower than for the other meetings at 15%, see Figure 3.3. In addition, results not shown, revealed that a small proportion of respondents (3%) indicated that it was 'very unlikely' that they would participate in any meeting and about a third of the respondents (27%) indicated that they were 'very likely' to participate in all four types of meeting.

Figure 3.3 The likelihood of respondents participating at four different types of information meetings.

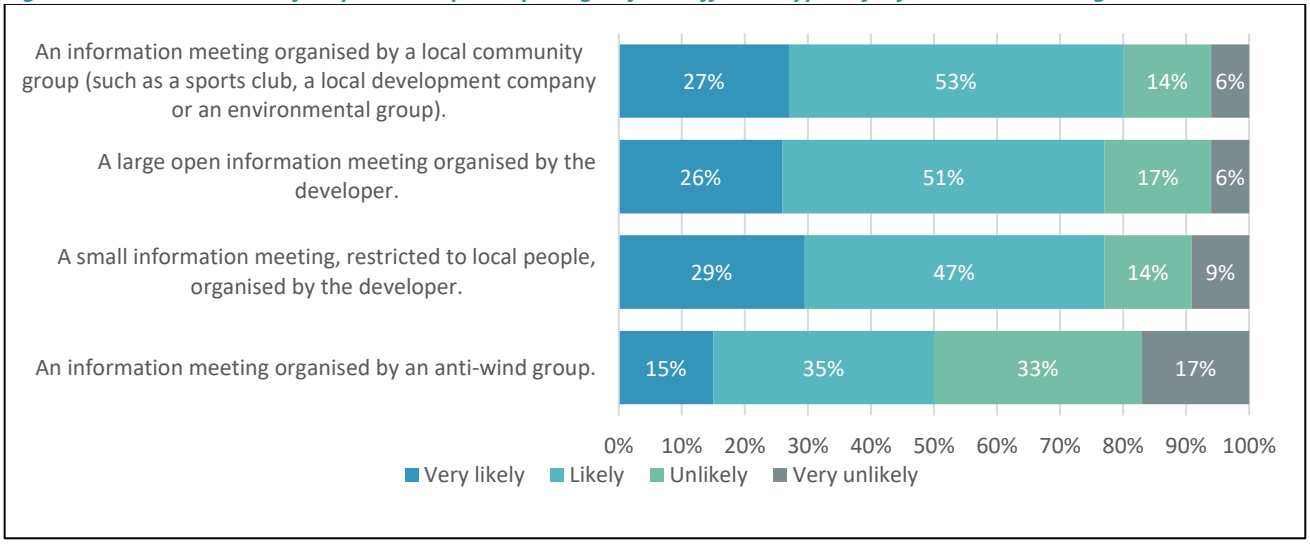
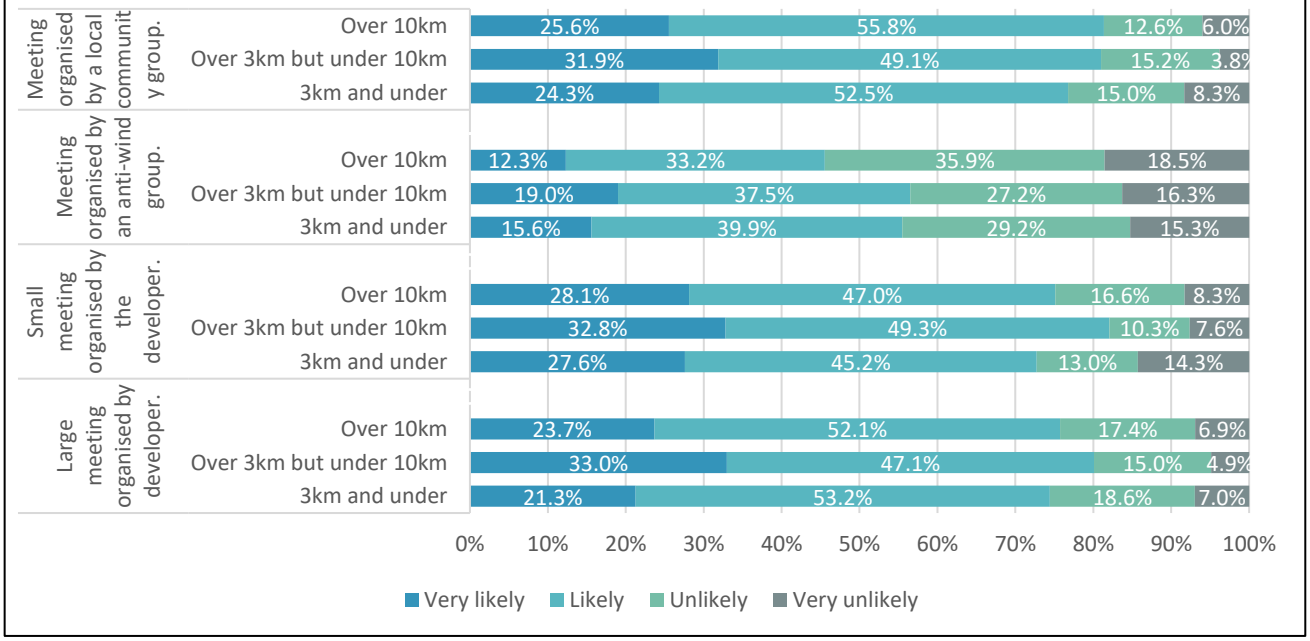


Figure 3.4 The likelihood of participating at different types of information meetings by Distance to nearest turbine.



Note: A Kruskal-Wallis H test followed by pairwise comparisons using Dunn's test was conducted to see if the mean rank likelihood to attend different types of information meetings was different among the three distance groups. The tests are available on request from the authors.

Looking more closely at the influence of living near an existing wind farm on respondents' participation at meetings, Figure 3.4 shows that small but significant differences in the likelihood of participating occurs for the three distance groups. A feature is that the middle *Distance to nearest turbine* group (over 3km to less than 10km) always had a higher proportion of 'very likely' to participate at all four meeting types than the group that live '3km or under', see Figure 3.4.

The respondents of the *National Survey* were asked how likely they were to encounter four different barriers that could hinder their engagement with the wind farm developer. The barriers were lack of trust, lack of confidence, lack of time and lack of knowledge. The overall results are presented in Figure 3.5. Of the four barriers, the barrier that had the highest proportion for the response option 'very likely to act as a barrier' was lack of time (15%), followed by lack of confidence (13%) and lack of knowledge (13%), and then lack of trust (7%).

Figure 3.5 The likelihood of respondents encountering barriers to engagement.

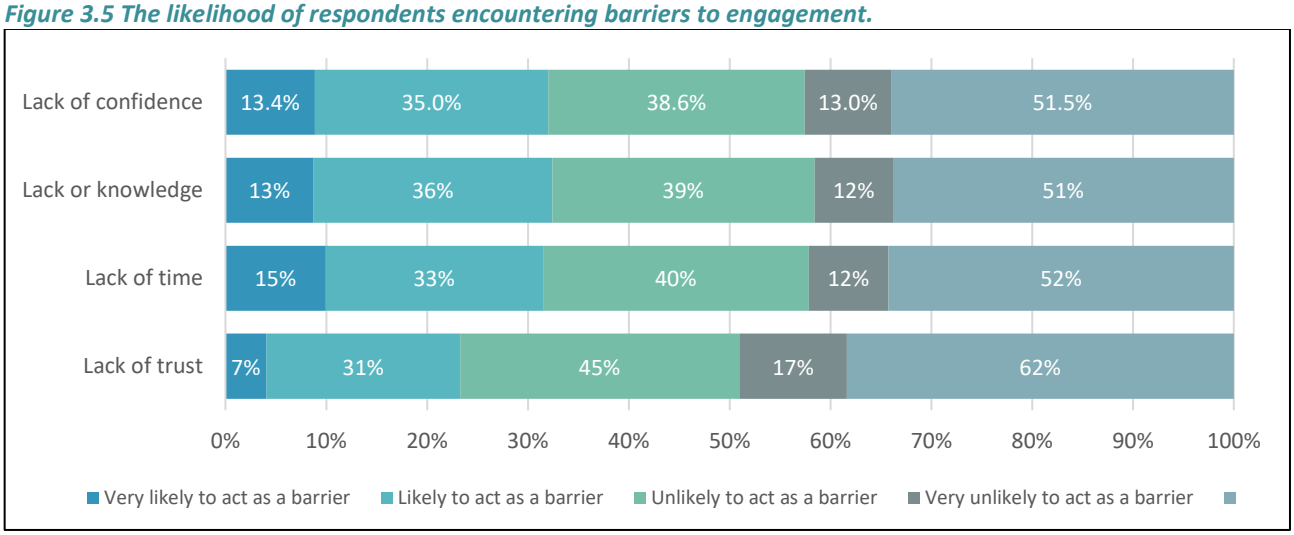
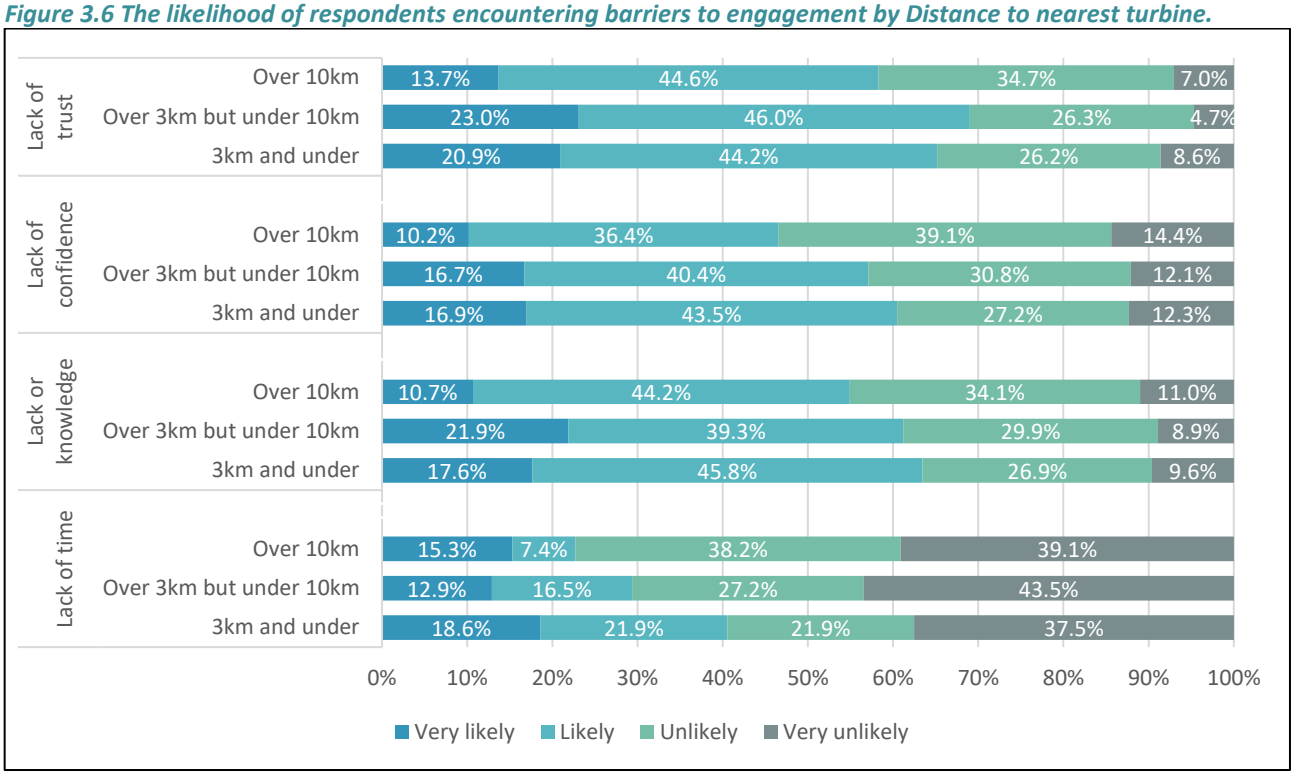


Figure 3.6 The likelihood of respondents encountering barriers to engagement by Distance to nearest turbine.



Note: A Kruskal-Wallis H test followed by pairwise comparisons using Dunn's test was conducted to see if there was a difference in the mean rank likelihood of the barriers presented to the respondents being a barrier to engagement in the three distance groups. The tests are available on request from the authors.

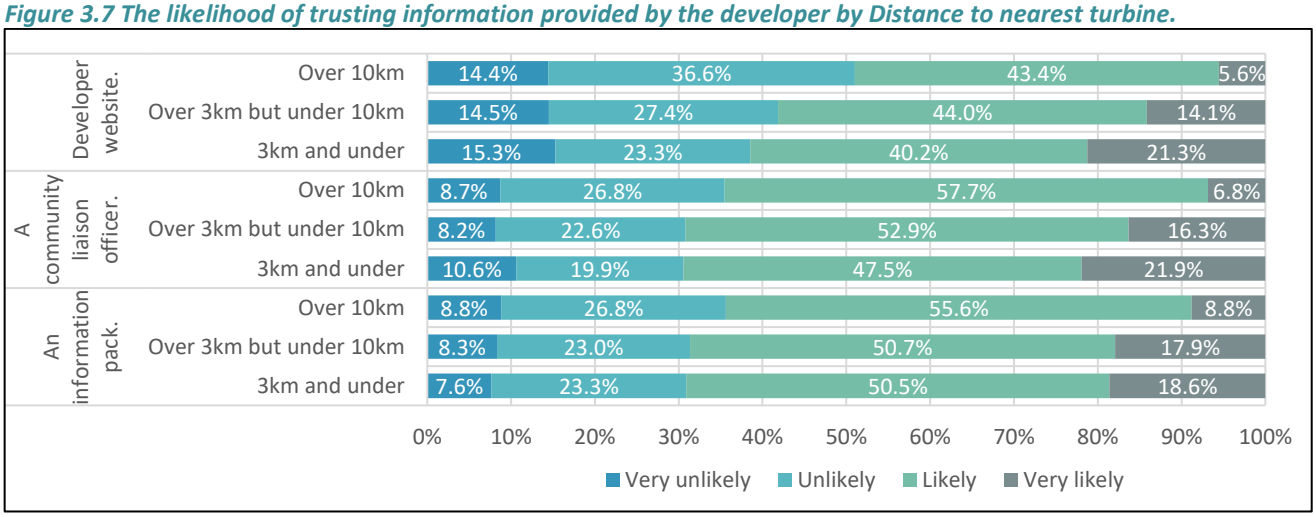
The influence of living near an existing wind farm on the likelihood of the four barriers to hinder respondents' engagement is presented in Figure 3.6. A feature is that the *Distance to nearest turbine* group was consistently different to the two groups of respondents that live under 10km to an existing wind farm. Examining Figure 3.6, lack of confidence, lack of trust and lack of knowledge have lower prevalance in the 'very likely' to be a barrier category for the *Over 10km* distance group compared to the other distance groups.

3.1.3 Sources of information

The survey also asked the respondents where they would look for reliable information if a new wind farm was proposed for their area on a scale from 'very unlikely' to 'unlikely' to 'likely' to 'very likely.' The results for developer-provided information and external sources of information are presented separately. Figure 3.7 shows the likelihood of respondents to the *National Survey* to trust information provided by the developer by distance to nearest turbine. Looking at the developer sources of information it was found that the proportions in the *Over 10km* distance group were constistantly different to the other distance groups. The results show that developer-provided information is largely trusted, especially the community liaison officer and the information pack. Looking at Figure 3.7, in each case the *Over 10km* distance group was less likely to trust the developer source of information than the respondents that live closer to an exisiting wind farm.

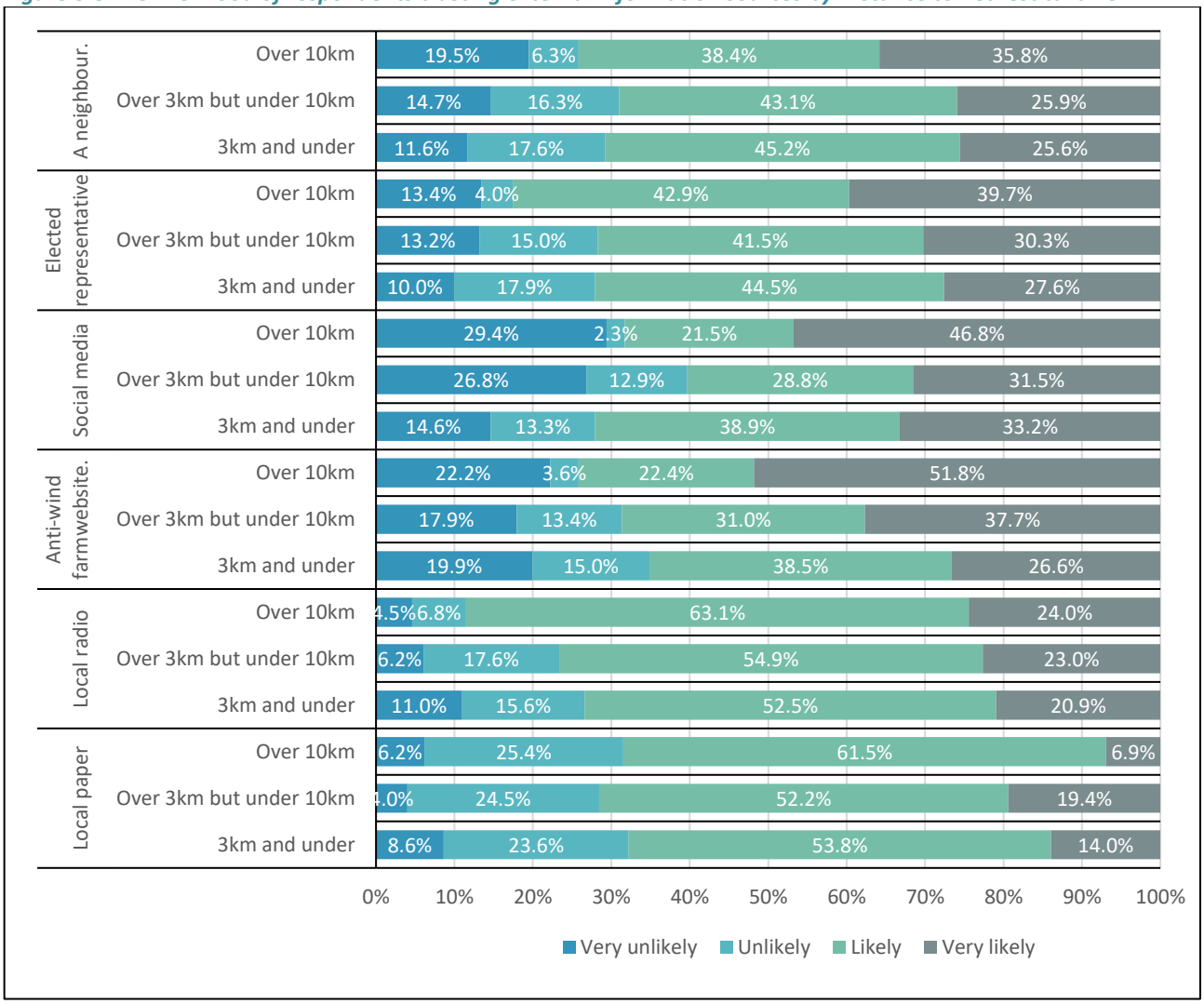
Figure 3.8 shows the likelihood of respondents to the *National Survey* to trust information sourced externally from the developer by distance to nearest turbine. Looking at the non-developer sources of information it was found that *elected representative, local radio,* and *local newspaper* are important for all distance groups. In each case, the Over 10km distance group was significantly different from the other two distance groups. For most external sources of information, the Over 10km distance group had higher proportions of 'very likely' than the other two distance groups. The very near (Under 3km) and the middle distance (Over 3km but under 10km) were similar in where they said they would look for information with the exception of *social media*. The percentage distribution for social media was different for each distance group.

Figure 3.7 The likelihood of trusting information provided by the developer by Distance to nearest turbine.



Note: A Kruskal-Wallis H test followed by pairwise comparisons using Dunn's test was conducted to see if there was a difference in the mean rank likelihood of the respondents using different developer-provided information in the three distance groups. The tests are available on request from the authors.

Figure 3.8 The likelihood of respondents trusting external information sources by Distance to nearest turbine.



Note: A Kruskal-Wallis H test followed by pairwise comparisons using Dunn's test was conducted to see if there was a difference in the mean rank likelihood of the respondents using different external information in the three distance groups. The tests are available on request from the authors.

3.2 Engagement: Community Survey Insights

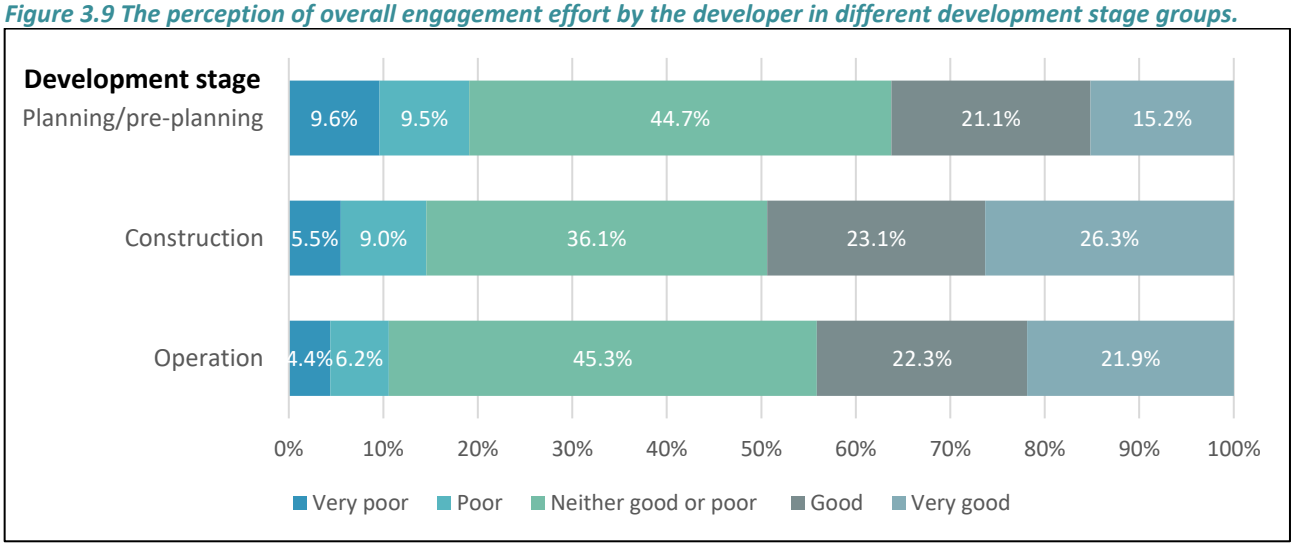
The *Community Survey* examined the topic of engagement among residents living in communities where there is a wind farm in either the pre-planning/planning, construction, or operation stage within 10 km of their home. Questions were asked to assess respondents' experience of engagement across the different stages of project development with the developer of the local wind farm and to examine the impact of engagement on willingness to accept the development of a local wind farm. In the first instance, the focus is on engagement during the pre-planning/planning stage. The responsiveness of owners/operators of wind farms to concerns that were raised are examined. The ongoing relationship across all three development stages is examined using the Social Licence to Operate status.

3.2.1 Overall satisfaction with developer engagement

We asked respondents of the *Community Survey* to rate the overall engagement efforts of the wind farm developer in terms of information provision and liaising with the local community on a scale of 1 to 5, where '1' is 'very poor' and '5' is 'very good'. The results, stratified by development stage, are presented in Figure 3.9. There were significant differences in the proportions in each developmental stage. Post hoc comparisons of engagement by development stage revealed that the significant difference in the developmental stages

occurred in the 'very good' category where the pre-planning/planning stage (15.1%) was significantly lower than in the 'very good' category for the operation and construction stages (21.9% and 26.3%, respectively).

Figure 3.9 The perception of overall engagement effort by the developer in different development stage groups.



Note: A Kruskal-Wallis H test followed by pairwise comparisons using Dunn's test was conducted to see if there was a difference in the mean ranked assessment of the developers' overall engagement in the three development stages. These tests are available on request from the authors.

3.2.2 Engagement during the pre-planning/planning stages

Hall and Devine-Wright (2013) also found procedural justice to be important for public acceptance and that involving locals in the pre-planning and planning stages would be beneficial in the development of locally appropriate solutions to issues and to the acceptance of the development. Brennan and Van Rensburg (2016) found that most participants in their survey valued information from the developer rather than monetary compensation in the form of electricity discounts. Consultation is encouraged at the outset (DHPLG, 2006; DCCAE, 2016). Developer engagement during the pre-planning/planning stage, the impact of developer engagement during the pre-planning/planning stage on wind farm acceptance and the activity of the respondents vis-à-vis the wind farm during planning are explored in this subsection.

3.2.2.1 Experience of engagement during the planning process

Rand and Hoen (2017) reviewed wind energy acceptance research and found that perceptions of the planning process, perceived fairness, and trust grouped together as one of six overarching themes impacted the level of support for wind energy projects. Studies have found that residents that are strongly annoyed by noise perceived the planning process as less fair than others (Hübner et al., 2019; Müller et al., 2023). We asked the respondents in all three developmental stages to think about their experience during the planning process and examine to what extent do they 'agree' or 'disagree' with four statements relating to the planning process. The statements were selected to represent building blocks of trust. They were:

Engagement quality:	The wind farm developer acted openly throughout the planning process.
Procedural justice:	The planning process was fair.
Participation:	The community was able to influence the project.
Empowerment:	The wind farm developer was going to do what they liked anyway.

The overall response proportions are presented in Figure 3.10. For all four statements approximately a third of the respondents had neutral feelings in that they 'neither agree nor disagree' with the statements. Looking at the perceived transparency of the wind developer, approximately a third (33%) 'agreed' and about 5% 'strongly agreed' that '*The wind farm developer acted openly throughout the planning process'*. In contrast, about 12% 'disagree' and 12% 'strongly disagree' that this was the case. Similarly, looking at the perceived fairness of the planning process, about 35% of respondents agreed and 3.5% 'strongly agree' as opposed to

about 13% who 'disagree' and 12% 'strongly disagree' that '*The planning process was fair*'. The results for the participatory aspect of the planning experience showed less agreement with the statement. Approximately 23% of respondents 'agree'' and 4% 'strongly agree' whereas approximately 21% 'disagree' and 15% 'strongly disagree' that '*The community was able to influence the project'*. Looking at how empowered the respondents felt, the results showed that about 32% of respondents 'agree' and 13% 'strongly agree', and about 17% 'disagree' and 6% 'strongly disagree' that wind farm developer was '*Going to do what they liked anyway'*. Overall, the results show that the respondents felt that the participatory element and empowerment were the least advanced aspects of engagement during the planning process. To further examine the planning experiences of the respondents the sample was stratified by wind farm *Development stage*, see Figures 3.11 to 3.14, and by *Distance to nearest wind turbine*, see Figures 3.15 to 3.18.

Figure 3.10 The response to four statements relating to the pre-planning/planning stage.

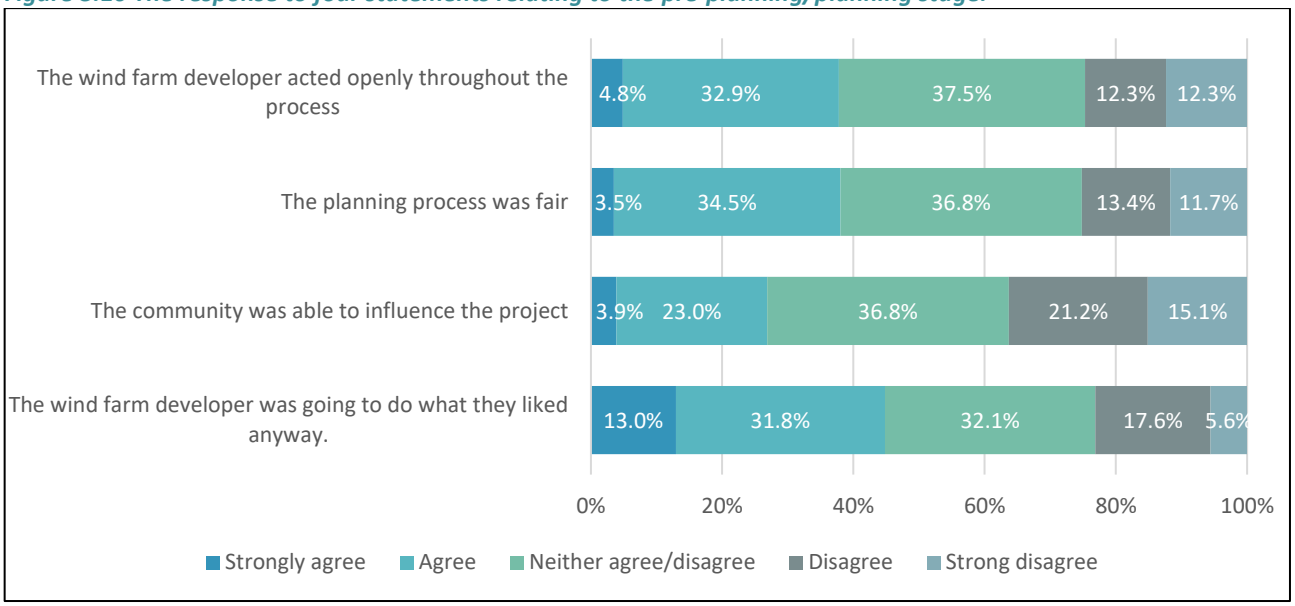
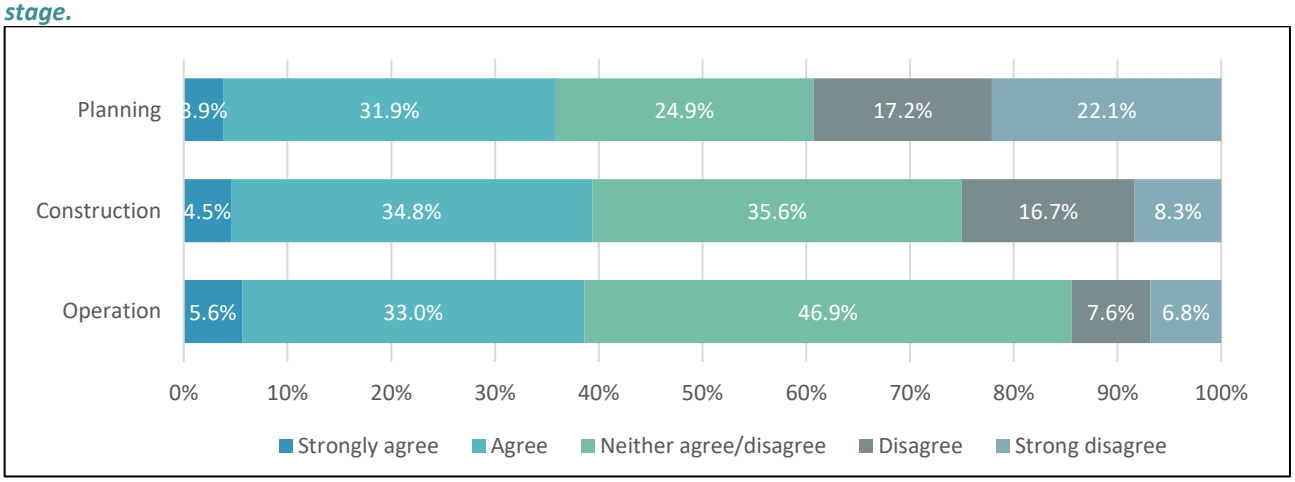
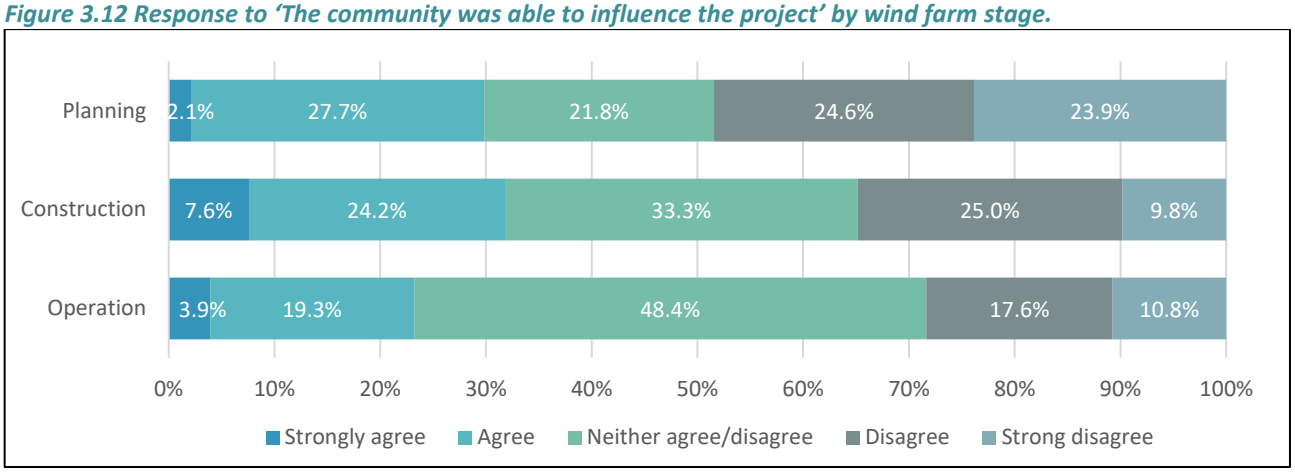


Figure 3.11 Response to 'The wind farm developer acted openly throughout the planning process' by wind farm stage.



Note: A Kruskal-Wallis H test followed by pairwise comparisons using Dunn's test was conducted to see if there is a difference in the mean ranked agreement of the respondents in the three development stage groups. The tests are available on request from the authors.

Figure 3.12 Response to 'The community was able to influence the project' by wind farm stage.

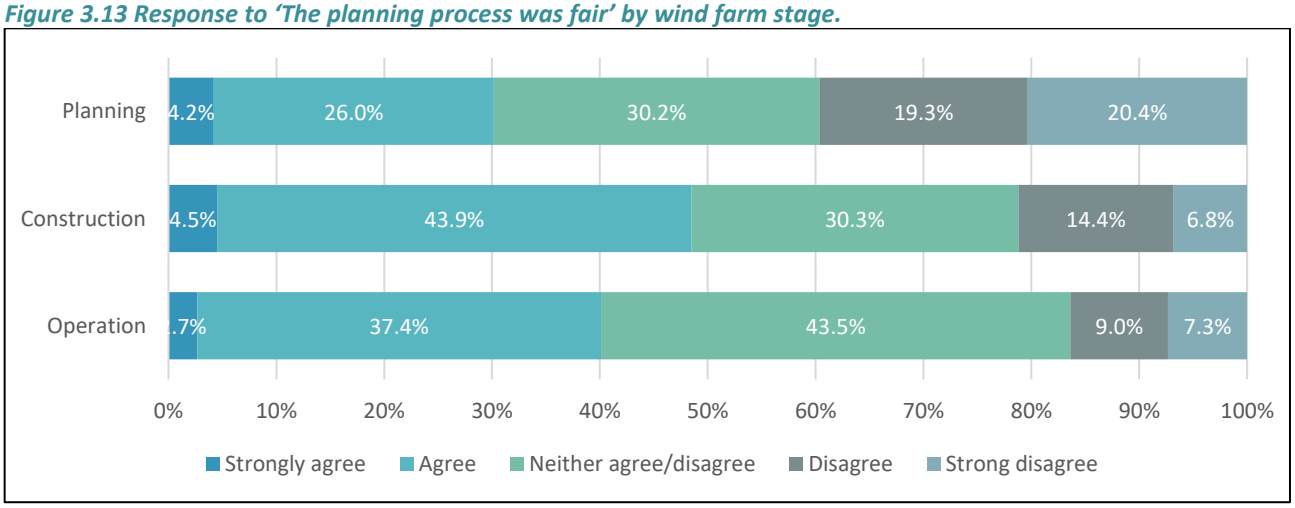


Note: A Kruskal-Wallis H test followed by pairwise comparisons using Dunn's test was conducted to see if there is a difference in the mean ranked agreement of the respondents in the three development stage groups. The tests are available on request from the authors.

For the positive statement *'The wind farm developer acted openly throughout the planning process'* the proportions for respondents in the pre-planning/planning stage were significantly different compared to the proportions in the construction or operation stage, Figure 3.11. The 'neither agree nor disagree' category (24.9%) was smaller in the pre-planning/planning stage than in the construction (35.6%) or operation stage (46.9%). A similar difference was found in the response to the positive statement '*The community was able to influence the project',* see Figure 3.12. The 'neither agree nor disagree' category (21.8%) was smaller in the pre-planning/planning stage than in the construction (33.3%) or operation stage (48.4%).

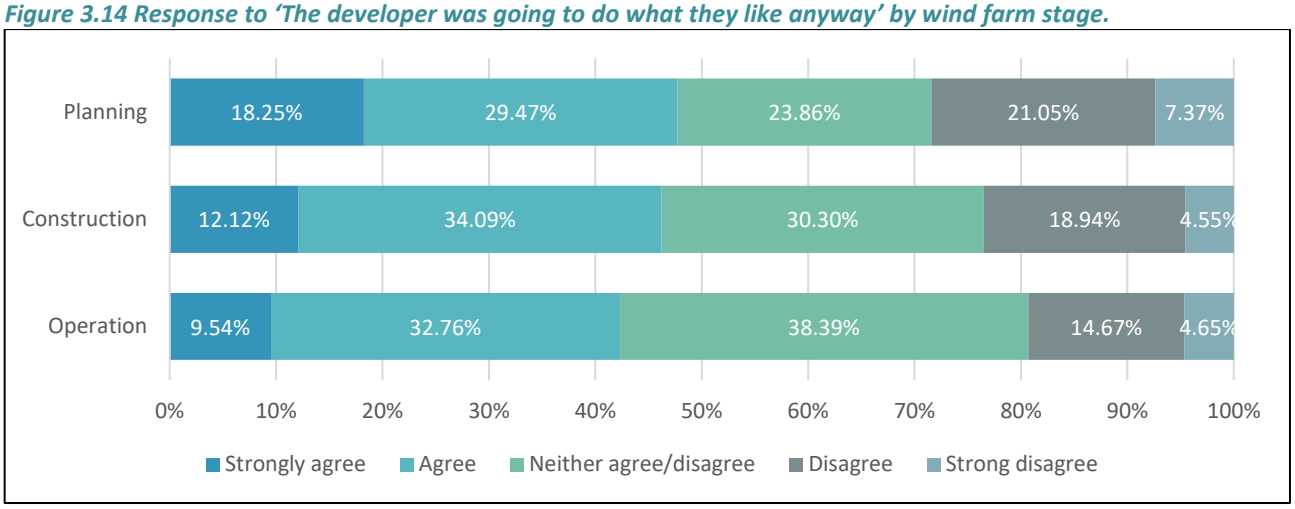
For the positive statement '*The planning process was fair', the* proportions for respondents in the pre-planning/planning stage were significantly different compared to the proportions in the construction or operation stage, see Figure 3.13. There was a significantly lower proportion in the 'agree' category (26%) in the pre-planning/planning developmental stage compared to the construction stage (43.9%) and operation stage (37.4%). There were also significantly higher proportions in the 'disagree' (19.3%) and 'strongly disagree' (20.4%) in the pre-planning/planning developmental stage compared to the construction stage (disagree = 14.4% and strongly disagree = 6.8%) and operation stage (disagree = 9.0% and strongly disagree = 7.3%). For the negative statement statement *'The wind farm developer was going to do what they liked anyway,'* there was no significant differences between the three development stages, see Figure 3.14.

Figure 3.13 Response to 'The planning process was fair' by wind farm stage.



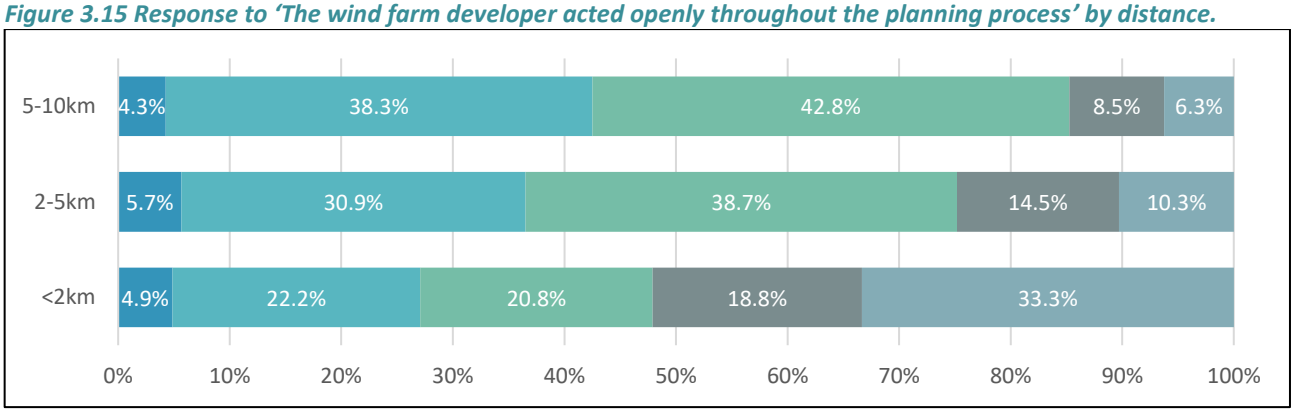
Note: A Kruskal-Wallis H test followed by pairwise comparisons using Dunn's test was conducted to see if there is a difference in the mean ranked agreement of the respondents in the three development stage groups. The tests are available on request from the authors.

Figure 3.14 Response to 'The developer was going to do what they like anyway' by wind farm stage.



Note: A Kruskal-Wallis H test followed by pairwise comparisons using Dunn's test was conducted to see if there is a difference in the mean ranked agreement of the respondents in the three development stage groups. The tests are available on request from the authors.

Figure 3.15 Response to 'The wind farm developer acted openly throughout the planning process' by distance.

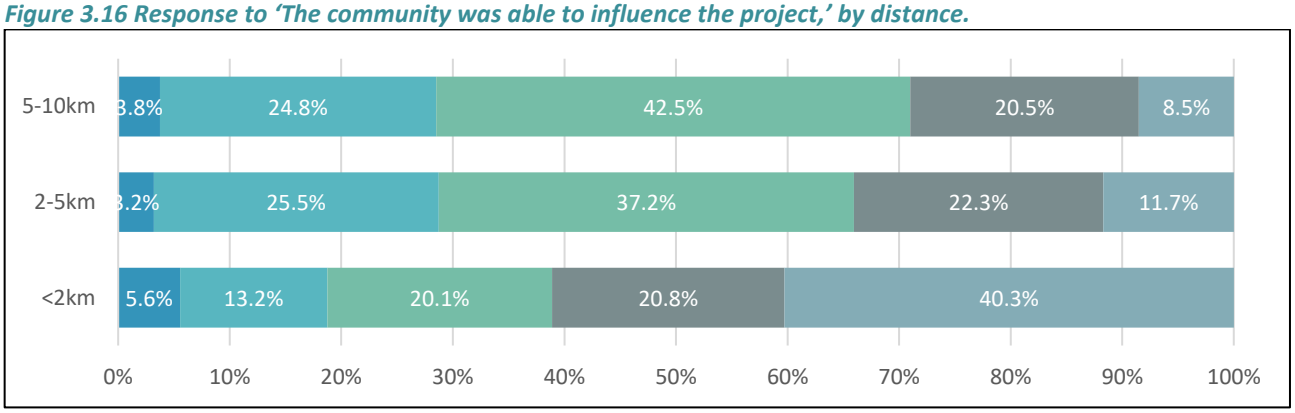


Note: A Kruskal-Wallis H test followed by pairwise comparisons using Dunn's test was conducted to see if there is a difference in the mean ranked agreement of the respondents in the three distance groups. The tests are available on request from the authors.

The impact of the distance to the nearest existing or planned wind turbine on the responses was examined in Figures 3.15 to 3.18. For the positive statement '*The wind farm developer acted openly throughout the planning process'* there was a significantly higher proportion of respondents in the 'strongly disagreed' category (33.3%, $p < 0.000$) in the Under 2 km distance group and significantly lower proportions were in the 'agree' category (22.2%, $p = 0.039$) and in the 'neither agree nor disagree' category (20.8%, $p < 0.000$). In the 5-10 km distance group, there were significantly higher proportions in the 'agree' (38.3%, $p = 0.024$) and 'neither agree or disagree' (42.8%, $p = 0.040$) categories and lower proportions in the 'disagree' (8.5%, $p = 0.017$) and 'strongly disagree' (6.3%, $p < 0.000$) categories. For the positive statement '*The community was able to influence the project',* there was a significantly higher proportion of respondents in the 'strongly disagree' category (40.3%, $p < 0.000$) in the Under 2 km distance group and significantly lower proportions in the 'agree' category (13.2%, $p = 0.031$) and in the 'neither agree nor disagree' category (20.1%, $p < 0.000$). In the 5-10 km distance group, there were significantly higher proportions in the 'neither agree or disagree' (42.5%, $p = 0.015$) category and a lower proportion in the 'strongly disagree' (8.5%, $p < 0.000$). For the positive statement *'The planning process was fair'*, there was a significantly lower proportion of respondents in the 'agree' category (14.6%, $p < 0.000$) in the Under 2 km distance group. In the 5-10 km distance group, there was a significantly higher proportion in the 'agree' category (41.8%, $p < 0.000$) and a lower proportion in the 'strongly disagree' (5.7%, $p < 0.000$). For the negative statement '*The wind farm developer was going to do what they liked anyway',* there was a significantly lower proportion in the 'neither agree or disagree' category (16.7%, $p < 0.000$) and a significantly higher proportion in the 'strongly agree' category (29.9%, $p < 0.000$) in

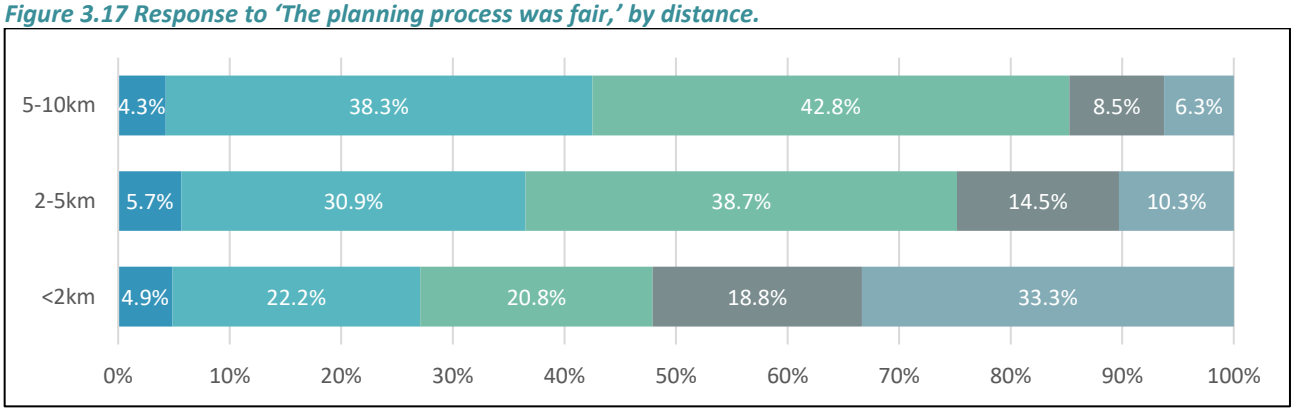
the Under 2km distance group. Overall, we see that the very near neighbours, the Under 2km distance group, stand out with a larger proportion disagreeing with the positive statements and a larger proportion in this group believe that the developer was going to do what they liked any way.

Figure 3.16 Response to 'The community was able to influence the project,' by distance.



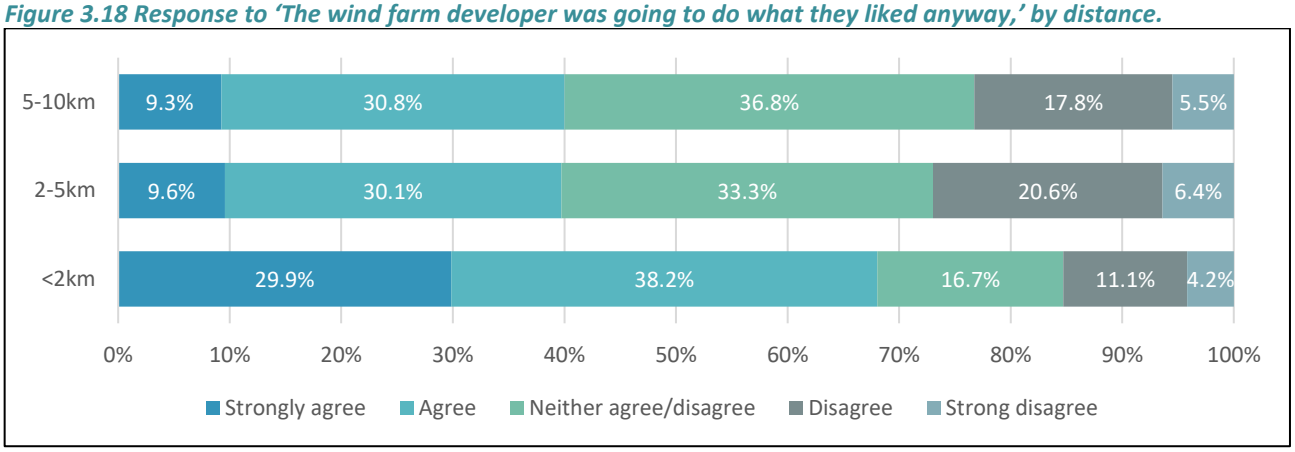
Note: A Kruskal-Wallis H test followed by pairwise comparisons using Dunn's test was conducted to see if there is a difference in the mean ranked agreement of the respondents in the three distance groups. The tests are available on request from the authors.

Figure 3.17 Response to 'The planning process was fair,' by distance.



Note: A Kruskal-Wallis H test followed by pairwise comparisons using Dunn's test was conducted to see if there is a difference in the mean ranked agreement of the respondents in the three distance groups. The tests are available on request from the authors.

Figure 3.18 Response to 'The wind farm developer was going to do what they liked anyway,' by distance.



Note: A Kruskal-Wallis H test followed by pairwise comparisons using Dunn's test was conducted to see if there is a difference in the mean ranked agreement of the respondents in the three distance groups. The tests are available on request from the authors.

3.2.2.2 Impact of engagement during planning on acceptance.

Hindmarsh (2010) proposes that insufficient public engagement by the wind farm developer during the early project proposal period allows an opportunity for organised anti-wind farm groups to fill the information void with their concerns over the impacts of wind farms. To this end, community engagement carried out at the early pre-planning stage may be effective in addressing concerns, moderating opposition, and influencing the acceptance of wind energy. Jobert et al. (2007) found in French and German cases studies that resentment occurs when the community is told after the deal is done at the local authority level. While developments cause disruption, the developer can make efforts to manage and mitigate negative impacts on infrastructure such as roads and electricity supply. The negative perception of developments is greatly reduced if the experience of individuals is less than that expected (Moffat and Zhang, 2014). Regression analysis was conducted to see if the experience of respondents during the pre-planning/planning stage influenced acceptance of the local wind farm.

Ordinal logistic regression was used to examine the impact of respondents' planning experience on their support for a local wind farm. Respondents were asked about their level of support for the local wind farm with '1' being very opposed and '4' being very supportive. The level of agreement to the four statements on the respondents' experience during planning from Subsection 3.2.2.1 (p. 20) were included in the analysis as regressors along with a range of sociodemographic and other factors. To simplify, only the significant variables impacting acceptance (p-value <0.05) are shown in Table 3.1.

Table 3.1 Significant factors based on engagement during planning on the willingness to accept a local wind farm.

Factor	Higher willingness to accept	Lower willingness to accept
The wind farm developer acted openly throughout the planning process	Agreement	Disagreement
The community was able to influence the project	Agreement	Disagreement
The planning process was fair	Agreement	Disagreement
The wind farm developer was going to do what they liked anyway.	Disagreement	Agreement
Development stage	Construction	Pre-planning/planning
Distance from wind farm	Over 2 km	Under 2 km
Sex	Male	Female
Age	18 to 24 years old	55 to 64 years old

It can be seen in Table 3.1. that the experience of respondents during the planning process can have an ongoing impact on respondents' acceptance of the local wind farm, demonstrating the importance of engagement and fair process during the pre-planning/planning stage. The respondents' who 'agree' or 'strongly agree' with the statements '*The wind farm developer acted openly throughout the planning process'* and '*The planning process was fair'* were significantly more likely to accept their local wind farm than those that 'disagree' or 'strongly disagree' with those statements. Respondents' who 'agree' with the statement '*The community was able to influence the project'* were significantly more likely to accept their local wind farm compared to those that 'strongly disagree' with this statement. Respondents' who 'strongly disagree', 'disagree' and 'neither agree nor disagree' with the statement '*The wind farm developer was going to do what they liked anyway*' were more likely to accept their local wind farm than respondents who agree with the statement. Respondents' who 'agree' with the statement '*The wind farm developer was going to do what they liked anyway*' were more likely to accept their local wind farm than respondents who 'strongly agree' with the statement. In the same analysis, it was found that respondents in the construction stage were more likely to accept their local wind farm compared to respondents in the pre-planning/planning stage. Respondents living over 2km from an existing or planned wind farm were more likely to accept compared to those living further away. Males and the younger age groups were more likely to accept compared to females and the older age groups, respectively.

3.2.2.3 Respondents' activity during the planning process.

We asked respondents of the *Community Survey* about a range of possible activities they undertook, or planned to undertake, during the pre-planning/planning process. The activities presented to the respondents and the results of the analysis are summarised in Figure 3.19. The most common activity was to attend a meeting (54%). In all, 54.7% of the respondents of the *Community Survey* said that they took at least one of the actions presented. For those respondents that attended a meeting, 25.7% did so in support of the wind farm and 18.6% did so in opposition of the wind farm. For the other activities, the percentage for support and for opposition was more equal but slightly more for supportive action rather than opposition.

The level of activity in the current study is higher than observed in previous reports of social action in response to renewable infrastructure. Previous studies suggest that there is typically an engaged minority and a silent majority and that the engaged minority are likely to be opposed to the development (Fleming et al., 2022; Hall et al., 2013). When the activity of the full sample of respondents is examined, with all respondents within 10 km of a wind turbine included, there was no evidence that the engaged respondents were likely to be opposed to the development, see Figure 3.19. However, when the results are stratified by distance, see Figure 3.20, we see that those under two kilometres were most likely to have taken action and this was most likely to have been in opposition of the project.

Figure 3.19 Respondents that took or plan to take action during the pre-planning/planning process.

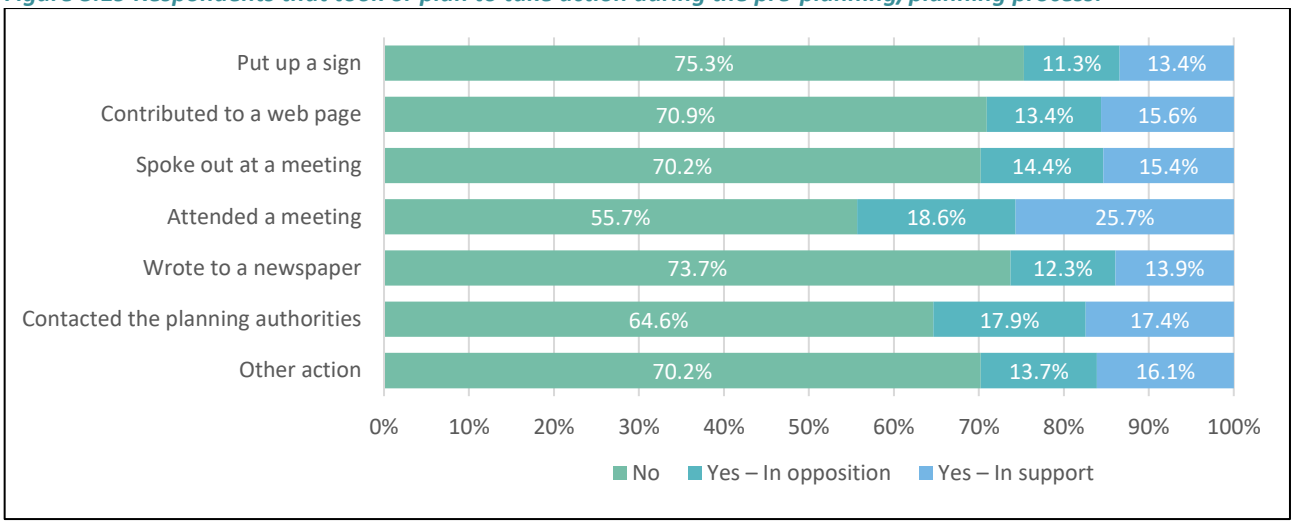


Figure 3.20 Respondents that took, or plan to take action during the pre-planning/planning process by distance.

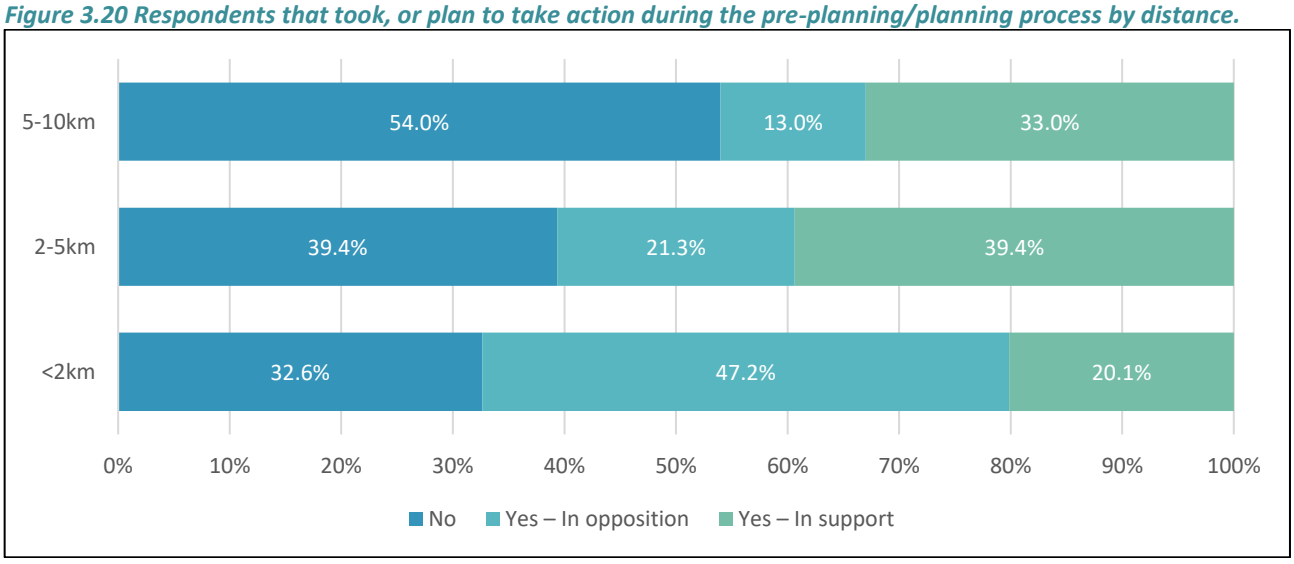


Table 3.2 A Crosstabulation of respondent action and perception of engagement in the pre-planning/planning stage.

	Respondent took action		
Statement and agreement	**No**	**Yes – In opposition**	**Yes – In support**
The wind farm developer acted openly throughout the planning process.	No	Yes – In opposition	Yes – In support
Strongly agree	15%	25%	60%
Agree	46%	10%	44%
Neither agree/disagree	65%	8%	27%
Disagree	26%	50%	24%
Strongly disagree	17%	65%	19%
The planning process was fair.	No	Yes – In opposition	Yes – In support
Strongly agree	17%	14%	69%
Agree	47%	7%	46%
Neither agree/disagree	60%	15%	25%
Disagree	30%	44%	26%
Strongly disagree	20%	64%	16%
The community was able to influence the project.	No	Yes – In opposition	Yes – In support
Strongly agree	16%	22%	63%
Agree	38%	12%	49%
Neither agree/disagree	63%	12%	25%
Disagree	43%	22%	35%
Strongly disagree	23%	61%	16%
The wind farm developer was going to do what they liked anyway.	No	Yes – In opposition	Yes – In support
Strongly agree	22%	52%	25%
Agree	49%	22%	29%
Neither agree/disagree	56%	11%	33%
Disagree	41%	19%	40%
Strongly disagree	24%	24%	52%

Note: A Chi-square analysis was conducted to test for associations between action types undertaken by the respondents (no action, opposition action or support action) and the respondents' agreement with the statements relating to their experience during the planning process. The results of these tests are available on request from the authors.

The results were further queried by examining if the respondents' experience of the planning process was associated with 'taking action'. Crosstabulations between whether the respondents took no action, opposition action, or support action and the respondents' experience of the planning process are presented in Table 3.2. The results also show that about 65% of the respondents who 'strongly disagree' with the statement that '*The wind farm developer acted openly throughout the planning process*' took action in opposition to the wind farm and 60% of respondents who 'strongly agree' with the statement took action in support of the wind farm. About 64% of respondents who 'strongly disagree' with the statement that '*The planning process was fair*' took action in opposition to the wind farm, while 69% of those who 'strongly agree' took action in support of the wind farm. About 61% of respondents that 'strongly disagree' with the statement that '*The community was able to influence the project'* took action in opposition to the wind farm whereas 62% who 'strongly agree' with the statement took action in support of the wind farm. When we look at the negative statement '*The wind farm developer was going to do what they liked anyway',* we find that about 52% of respondents who 'strongly disagree' with the statement took action in support of the wind farm while about 52% who 'strongly agree' with the statement took action in opposition.

We asked the respondents of the Community Survey what they thought was the most effective mechanism for community input into the design of the wind farm. The results are presented in Table 3.3. A neutral third-party intermediary was the most frequently chosen mechanism; with a preference that they were funded by the community in the near-neighbour group of under two kilometres and funded by the government for the other further away distance groups. The near-neighbour group considered an objection to the planning authority more effective than those residing at greater distances from the wind farm development.

Table 3.3 The most effective mechanism for community input into the design of the wind farm by distance.

Mechanism	<2km	2-5km	5-10km	All
Community liaison officer provided by the developer	17.4%	19.9%	23.5%	21.2%
Neutral third-party intermediary funded by the community	34.7%	27.7%	24.0%	27.1%
Neutral third-party intermediary funded by the government	20.8%	31.2%	34.2%	30.9%
An objection to planning authorities	22.2%	17.7%	16.2%	17.8%
Other	4.8%	3.5%	2.0%	3.0%

3.2.3 Engagement during the operation stage of wind farms

A criticism of wind energy projects is that some developers take a narrow, short-term approach to community engagement with the aim of securing planning consent rather than the development of an on-going relationship (Ellis et al., 2023). Compared to the study of community acceptance at the planning stage, comparatively few studies examine community-developer relations in the operational stage.

Industries that foster good relationships with the community in their immediate vicinity are perceived as civically appropriate but there are also pragmatic reasons for maintaining ongoing good relations with local communities. The reputation of the wind energy sector and of individual developers will accompany developers' new projects during wind energy expansion. In addition, many wind farm owners of the earliest established wind farms in Ireland will soon be looking to their community neighbours to agree to life-extension or repowering. The wind farm externalities typical of a new development also arise when permission for repowering is sought. However, the experience of living with the existing wind farm influences the response of the community (Windemer, 2023). Windemer (2023) found that one cannot assume community support for repowering or life-extension of existing wind farms. She finds that community support is greatly impacted by context including the community relationship with the operator. Frantál (2015) found that support for repowering was conditional on economic benefits for the community having been realised.

The ongoing relationship between a wind farm developer and the local community during operation was explored in the *Community Survey*. First, the experience of community members interaction with developers when negative impacts of an operational wind farm are experienced was examined. Secondly, the social licence to operate scoring system developed by Thompson and Boutlier (Boutilier, 2017) was used to explore the relationship between developer and community members in different wind farm stages.

3.2.3.1 The wind farm owner/operator response to concerns raised during the operation stage.

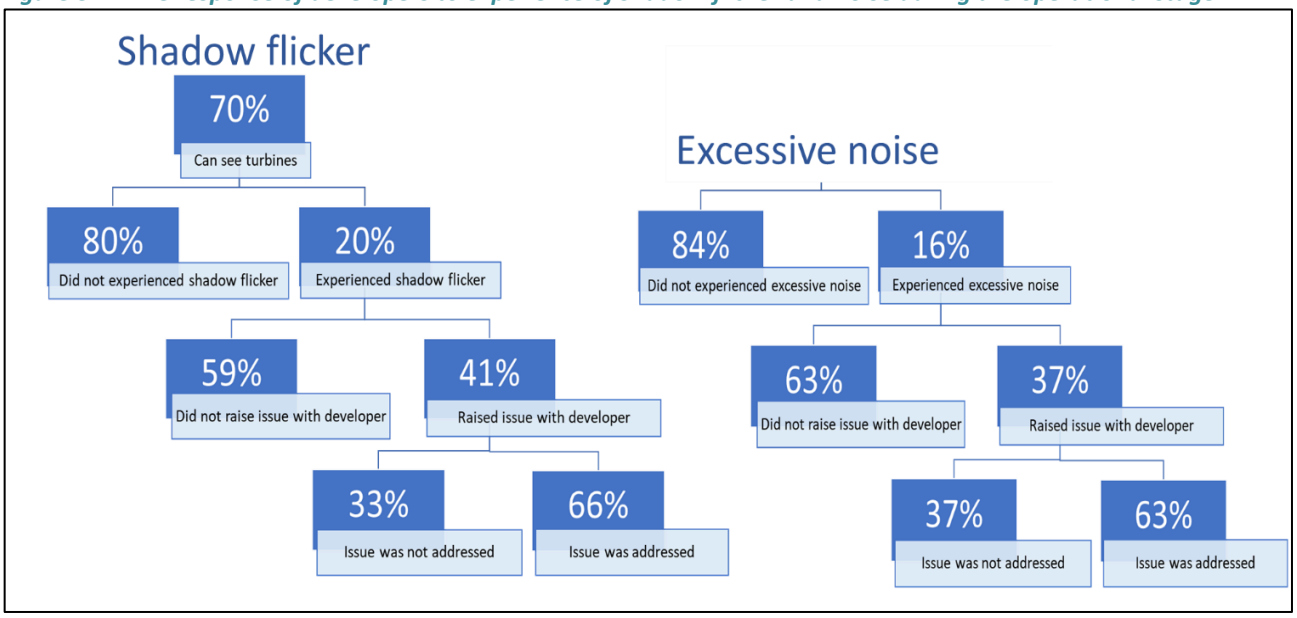
Noise and shadow flicker are two negative wind farm externalities for residents living near wind farms. Excessive or repetitive noise can arise from the rotation of the turbine blades (Pedersen & Persson Waye, 2004; Zerrahn, 2017). Shadow flicker can occur when the moving turbine blades casts shadows while the sun is low in the sky or when the sun reflects off the moving blades. Annoyance levels depend on site-specific conditions and are subjective (Peri and Tal, 2021; Müller et al., 2023). Noise reduction measures from wind turbines is an active area of research (Merino-Martínez et al., 2021). The current guidelines indicate that a setback distance of 500m should be sufficient to prevent noise annoyance arising from wind turbines (DHPLG, 2006). Solutions to shadow flicker have been available for over ten years (Marks, 2011) and can be addressed in the wind farm design stage. However, these annoyances for residents living close to a wind farm can still occur.

We asked respondents to the *Community Survey* that live near an operating wind farm if they had ever experienced shadow flicker or noise annoyance and if they had whether they raised the issue with the owner/operator of the wind farm and if the issue was addressed. The question posed purposely asked if the issue was addressed to the respondents' satisfaction rather than the total removal of the annoyance. There is evidence to suggest that procedural justice (i.e., believing that the issue has been acknowledged and considered), can lead to a willingness to accept a less preferred outcome (Terwel et al., 2010). The results are presented in Figure 3.21.

About 70% of the respondents that live near an operating wind farm can see at least one turbine from either inside their house or from their property, or both. Of these respondents, 20% have experienced shadow flicker from the wind turbine(s). In numerical terms this 20% refers to 58 respondents out of 288 respondents

to the community survey that can see turbine(s) and said that they had experienced shadow flicker. Of the 41% of respondents that experienced shadow flicker, 24 respondents, raised the issue with the developer. Of the respondents that raised the issue of shadow flicker with the developer, 66%, reported that the issue had been addressed. Looking at noise annoyance in the operation stage (see right side of Figure 3.21), about 16% of the respondents to the *Community Survey* said they had experienced noise annoyance. In numerical terms, this 16% is 65 respondents. About 37% of the respondents that experienced noise annoyance raised the issue with the developer. Of the respondents that raised the issue of noise annoyance with the developer, 63%, reported that the issue had been addressed.

Figure 3.21 The response of developers to experience of shadow flicker and noise during the operational stage.



Note: n= 409

Suprisingly, less than half the respondents that experienced either shadow flicker or excessive noise raised the issue with the developer. It's unclear if this is because the annoyance was small or transient or if there was a communication barrier preventing the respondent from raising the issue. For both noise and shadow flicker, about two thirds of the respondents that brought the issue to the attention of the wind farm developer were satisfied with the outcome. It would improve relations futher if more respondents experiencing noise or shadow flicker annoyances were to raise the issue with the developer and if the developer was to maintain or improve the mitigation rate observed here. The results indicate that the need for engagement and responsiveness does not expire after the planning process for a wind farm has concluded. Project developers should be prepared to continue engagement with residents after the planning phase (Janhunen et al., 2018). A summary of the changes in level of concern for seven issues expressed by respondents at and post the planning stage is presented in Appendix 2.

3.2.4 The social licence to operate at different stages.

The term social licence to operate (SLO) was first used in 1997 and is now generally referred to as a social licence (Thomson and Boutilier, 2011). The concept was originally developed in the extractive and natural resource industries as these sectors recognised that civil society could influence the success of their projects and this presented a risk that needed to be managed (Joyce and Thomson, 2000; Thomson and Boutilier, 2011). Over time the social licence concept has developed and now reflects the modern expectation of impacted civil society groups to be involved in decision-making, to benefit from operations, and assurances of good regulation/governance (i.e., trust, fairness, and good governance with respect to operations) (Moffat et al., 2016). The social licence framework is now applied in a range of other industry sectors including energy (Hall et al., 2015). The social licence is most frequently considered in relation to local community groups.

The social license construct differs from other assessments of corporate social responsibility (CSR) and reporting schemes, such as the Global Reporting Initiative, in two ways. Firstly, it focuses on the relationship between the business and the community. Secondly, rather than internal assessment or official external validation of good corporate behaviour, it is the impacted group(s) that evaluates the social licence and sets the threshold levels for acceptance of the impacts (Boutilier, 2017). The advantages of using the Thomson and Boutilier social licence to operate framework to assess community acceptance is that: i) the licence comes from the community; ii) it can be applied to all stages of project development; iii) it is a measure suitable for a large online survey; and iv) the framework provides a more realistic scale for acceptance rather than a binary outcome. Here, the social licence was applied to respondents living within 10km of an existing or planned wind farm. The relevant survey questions and the scoring system are explained in Section 2.5.

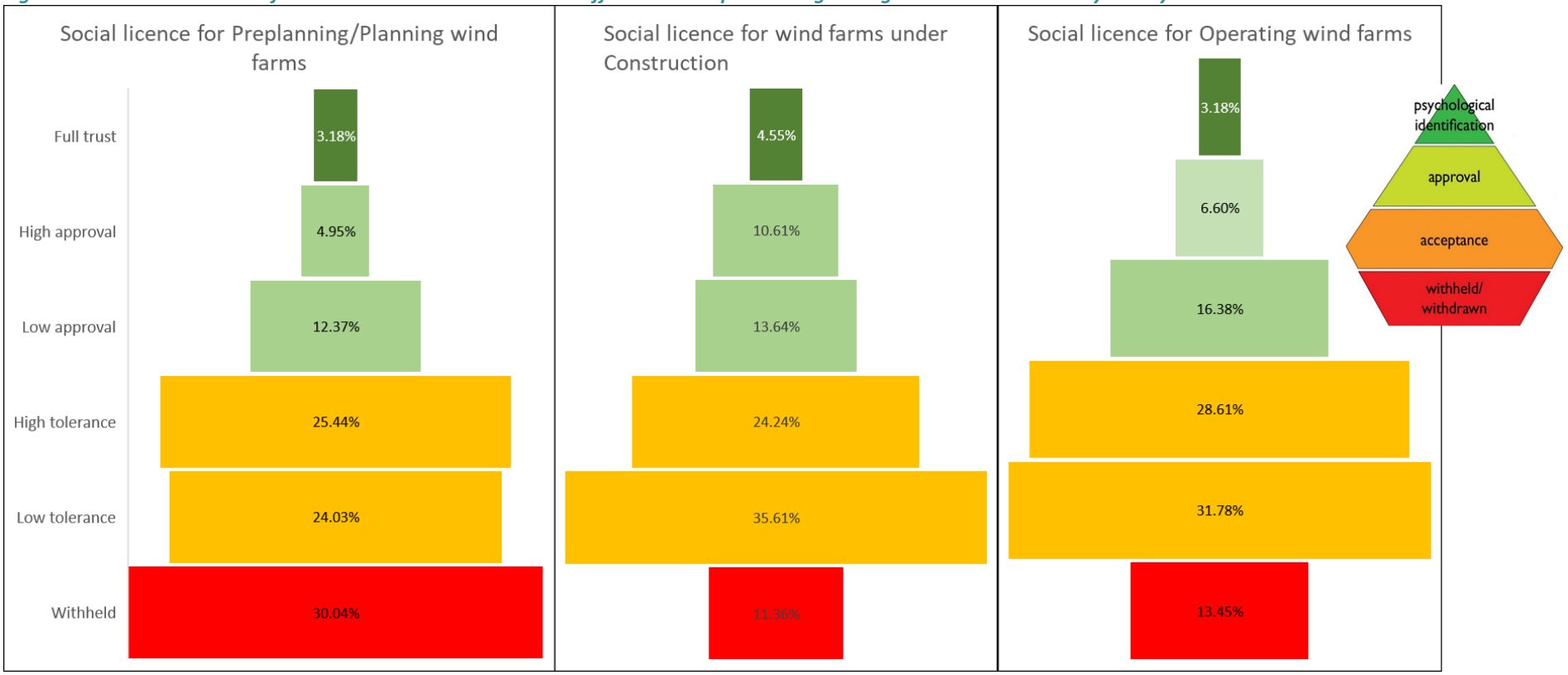
The social licence status within the three development stages was determined, see Figure 3.22. The 'withheld' level was the most common social licence level for respondents in the pre-planning/planning stage indicating that for many respondents (30%) the developers have not crossed the legitimacy boundary at this early stage. The perception that the project will inflict harm leads to the social licence being withheld. The proportion of respondents in the 'withheld' level in the construction and operation wind farm stages were 11.3% and 13.4%, respectively.

It was found that in the construction and operation wind farm stages the largest proportion of respondents are in the 'tolerate' level, about 50% for both stages. This is typical for most large infrastructure projects. Thomson and Boutilier's (2011) extensive research into different sectors and geographic regions found that the social licence distribution for projects typically have a spearhead shape with most individuals in the 'tolerance' range, see Figure 3.22.

The results were further examined to compare the different dimensions of the social licence in the different wind farm development stages, see Table 3.4. It can be seen in Table 3.4 that the mean scores for all dimensions were lower for the respondents in the pre-planning/planning stage. The dimension with the highest score in all three developmental stages was for economic legitimacy (assessed by the statement 'We can gain from a relationship with the project/company'). The dimension with the lowest score in each stage was institutionalized trust based on the four questions on fairness and openness, see Section 2.5 for the four questions.

Local residents are introduced to the wind farm project and the project developer during the planning stage. It is also a time when the local residents are very influential stakeholders. Although there has not been a lot of time to build trust in the pre-planning/planning stage, this is the time when the developer needs an abundance of trust from the community. For wind farm developers, failure to quickly gain and then maintain a social license can lead to conflict, delays, and additional costs (Jobert et al., 2007; Wüstenhagen et al., 2007; Fleming 2022). The developers must mainly rely on their reputation and their engagement practice to establish an authentic and long-term relationship with the local community at this crucial early stage.

Figure 3.22 The distribution of social licence levels in the three different development stage categories in the Community Survey.



Note: The typical 'spearhead' shape of the SLO distribution found in international studies is included for reference.

Table 3.4 The social licence dimensions and overall social licence scores, by wind farm development stage

Dimension	Pre-planning/Planning (n = 285)	Construction (n = 132)	Operation (n = 409)	Overall (n = 132)
Economic legitimacy: The perception that project/company offers a benefit to the perceiver.	**2.99**	**3.36**	**3.40**	**3.25**
Socio-political legitimacy: The perception that the project/company contributes to the well-being of the region, respects the local way of life, meets expectations about its role in society, and acts according to stakeholders' views of fairness.	**2.74**	**3.20**	**3.07**	**2.98**
Interactional trust: The perception that the company and its management listens, responds, keeps promises, engages in mutual dialogue, and exhibits reciprocity in its interactions.	**2.77**	**3.15**	**3.14**	**3.01**
Institutionalized trust: The perception that relations between the community's representative organizations and the project/company are based on an enduring regard for each other's interests.	**2.70**	**3.05**	**3.01**	**2.91**

Note: All scores are out of a maximum of 5.

3.3 Developer Interviews Insights

Overall, all the developer interviewees said that their company invests significant resources on communication and engagement and that community acceptance was very important to ensure national targets for onshore wind energy are reached. All the interviewees that worked in engagement said that their company has a formalised stakeholder engagement and communication strategy. Some companies outsource some of their stakeholder management. Overall, all the developer interviewees felt they had a participatory process in place where the community liaison officer would communicate any issues not immediately solvable to the project team and all developer interviewees said that they were aware of projects where the wind farm design had been influenced by community feedback.

The research shows that the preference of the people likely to be most impacted by the development (i.e., near neighbours), is for engagement to be at the earliest time. When asked about the timing of initiating engagement, the developer interviewees revealed that the timing of engagement was a difficult issue for them to balance. The developer interviewees revealed that they wait until after the feasibility stage and begin engagement when there is a commitment to the site. Most felt that talking to communities too early was ineffective for the following reasons:

- They may not proceed at that location as a result of site investigations. Therefore, it would be a wasteful exercise.
- They had a duty to respect the privacy of landowners during negotiation of leasing and right of ways.
- There is no useful exchange possible without a site outline at least the first iteration of design ready to share.
- They felt that they can be accused of evasiveness if they did not have that first site outline ready.

Large town-hall style meetings are not held anymore. There has been a move to online meetings (even prior to the Covid pandemic) which are more controlled. One interviewee felt that people could be more aggressive in groups. The small meetings and one to one interaction were extremely important in building trust. About half the interviewees felt that public sentiment about wind farms had changed in recent years. This was attributed to increased exposure to wind farms, awareness of climate change and a growing awareness of community benefit funds.

The interviewees were asked how they would go about giving neighbours '*a seat at the table'* when it came to project planning. One interviewee said they hold workshops for very near neighbours (<2km) in the early stage. Another interviewee said they had moved away from community forums as the forums were difficult to keep on topic. They now do questionnaires to get peoples feedback, but that people can email outside of the questionnaire. Giving people time with the wind farm information, letting the information "sink in" before going back for a second interaction was mentioned by a third of the interviewees. Another

interviewee said that 50% of the calls received from the public are from landowners looking to have a turbine on their land. Two interviewees said that the commercial interest of the project must be maintained and that they have to manage expectations of realistic changes. Another said that linking residents' electricity use to electricity generation via electricity discounts provided buy-in from the community and they identified with the wind farm.

Eight of the nine developer interviewees stated that the community liaison officer is very important but that you need the right person. The community liaison officer provides information to the community, brings information to the project team, represents the developer in the community. Not all community liaison officers are local but, as they operate in rural areas, a farming or rural background is considered important by most. The developer companies do not capture the work of the engagement team in key performance indicators. The subject is too intangible and different for each community.

3.4 Summary of Results for Developer Engagement

This section provides a summary of the key findings from the *National Survey*, the *Community Survey,* and the *Developer Interviews* on the topic of developer engagement with local residents and communities. The *National Survey* explored engagement mainly considering preferences and expectations of survey respondents in the absence of any existing or proposed wind farm development. The *Community Survey* examined the engagement experience of survey respondents that had wind farm(s) within 10km of their home in either the pre-planning/planning, construction, or operation stage. The key learning outcomes on the topic of engagement can be summarised as follows:

	Key learning outcomes
National Survey	• Near neighbours prefer very early engagement. Developers prefer to wait until they are committed to a site. • Respondents that are near neighbours of an existing wind farm use multiple sources of information. • Respondents that live over 10km away from a wind turbine indicated that they would be more discriminatory in seeking information.
Community Survey	• Engagement quality had an impact on taking action during the planning process. • Feeling powerless or feeling excluded from having an influence on the project were strong motivators for negative action. • Engagement quality had a significant impact on acceptance of the respondents' local wind farm. • The level of activity by community members in response to the wind farm when first proposed was higher than observed in other studies of social action. • Residents living close to an existing wind farm are less likely to participate at meetings. • Lack of time was a key barrier in engaging with developers. • Near neighbours of wind farms are most likely to have taken action during the pre-planning/planning stage and most likely in opposition. • Respondents believed that a neutral third-party intermediary was the most efficient mechanism to influence the design of the project. • For near neighbours under 2 km an objection to the planning authority was seen as more effective way to influence the project than working through the community liaison officer. • Noise and shadow flicker annoyance is addressed satisfactorily in two thirds of cases raised with the developer. • The community members are most likely to withhold the social license to operate in the pre-planning and planning stages though this dissipates as the project moves through the stages. • The social license to operate was most likely to be in the Tolerate level stage in the construction and operation stages.
Community Interviews	• Any mistake on the part of developers, such as having leaflets delivered to the wrong area, is interpreted as engagement being a 'tick the box exercise' and is extremely difficult to overcome at a later stage.
Developer Interviews	• Developer interviews revealed that the developers wait until after the feasibility stage and begin engagement when there is a commitment to the site. • Developers feel that they have a participatory engagement process.

4. Community Benefit Sharing

Highlights

- In the National survey benefits with the strongest impact on acceptance were direct payments to near neighbours for 15 years and a community benefit fund for green and sustainable initiatives for 15 years.
- Non-monetary community benefits have the most positive effect on acceptance across all stages of development.
- The development of amenities in an area was the most impactful benefit on acceptance of a wind farm in the pre-planning/planning and construction stages and was a high impact benefit in the operation stage.
- There is some evidence that the community benefit fund can be perceived in a negative context by a minority; 20% in the pre-planning/planning stage, 25% in the construction stage and 9.7% in the operation stage stated that a community benefit fund would reduce their acceptance of a wind farm.
- Most respondents in all wind farm development stages feel that the €1,000/annum near neighbour payment is too low. The developers interviewed were eager to point out that this is a minimum payment and is often negotiated higher.

It is now the conventional view that sharing the benefits from wind farms with local communities can generate increased acceptance of projects (Rudolph et al., 2018; Rudolph et al., 2015; Walker et al., 2014). Community benefits serve to redistribute resources from the beneficiaries of a wind farm to those who are most adversely affected by it and, in doing so, can address perceived inequities between the benefits and impacts of a project (Rudolph et al., 2018). However, the implementation of community benefits presents several challenges which can determine their effect on acceptance. One of the main challenges relates to the adequacy of the benefits (e.g., the type and size of the benefits). In this regard, community benefits can take a myriad of forms, and they may be provided to individuals or the community. For example, benefits may comprise of direct payments or electricity discounts to near neighbours of a wind farm, upgrades to local infrastructure, the development of amenities in the local area, sponsorship for local activities and the provision of community benefit funding. Another key challenge relates to the governance of community benefits (e.g., how is benefit funding distributed) (Jorgensen et al., 2020; Rudolph et al., 2018). In this regard, community benefits could potentially be administered by a wide range of stakeholders such as local citizens, local development companies, local authorities, or the wind farm developers (Le Maitre et al., 2023). While previous research in Ireland indicates that benefit sharing positively impacts community acceptance of wind farms (Brennan et al., 2017), there has been no research examining the types of benefits that have the most positive effects on Irish citizens. In addition, little is known about Irish citizens' preferences vis-à-vis the governance of community benefit funding. This section provides insights into these issues by outlining our findings from the *National Survey*, the *Community Survey,* and the *Developer Interviews*.

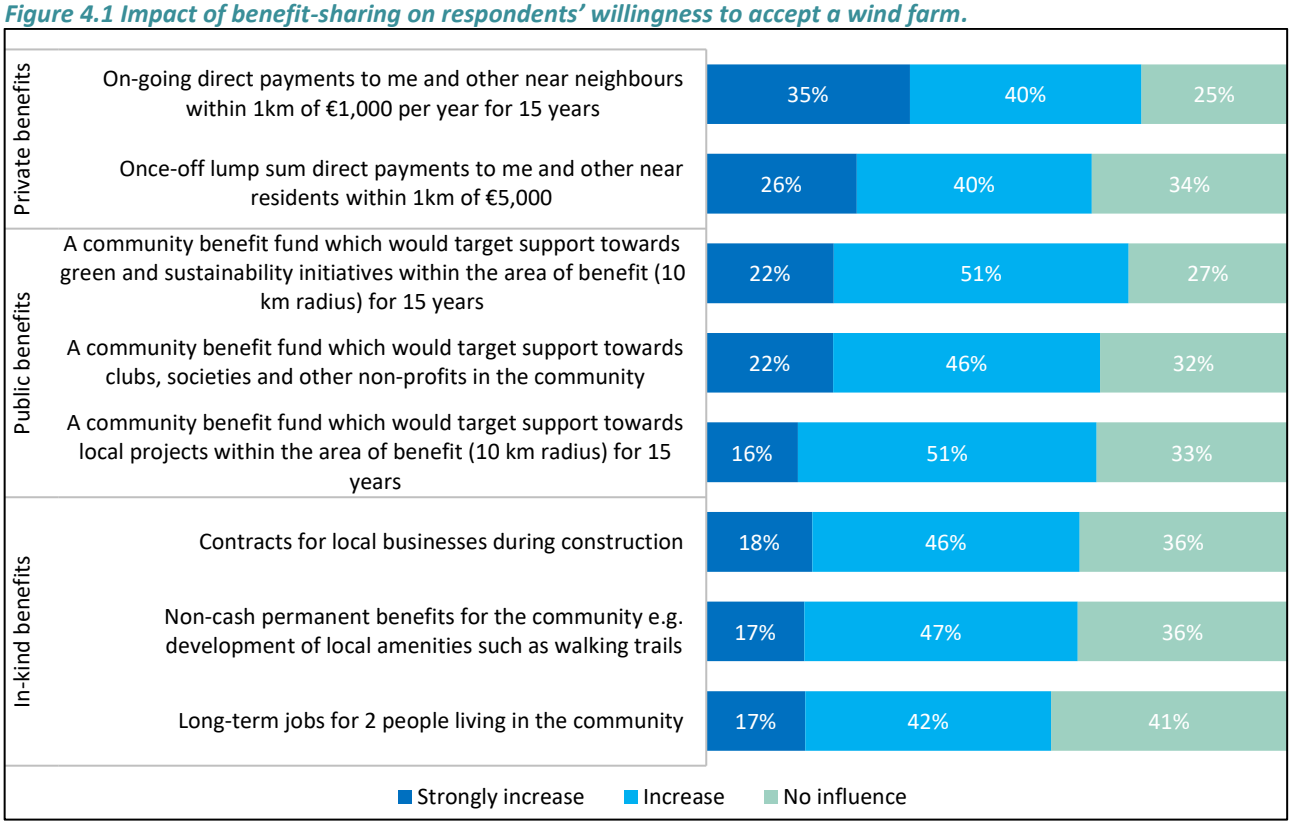
4.1 Insights from National Survey

The *National Survey* examined citizens' views on benefit sharing mechanisms for local wind farm developments. Questions were asked to assess: (1) the impact of different types of benefit sharing on citizens' willingness to accept a local wind farm; (2) citizens' preferences with respect to the distribution of benefit funding between private households and the wider community; (3) citizens' preferences vis-à-vis the allocation of benefit funding to different categories of near neighbours (i.e. to households within 1 km of a wind farm versus those located 1-2 km away); and (4) the preferences of citizens with respect to governance of community benefit funding.

To assess the impact of different types of benefit sharing on citizens' willingness to accept a local wind farm, the respondents were asked whether specific types of private household benefits, public community benefits and in-kind community benefits would increase their willingness to accept a local wind farm development near their home. Respondents' willingness to accept the wind farm was assessed using the following scenario and question: "Consider a proposed wind farm (15 turbines of 185 m height) is to be built in your community. Your home will be within a 1 km radius of one of the turbines. Please indicate the extent to which the following benefit sharing mechanisms would influence your willingness to accept the wind farm near your home." A list of eight mechanisms were presented including two types of private household benefits, three types of public community benefits, and three types of in-kind community benefits.

As shown in Figure 4.1, most respondents indicated that the various types of benefits would either increase or strongly increase their willingness to accept the wind farm. However, proportionally more respondents reported that private household benefits, as opposed to public community benefits or in-kind community benefits, would strongly increase their willingness to accept. In this regard, 35% of respondents stated that their willingness to accept the wind farm would strongly increase due to the provision of on-going annual direct payments of €1,000 to residents living within 1 km of the wind farm, while 26% of respondents reported that a once-off lump sum direct payment of €5,000 to residents living within 1 km of the wind farm would strongly increase their willingness to accept. Compared to private household benefits, public community benefits were more likely to increase, but not strongly increase, respondents' willingness to accept the wind farm. In this regard, high proportions of respondents reported that their willingness to accept would increase to some extent due to the provision of a community benefit fund that would target support towards either green and sustainability initiatives (73%), clubs, societies, and other non-profits (68%) or local projects (67%). Of all the various types of benefits, in-kind community benefits had the least positive effect on acceptance, with many respondents reporting that contracts for local businesses during construction (36%), non-cash permanent benefits for the community (e.g., development of local amenities such as walking trails) (36%), and long-term jobs for 2 people living in the community (41%) would have no influence on their willingness to accept.

Figure 4.1 Impact of benefit-sharing on respondents' willingness to accept a wind farm.



Note: The respondents were told that there would be a wind turbine located within a 1 km radius of their home.

Citizens' preferences with regards to the distribution of benefit funding between private households and the wider community was also explicitly examined in the survey. Specifically, the survey asked: "Assuming a typical fund of €180,000 per annum, how should it be split between: (1) homes near the wind farm; (2) community projects for green and sustainability initiatives; and (3) local clubs, societies and not-for-profits." To answer the question, the respondents were presented with four options each showing a different proportional allocation of the funding to the three benefactors (i.e., homes near the wind farm, community projects or clubs/societies/not-for-profits), and they were asked to rank these options in order of preference. Table 5.1 provides details on the four options presented. As shown in Figure 4.2, a general preference emerged for a model of benefit sharing whereby priority is given to near-neighbour payments. In this regard, 41% of

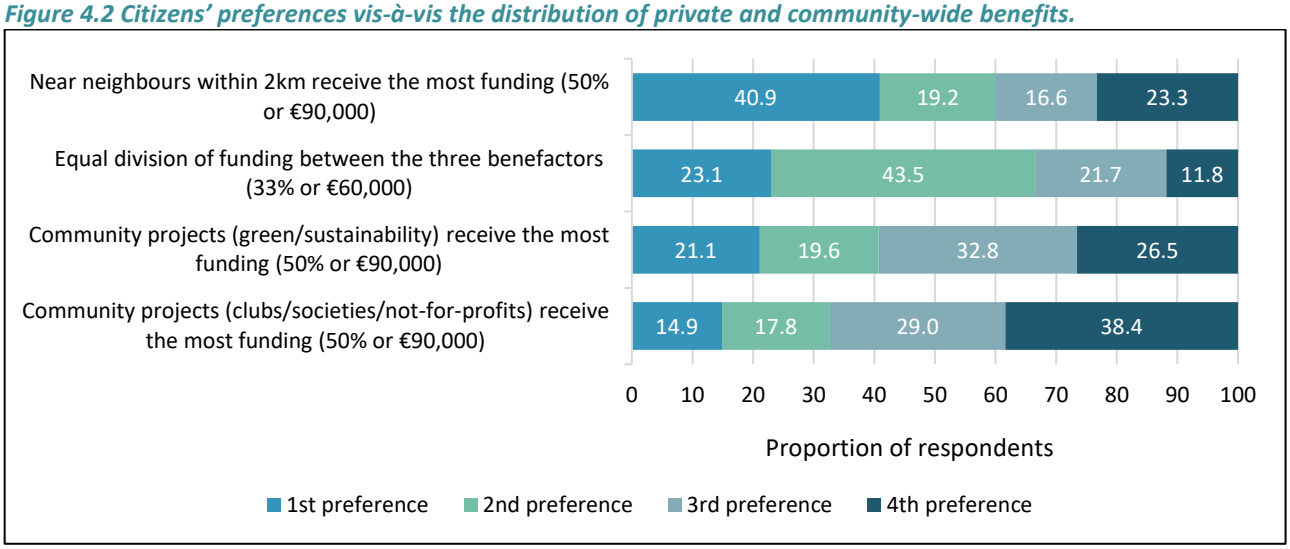
respondents indicated that near neighbours living within 2 km of the wind farm should receive half of the €180,000 fund (€90,000), with the remaining funds divided equally between community projects associated with green or sustainability initiatives (€45,000) and clubs, societies, and not-for-profits (€45,000). An equal division of the fund between each of the three benefactors was the second most popular option, while allocating greater shares of funding to green/sustainability projects or to clubs/societies/not-for-profits were the least preferred.

Table 4.1 The preferred allocation of the community benefit fund.

	Option 1	Option 2	Option 3	Option 4
Near neighbours (within 2km)	50% (€90,000)	25% (€45,000)	25% (€45,000)	33.3% (€60,000)
Community projects (green/sustainability)	25% (€45,000)	50% (€90,000)	25% (€45,000)	33.3% (€60,000)
Community projects (clubs/societies/not-for-profits)	25% (€45,000)	25% (€45,000)	50% (€90,000)	33.3% (€60,000)

Note: Options given to respondents in the question "Assuming a typical fund of €180,000 per annum, how should it be split between: (1) homes near the wind farm; (2) community projects for green and sustainability initiatives; and (3) local clubs, societies and not-for-profits." Each option corresponds to a different proportional allocation of the funding to the three benefactors, with the associated allocation shown in brackets.

Figure 4.2 Citizens' preferences vis-à-vis the distribution of private and community-wide benefits.



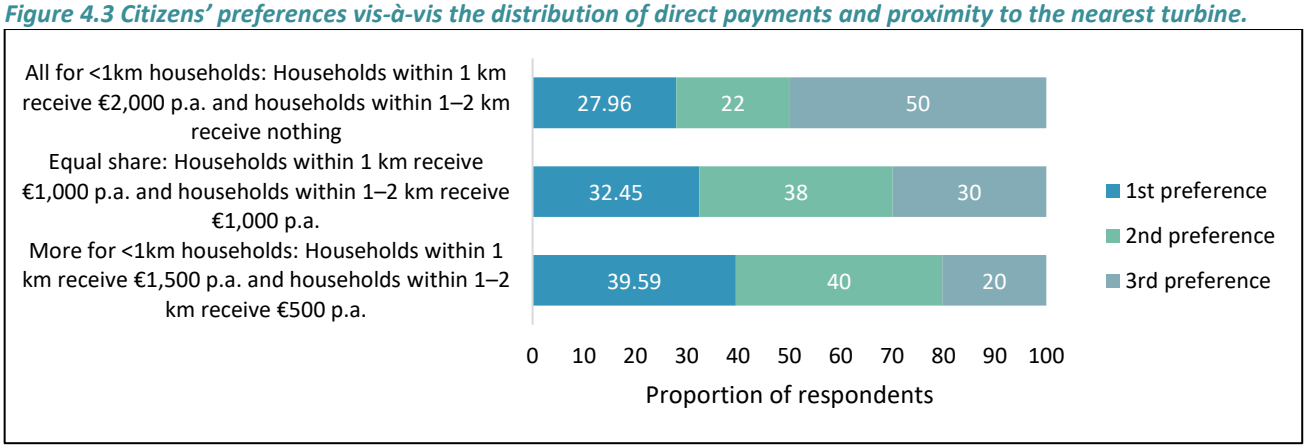
To assess respondents' views specifically in relation to near neighbour payments, the survey examined their preferences in relation to the allocation of funding to different categories of near neighbours i.e., the size of payments to households located within 1 km of a wind farm versus the size of payments to households located 1-2 km away. Specifically, the survey asked: "Imagine your home is located within 1 km of a wind turbine. What would you consider to be the fairest way of distributing a €50,000 fund for near neighbours?" Respondents were told there were 25 houses located within 1 km of the wind farm and another 25 houses located 1-2 km away. To answer the question, the respondents were presented with three options that each showed different funding allocations to the households located within 1 km and to those located 1-2km away, and they were asked to rank the options in order of preference. Table 4.2 provides details on the three options presented. As shown in Figure 4.3, a higher proportion of respondents indicated a preference for households within 1 km to receive most of the fund (40%), compared to giving equal shares of the fund to households within 1 km and within 1-2 km (32%), or giving all the fund to households within 1 km (28%).

Table 4.2 The preferred allocation of the near neighbour payments.

Option 1	Households within 1 km get all of the fund (€50,000) - Each household within 1 km receives €2,000 p - No payments to households within 1-2 km
Option 2	Equal shares to households within 1 km and within 1-2 km (€25,000 each) - Each household within 1 km receives €1,000 pa - Each household within 1-2 km receives €1,000 pa
Option 3	Households within 1 km get more of the fund (€37,500) - Each household within 1 km receives €1,500 pa - Each household within 1-2 km receives €500 pa

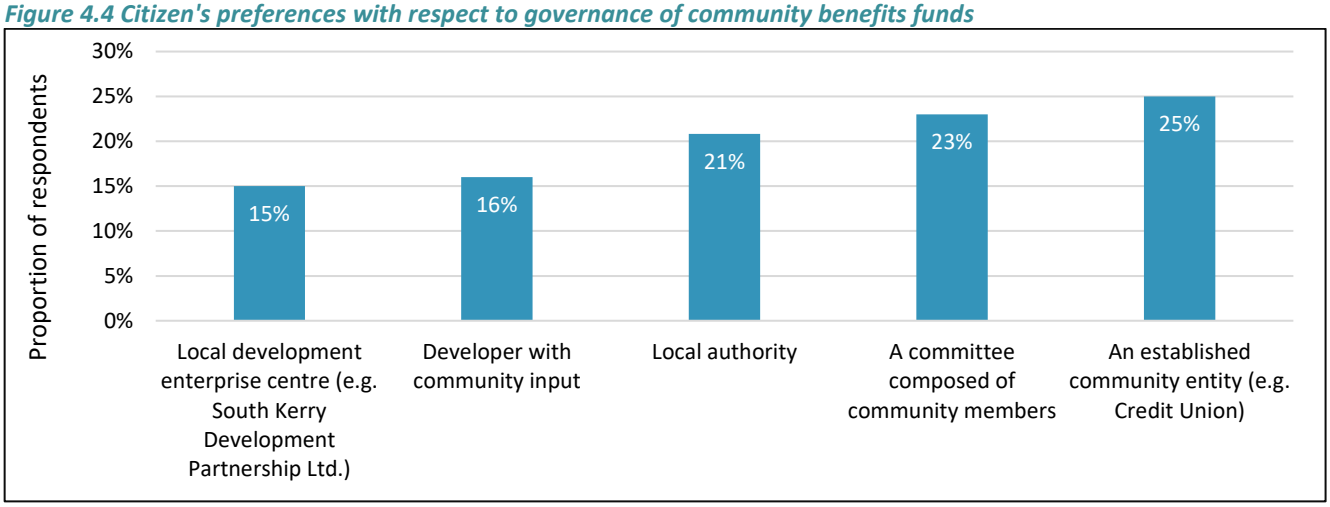
Note: Options given to respondents in the question "Imagine your home is located within 1 km of a wind turbine. What would you consider to be the fairest way of distributing a €50,000 fund for near neighbours?"

Figure 4.3 Citizens' preferences vis-à-vis the distribution of direct payments and proximity to the nearest turbine.



The survey also examined respondents' preferences with respect to the governance of community benefits funds. In this regard, the following question was asked: "A community benefit fund needs to be managed in a fair and transparent manner. In your opinion, what is the best governance structure for the fund?" Respondents were presented with five options and had to select their preferred one. As shown in Figure 4.4, proportionally more respondents indicated a preference for an established community entity (e.g., Credit Union) (25%) to administer the fund, relative to the other options, but this was closely followed by a committee composed of community members (23%) or a local authority (21%). The least preferred governance structures were those involving the developer in conjunction with community input (16%) or a local development enterprise centre (15%).

Figure 4.4 Citizen's preferences with respect to governance of community benefits funds

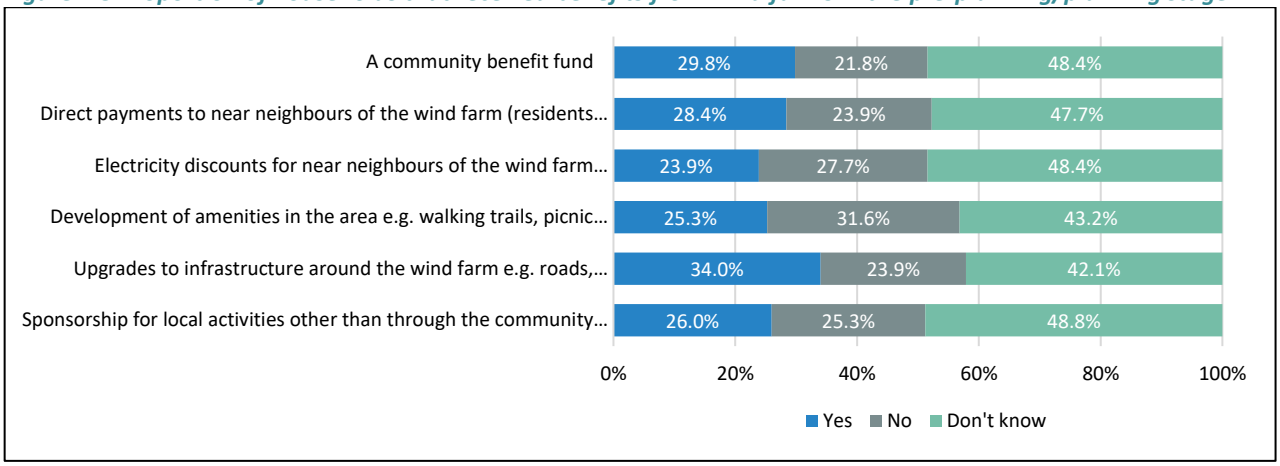


4.2 Insights from Community Survey

The *Community Survey* examined the topic of benefit sharing among residents living in communities where there was a wind farm in pre-planning/planning, construction or operation. Questions were asked to elicit information on (1) the types of benefits that the communities have received (or will receive)[7]; (2) the impact of different types of benefits on residents' willingness to accept their local wind farm; (3) residents' views on the fairness of the community benefit fund contributions by wind farm developers; (4) residents' opinions on current Irish Government rules governing the distribution of community benefit funding; and (5) residents' preferences vis-à-vis the administration of community benefit funding.

To assess the types of benefits that the communities have received (or will receive), the respondents were presented with a list of six benefit types and were asked "Has (Will) your community received (receive) any of the following benefits from the wind farm?" Figures 4.5 to 4.7 present the results showing the types of benefits received by communities across the different stages of project development. Several interesting results are evident. Firstly, respondents who live near a wind farm that is in construction are generally more likely to report receiving the various types of benefits, whereas those living near an operational wind farm are generally less likely. Secondly, upgrades to infrastructure around the wind farm (e.g., roads, bridges etc.) is the most reported benefit across all stages of project development. A community benefit fund and direct payments to near neighbours of the wind farm are the next most commonly reported benefits by respondents who live near a pre-planned/planned wind farm, while the development of amenities in the area (e.g. walking trails, picnic areas etc.) and sponsorship for local activities (other than through the community benefit fund) are the next most commonly reported benefits by respondents living near operational/ in-construction wind farms. Thirdly, many respondents, and particularly those living near operational or pre-planned/planned wind farms, are not aware if their community has or will receive many types of benefits. Notably, almost half of the respondents (48%) who live near a pre-planned/planned wind farm stated they did not know if their community would receive a community benefit fund, despite current Irish Government rules stating that all new RESS projects must establish such a fund for the local community.

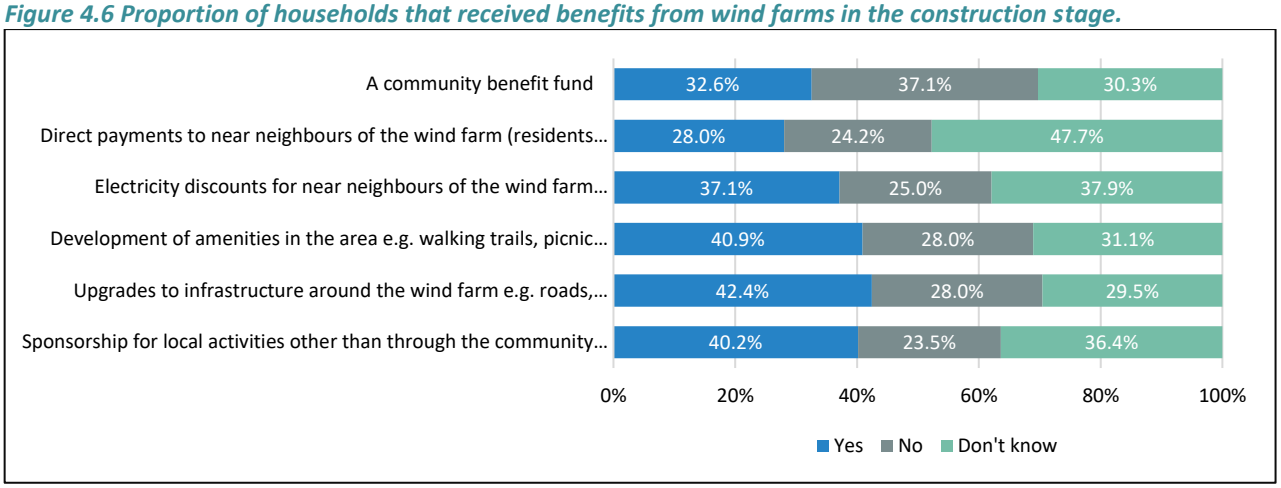
Figure 4.5 Proportion of households that received benefits from wind farms in the pre-planning/planning stage.



Note: n= 285

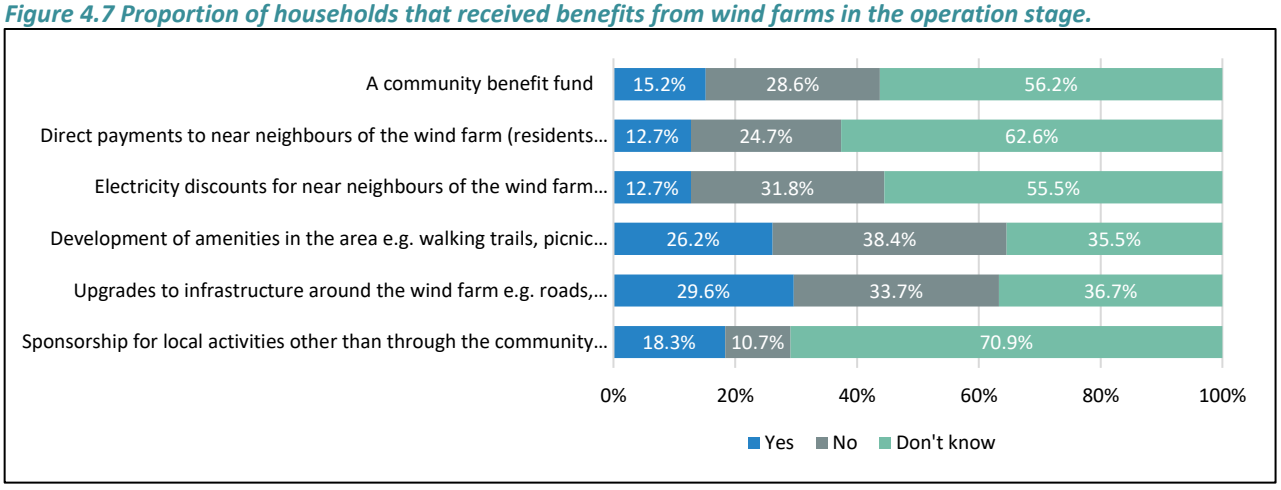
[7] Respondents living within 10km of either a pre-planned/planned wind farm or a wind farm in construction were asked: "Will your community receive any of the following benefits from the wind farm?". Respondents living within 10km of an operational wind farm were asked: "Has your community received any of the following benefits from the wind farm?"

Figure 4.6 Proportion of households that received benefits from wind farms in the construction stage.



Note: n= 132

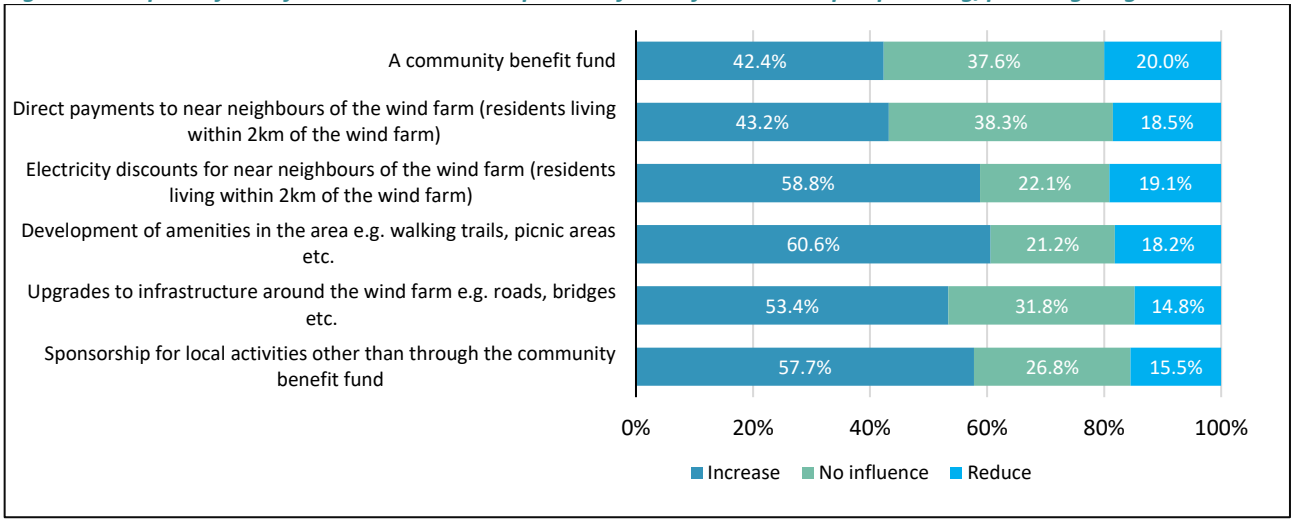
Figure 4.7 Proportion of households that received benefits from wind farms in the operation stage.



Note: n= 409

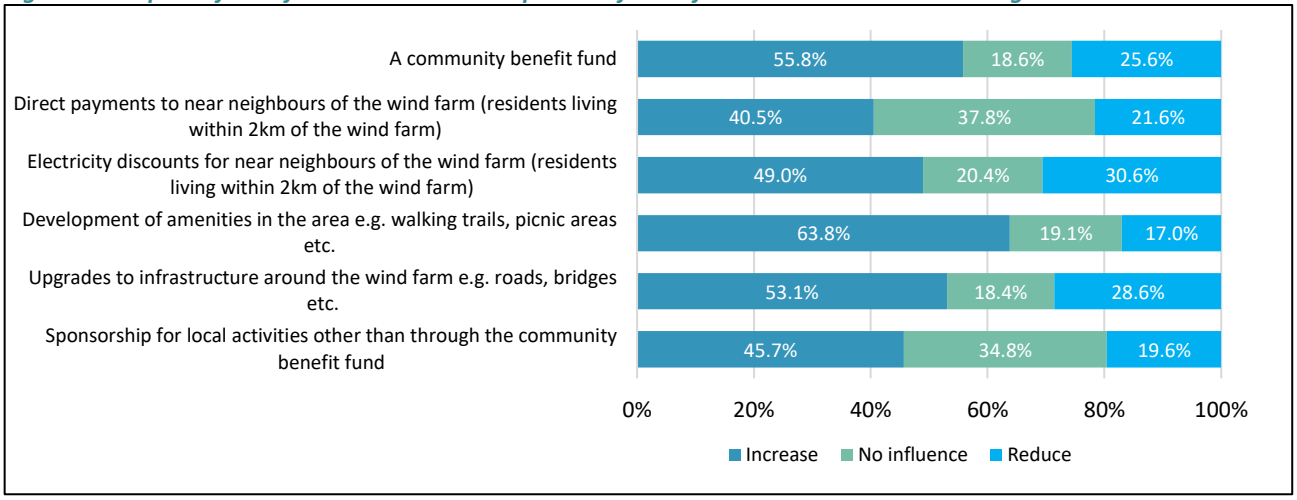
In addition to asking about the types of benefits that communities have received (or will receive), the survey asked the respondents: "How have these benefits influenced your willingness to accept the wind farm?" Figures 4.8 to 4.10 present the results showing the impact of the various types of benefits on acceptance across the different stages of project development. Interestingly, non-monetary community benefits have the most positive effect on acceptance across all stages of development. In this regard, the development of amenities in the area has the most positive impact in both the pre-planning/planning (61%) and construction stages (64%), while upgrades to the infrastructure around the wind farm has the most positive effect in the operation stage (60%). Electricity discounts for near neighbours of the wind farm (58%) and sponsorship for local activities (other than through the community benefit fund) (58%) also have strong positive effects in the pre-planning/planning stage, while a community benefit fund (56%) and upgrades to local infrastructure (53%) have strong positive effects in the construction stage. The development of amenities (59%) and sponsorship for local activities (59%) have strong positive effects in the operation stage. Two additional results are noteworthy. The first is that electricity discounts to near neighbours have a more positive effect than direct payment across all stages of project development, which is possibly due to recent rises in electricity prices. The second is that the impact of community benefit funds on acceptance seems to increase as a project moves from the pre-planning/planning stage to the construction stage, which is possibly due to increased awareness of the value of the fund and its potential impact on the local area.

Figure 4.8 Impact of benefits on residents' acceptance of wind farms in the pre-planning/planning stage.



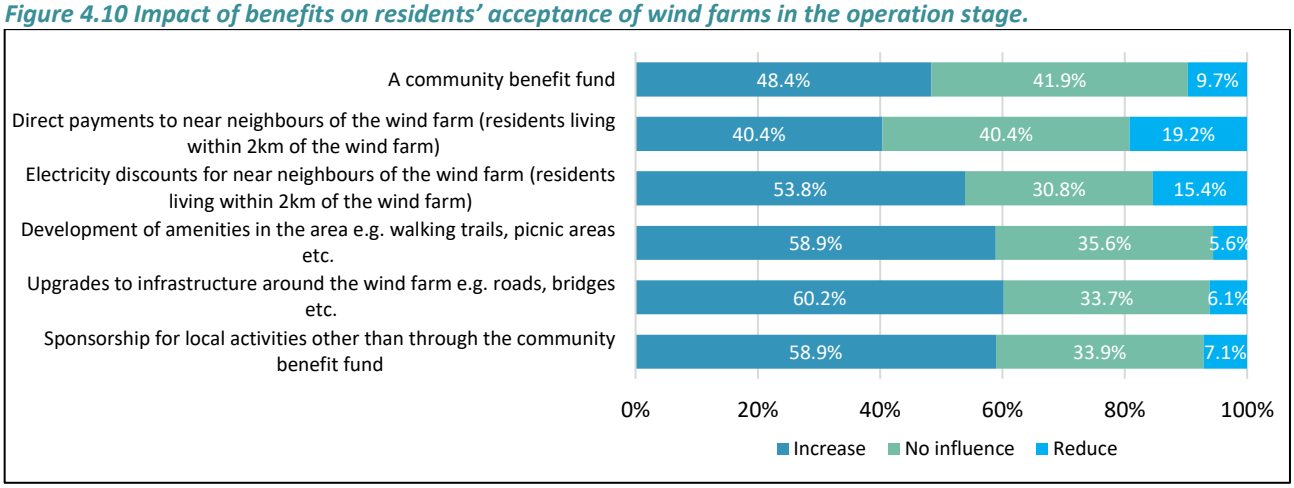
Note: n= 285

Figure 4.9 Impact of benefits on residents' acceptance of wind farms in the construction stage.



Note: n= 132

Figure 4.10 Impact of benefits on residents' acceptance of wind farms in the operation stage.

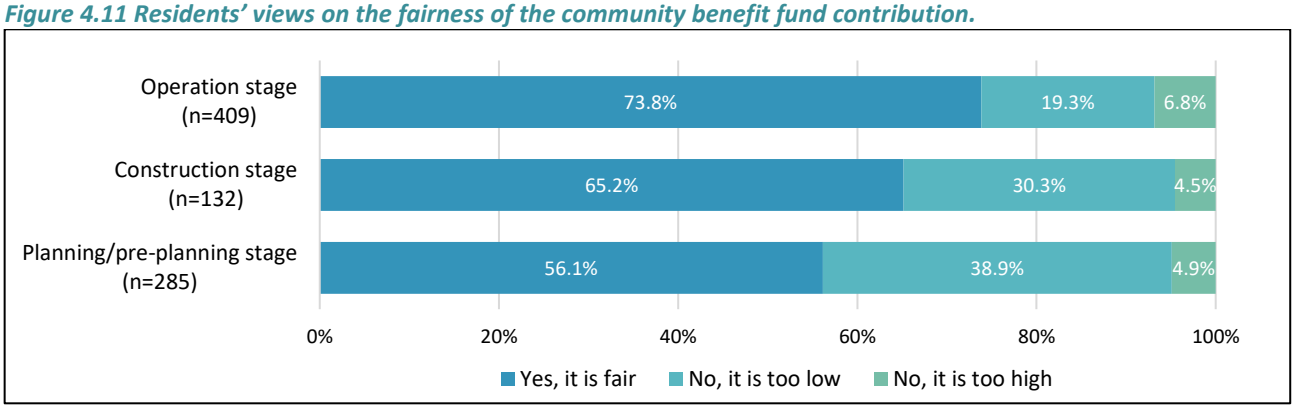


Note: n= 409

In relation to community benefit funds, the survey elicited the respondents' views on the fairness of the size of the monetary contributions by wind farm developers operating under the RESS auction process by asking: "Since 2020, the government has mandated that wind farm developers who sell electricity into the national

grid must provide a community benefit fund that is made available annually for the benefit of the local community. The value of the community benefit fund is based on the generation capacity of the wind farm. For a 10MW wind farm (e.g., 3-4 turbines), the fund is expected to be approximately €60,000. For a 50MW wind farm (e.g., 15-20 turbines), the fund is expected to be approximately €300,000. Do you think this is a fair contribution by a wind farm developer?" The respondents were also told that a higher contribution would increase costs for developers and may result in higher electricity prices or projects not proceeding. As can be seen in Figure 4.11, most respondents believe that the contribution is fair. However, respondents who live near an operational wind farm are more satisfied with the contribution (73.8%), compared to those living near pre-planned/planned wind farms (56%) or wind farms in construction (65%).

Figure 4.11 Residents' views on the fairness of the community benefit fund contribution.



Note: A Kruskal-Wallis H test followed by pairwise comparisons using Dunn's test was conducted to see if there is a difference in the mean ranked agreement to the fairness of the developer contribution to the community benefit fund. The tests are available on request from the authors.

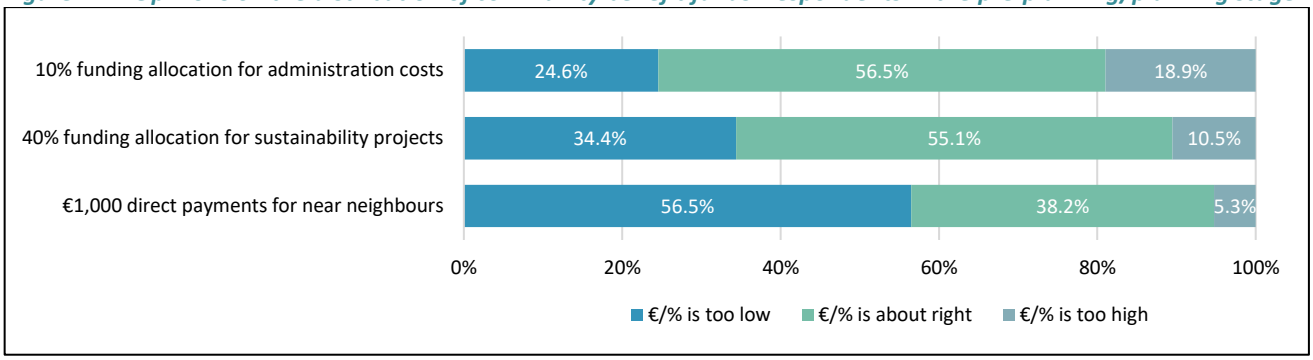
To assess residents' opinions on current Irish Government rules that govern the distribution of community benefit funds, the respondents were asked: "The Irish Government has developed rules governing the distribution of community benefit funds. What is your opinion on the following specific rules?" As outlined in Table 4.3, three specific rules were examined: (1) the size of direct payments to near neighbours; (2) the proportion of funding allocated to local sustainability projects; and (3) the proportion of funding allocated to administration costs. Figures 4.12 to 4.14 present the results for residents living near wind farms in the pre-planning/planning stage, construction stage and operation stage, respectively. Across each of the stages, most respondents stated that the current proportional allocation of funding to sustainability projects and administration costs was about right. However, many respondents believed that the minimum payment of €1,000 for near neighbour payments was too low, particularly those living near planned/pre-planned wind farms (56%).

Table 4.3 Rules governing the distribution of community benefit funds.

Focus of the rule	Rule
Direct payments to near neighbours	A minimum of €1,000 is to be paid to each household located within a 1km radius of the wind farm.
Funding allocation to sustainability projects	A minimum of 40% of the fund must be spent on local sustainability projects delivered by non-profit community enterprises e.g. retrofitting homes.
Funding allocation to administration costs	A maximum of 10% of the fund may go towards administration which should ensure successful outcomes and good governance.

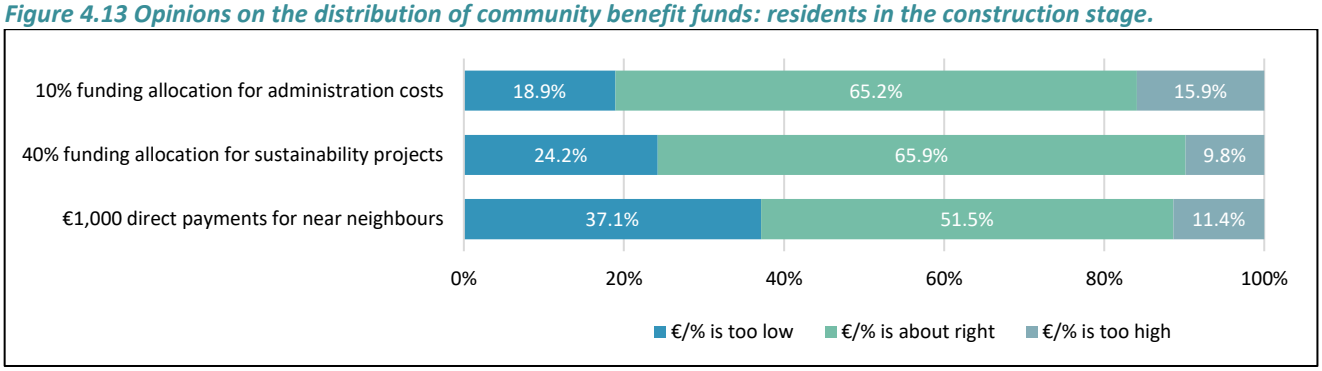
Note: Rules presented to respondents in the question "The Irish Government has developed rules governing the distribution of community benefit funds. What is your opinion on the following specific rules?"

Figure 4.12 Opinions on the distribution of community benefit funds: respondents in the pre-planning/planning stage.



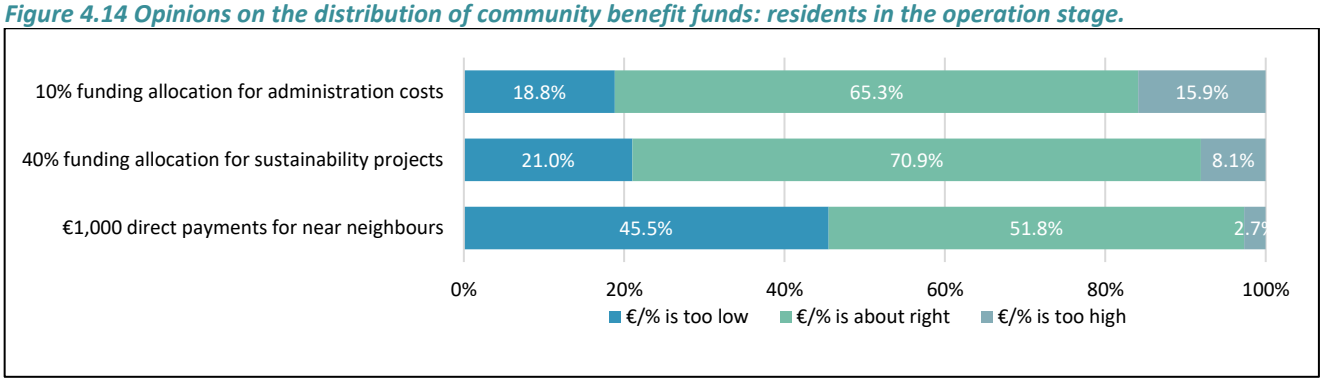
Note: n= 285

Figure 4.13 Opinions on the distribution of community benefit funds: residents in the construction stage.



Note: n= 132

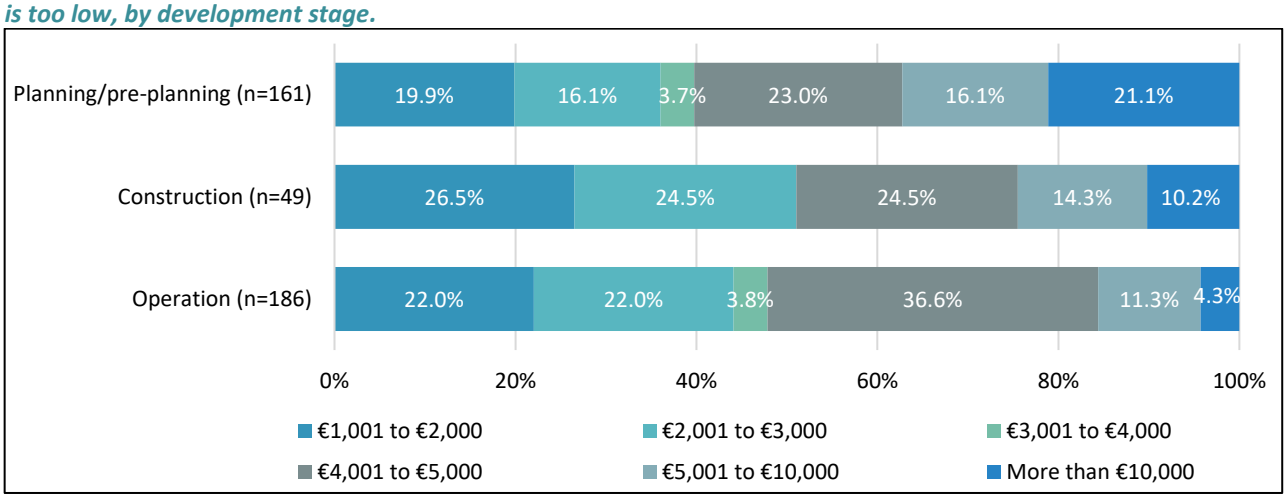
Figure 4.14 Opinions on the distribution of community benefit funds: residents in the operation stage.



Note: n= 409

To explore respondents' views on what would be a fair amount for the direct payments to near neighbours, those who indicated that a minimum payment of €1,000 was too low were asked: "What do you think would be the fairest amount for the annual payments to residents living within 1km of a wind farm?" As can be seen in Figure 4.15, most of these respondents indicated that amounts up to €5,000 per annum would be fair. However, views differed somewhat depending on whether the respondents were living near a wind farm that was in pre-planning/planning stage or one that was in construction or operation. Of those who indicated that a minimum payment of €1,000 was too low and who were living near an operational wind farm, 84% reported that amounts up to €5,000 per annum would be fair. However, the proportion fell to 76% among respondents living near a wind farm that was in construction and to 63% among those living near a wind farm that was in pre-planning/planning.

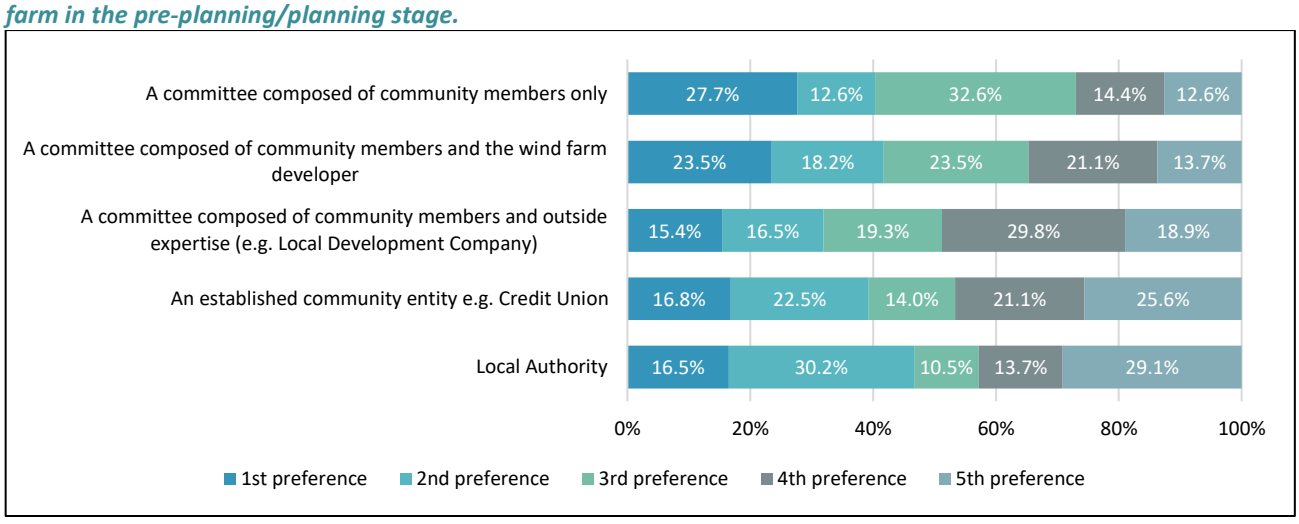
Figure 4.15 The fairest amount for annual near neighbour direct payments among residents who believe that €1,000 is too low, by development stage.



Note: Opinions on the fairest amount for annual direct payments to near neighbours among residents who believe that €1,000 is too low and across the different stages of project development. A Kruskal-Wallis H test followed by pairwise comparisons using Dunn's test was conducted to see if there is a difference in the mean ranked agreement to the fairness of the developer contribution to the community benefit fund. The test results are available on request from the authors.

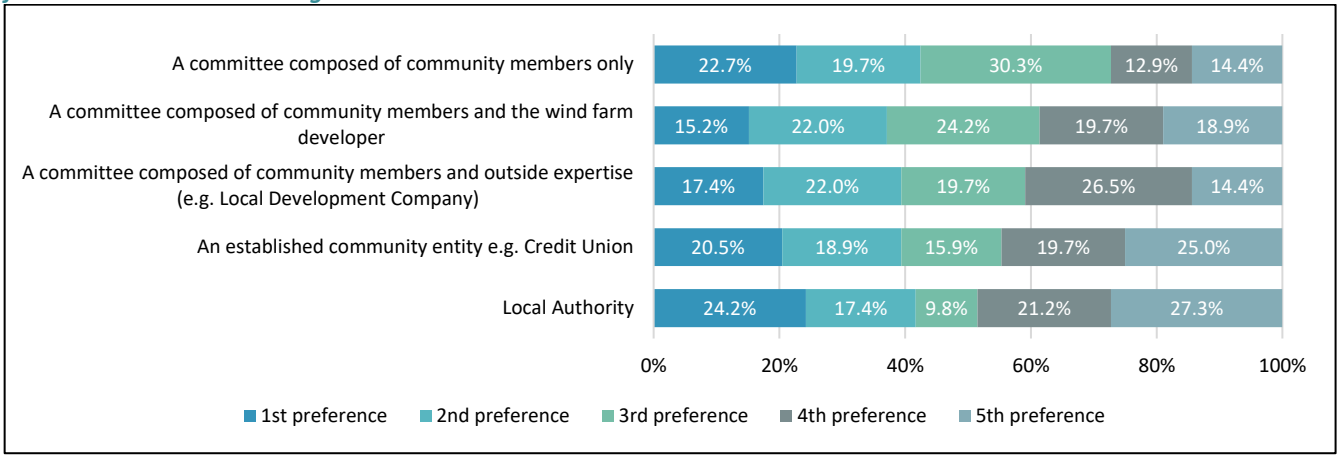
In addition, the survey assessed residents' preferences vis-à-vis the governance of community benefit funding. Specifically, the survey asked: "A community benefit fund can involve a considerable amount of money which can be used to fund local initiatives. It is generally expected that several local projects would apply to use this funding on an annual basis. Who do you think should be responsible for managing a community benefit fund?" Respondents were presented with five options and had to rank them in order of preference. As can be seen in Figures 4.16 to 4.18, respondents' preferences varied in each of the stages of project development. However, a committee composed of community members was the first preference for the highest proportion of respondents in both the pre-planning/planning (28%) and operation (22%) stages, compared to the other options. While a Local Authority was preferred by almost a quarter (24%) of respondents in the construction stage (24%), it was also the least preferred option in all stages of project development.

Figure 4.16 Preferences vis-à-vis the governance of community benefit funding among residents living near a wind farm in the pre-planning/planning stage.



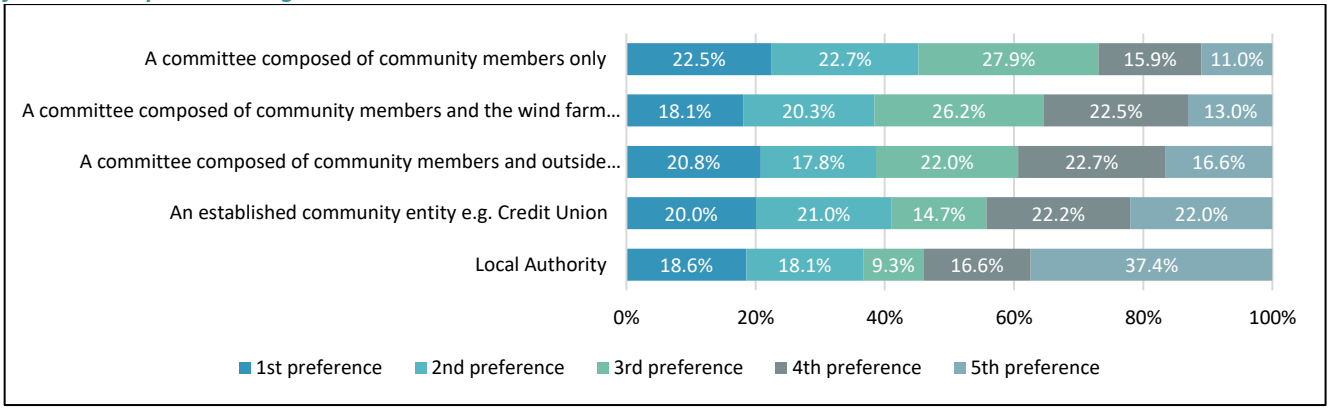
Note: n=285

Figure 4.17 Preferences vis-à-vis the governance of community benefit funding among residents living near a wind farm in the construction stage.



Note: n=132

Figure 4.18 Preferences vis-à-vis the governance of community benefit funding among residents living near a wind farm in the operation stage.



Note: n=409

4.3 Developer Interviews Insights

The perspectives of people working in the wind energy sector on benefit-sharing aspects were sought during the Developer Interviews section of the research programme. Their experience and thoughts on benefit-sharing overall, the potential of specific mechanisms of benefit-sharing to influence community acceptance, and the benefit-sharing policies included in the RESS auction system were sought.

Mandatory benefit sharing was introduced in 2020 (RESS 1) and we see in the *Community Survey* that respondents living near older operational projects were least likely to be receiving various benefits. However, the companies represented in our Developer Interviews have experience of benefit sharing impacts on acceptance and company-community relationships as they were already engaging in some sort of benefit-sharing with local communities prior to the introduction of RESS.

Benefit sharing represents distributional fairness in wind farm development. One interviewee described the essence of the situation bluntly as 'the country needs this development, this development has been imposed on you, we will transfer real benefit to you.' All the interviewees agreed that benefit-sharing with local communities was a justified and proper approach.

There was general agreement that a community benefit fund had a positive influence on peoples' willingness to accept a wind farm. Four of the interviewees considered it a strong influencer and five interviewees expressed some reservation about the community benefit fund as a 'magic bullet' to influence people. Most agreed that this occurred at a later stage when the fund became more real to them. Three related that they do not start talking about the community benefit fund in the *Early* stages of engagement. The reasons given were that i) there is not clarity in the *Early* stages as the initiation timeframe and amount for the community benefit fund is not known until later in the process; and ii) while some residents like the idea of

the community benefit fund, others dislike it and see it as an attempt to buy people off. As stated by one interviewee, it is preferable to keep the narrative centred on the project itself rather than give the perception of deflecting focus. The developer interviewees felt that positivity about the community benefit fund tends to build after residents' fears reduce (i.e., later in the engagement process) and when the information about the community benefit fund becomes more concrete and when the residents are asked to be involved in how the funds are spent. This aligns with the results from the *Community Survey* that showed the impact of community benefit funds on acceptance seems to increase as a project moves from the pre-planning/planning stage to the construction stage. One interviewee is hopeful that, as time goes by, good news stories regarding community benefit funds will have reached new host communities from other rural communities before initial engagement begins and the positivity will occur earlier without risking the 'buying off' opposition narrative that can arise with the promotion of a community benefit fund by the developer.

A third of the developer interviewees agreed that the contribution of €2 per MWh of electricity produced was an appropriate figure, with one saying that they would have agreed a higher figure. A third of the interviewees said that this value was high for big projects. Some concern was expressed that very large projects in sparsely populated areas will mean that some communities will struggle to spend the funds. The idea of introducing some scaling depending on the size of the project, increasing the area of benefit, and using external expertise to develop a long-term community action plan, were two solutions put forward for such circumstances. This would have to be subject to the agreement of the community. Two interviewees noted that other large infrastructure projects could be disruptive to local communities, such as quarries, but developers of these infrastructure are not obliged to establish a community benefit fund.

The wind farm companies we spoke to had experience of setting up community benefits prior to the RESS requirements. Slightly at odds with the results of the National and Community Surveys, the interviewees stated that their companies' preference was to stay actively involved and associated with the community benefit fund. This is understandable as the interviewees agree that the benefit sharing impact on community relations is minimal in the pre-planning stage but builds on the engagement work done in the early stages of the project and enhances the company-community relationship throughout construction and operations. Also, the interviewees explained that the use of a third-party company to help manage the fund was the norm and, as detailed by one interviewee, regulation around GDPR, finance, confidentiality agreements, etc. means there is 'a lot for a community committee to take on'.

Although most companies represented had been doing some community benefit fund management inhouse and had some indication of the work involved, there wasn't consensus among the interviewees regarding the allocation of a maximum of 10% of the community benefit fund for administration costs. Four of the interviewees felt that 10% was much too high, three of the interviewees felt that the value was about right and represented good value for money and two interviewees thought that the figure should be higher. It is expected that the 10% figure will become the norm in most cases.

Nearly all agreed that the €1,000 per year set for direct payments to each household within 1km was either right or was at least a minimum that near-neighbours should receive. The interviewees indicated that there is some negotiation involved in near-neighbour payments. A third of the interviewees said they treat the figure as a minimum especially for those living very close. The idea that there should also be a cap on the value was mentioned by two interviewees. It was noted that the payments were taxable but that the after-tax amount would still be substantial enough to be spent on significant items such as a laptop.

The 1km distance value was discussed. Increasing the distance for the €1,000 minimum from 1km to 2 km would quickly get very expensive as the number of eligible households would rapidly increase. However, most practice a tiered payment system using distance thresholds smaller to the 1km and 2km cut off points in RESS. Residents living very close expect more. Therefore, while meeting their minimum RESS obligations, higher near-neighbour payments are often arranged depending on distance and local topography.

In relation to the 40% proportion reserved for not-for-profit green and sustainable initiatives by community enterprises, most agreed that linking benefits to sustainability projects (e.g., improved household BER rating) had most impact. One interviewee said that benefits in the form of electricity discounts can establish a direct link in peoples' mind between the wind farm and their energy requirements. However, there was some disappointment expressed with insisting that as much as 40% of the fund was spent on sustainable initiatives. The issues highlighted were: i) that communities will find this rule hard to understand; ii) that it's

patronising, and communities should decide themselves; and iii) using a third-party not-for profit enterprise rather than directly interacting with community members may make the process a passive rather than engaging process.

4.4 Summary of Results for Benefit Sharing

This section provides a summary of the key findings from the *National Survey*, the *Community Survey,* and the *Developer Interviews* on the topic of benefit sharing from wind farms. The *National Survey* explored this topic by examining the impact of different types of benefit sharing mechanisms on Irish citizens' willingness to accept a local wind farm. Citizens' views on the distribution of benefit funding between private households and the wider community, the allocation of benefit funding to different categories of near neighbours, and the best governance structure for managing community benefit funds, were also examined. The *Community Survey* examined the impact of different types of benefit sharing mechanisms on citizens' willingness to accept local wind farms in various stages of project development. Citizens' views on the fairness of the community benefit fund contributions by developers, the rules governing the distribution of community benefit funding, and the best governance structure for managing community benefit funds, were also assessed. The *Developer Interviews* explored the topic of benefit sharing by eliciting the views of developers on the types of benefit sharing mechanisms that they feel are most important for community acceptance of wind farms in Ireland. Developers' views on the fairness of their contribution to community benefit funding, the rules governing the distribution of community benefit funding, and the best governance structure for administering community benefit funds, were also elicited. The key learning outcomes on the topic of benefit sharing can be summarised as follows:

	Key learning outcomes
National Survey	• Various benefit sharing mechanisms can positively impact the acceptance of local wind farms, including near neighbour payments, community benefit funds, contracts for local businesses during construction, the development of amenities in the local area and long-term jobs for local people. • Private household benefits tend to be more important for people to accept living in close proximity (1 km) to a wind turbine, compared to public or in-kind community benefits. • Citizens prefer a model of benefit sharing in which proportionally more funding is allocated to near neighbour payments than to community projects.
Community Survey	• Many residents of communities where there is an operational or pre-planned/planned wind farm are not aware if their community has or will receive many types of benefits. • Awareness about benefits is higher when wind farms are in construction. • Non-monetary community benefits, such as the development of local amenities, or upgrades to local infrastructure, have a more positive impact on acceptance for people living up to 10 km from a project, relative to monetary benefits, such as direct payments or electricity discounts for near neighbours, or a community benefit fund. • Most residents who live in communities where there is an operational wind farm believe that both the current contribution of wind farm developers to community benefit funding and the minimum payment of €1,000 for near neighbour payments are fair. However, many residents living in communities where there is a planned/pre-planned wind farm believe that both the contribution of developers to community benefit funding and the €1,000 minimum payment for near neighbours are too low.
Community Interviews	• There were mixed opinions on benefit sharing within the communities. • Some community members stated that there was little benefit accruing to their household unless their children were participating in school or clubs.
Developer Interviews	• Benefit sharing was already best practice but has been formalised with the RESS system. • Developers wish to stay involved with the community benefit fund and maintain peoples' awareness of the link between community benefit fund and the wind farm.

5.Community Ownership/Co-ownership

Highlights

- Community ownership/co-ownership arrangements tend to have a positive impact on local residents' acceptance of wind farms. However, such arrangements are not a panacea for improving acceptance of planned wind farms among people who are opposed to projects or among those who would live in close proximity.
- Citizens' preferences vis-à-vis community ownership/co-ownership arrangements depend on a project's stage of development, whether citizens are supportive/opposed to a project, and the distance they live from a project.
- Citizens have a strong appetite for investing in local wind farms that are in construction or operation. However, their willingness to invest falls substantially if the investment is risky or illiquid, and they are generally only willing to invest low sums of money.
- Non-local investment would be needed for large-scale community owned/co-owned projects to be financially viable, particularly in small communities.
- Developers are generally willing to facilitate co-ownership arrangements. However, they tend to have a preference for shared revenue arrangements over joint ventures and split ownership agreements.
- Capacity building programmes that would educate and advise communities on how to develop wind farms would be critical for encouraging citizen participation in community owned/co-owned projects.
- Building trust between communities and developers would help to promote citizen participation in co-ownership arrangements.

Much international research has suggested that community ownership or co-ownership of wind farms provides a means of achieving a greater acceptance of projects within host communities (Berka et al., 2017; Brennan et al., 2017; Ek and Persson, 2014; Haggett et al., 2013; Jobert et al., 2007; Musall and Kuik, 2011; Toke et al., 2008; Warren and McFadyen, 2010). This positive impact is often based on the view that community owned/co-owned projects can provide greater economic benefits to local communities (Slee, 2015), while they can also create a psychological sense of ownership in the minds of local citizens (Warren and McFadyen, 2010). However, existing studies have also highlighted considerable challenges for progressing community owned/co-owned projects, such as a lack of skills and expertise within communities, the inability of communities to raise sufficient finance to invest (Haggett et al., 2014), and a lack of trust between communities and developers (Goedkoop and Devine-Wright, 2016). While previous research in Ireland has suggested that community ownership/co-ownership may help to increase project acceptance (Brennan et al., 2017), there have been no studies examining the willingness of Irish citizens to participate in community owned/co-owned projects. Moreover, little is known about the willingness of developers to engage in co-ownership arrangements with Irish communities, or the types of co-ownership arrangements that would work best. This section draws on the results from the *National Survey*, *Community Survey*, *Community Interviews* and *Developer Interviews* to provide insights into these issues in an Irish context.

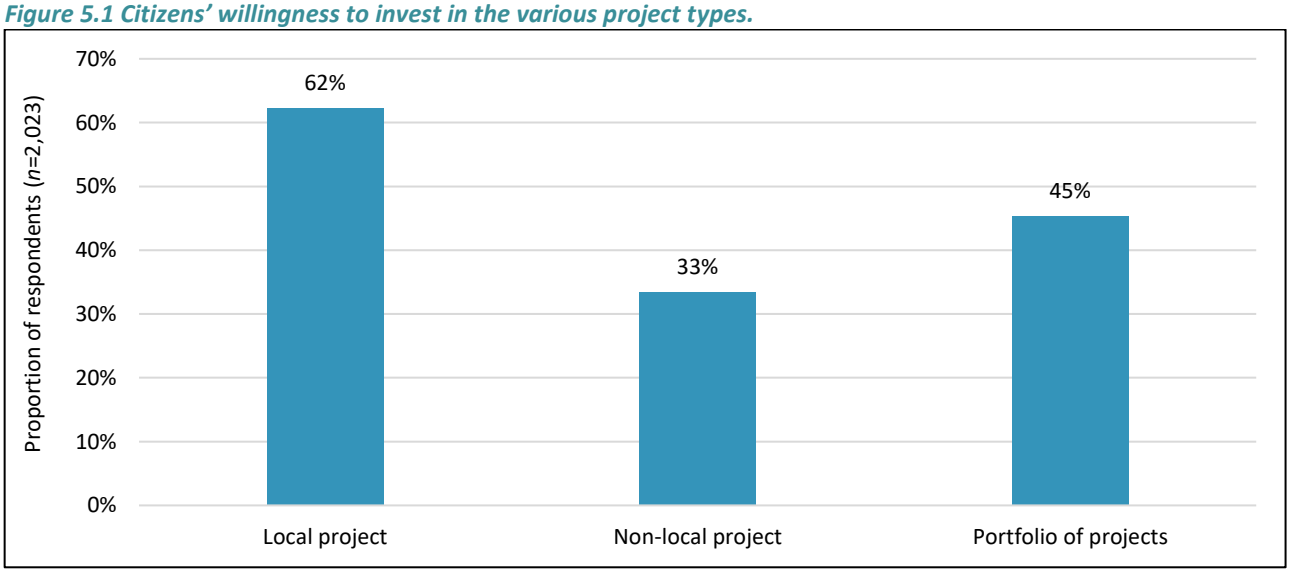
The findings of this section should be particularly useful for Irish policymakers who are seeking to formulate policies to encourage community participation in wind farms. Currently, the Irish Government provides support for fully community-owned (100%) wind farms between 0.5 and 5 MW in size under the RESS scheme (Irish Government, 2021). The SEAI's RESS Community Enabling Framework also provides assistance to community groups that are seeking to engage in these projects, including advice, mentoring and financial support. Under this Framework, the SEAI has also developed a Community Energy Resource Toolkit to provide communities with practical guidance on technology options, business planning and how to set up and manage a small-scale community wind farm (SEAI, 2023). While there is currently no wind farm co-ownership scheme in Ireland, the Irish Government did propose a citizen investment scheme in 2019, which would have allowed citizens acquire shares in developer-led projects, but this scheme was set aside due to concerns about the financial risks for citizens and the administrative burden that would be placed on developers (Irish Government, 2020). Despite not introducing this scheme, the Government still holds the view "*that increased participation by citizens in renewable electricity projects will bring about significant support for climate action as citizens become personally invested in their delivery*" (Irish Government, 2021). It has also stated that it is "*continuing to investigate opportunities to deliver on these investment opportunities and to further develop the overall package of community participation and benefits in line with Ireland's climate ambitions to achieve*

net zero emissions by 2050 and deliver on the European Green Deal" (Irish Government, 2021). Our findings in this section will assist policymakers in their efforts to develop and deliver on these opportunities.

5.1 Insights from National Survey

Citizens' willingness to invest in a variety of types of hypothetical wind energy projects was examined in the *National Survey*. Specifically, the survey respondents were asked: "*If you were provided with the opportunity to invest in the following projects over a 5-year time horizon at an approximate return between 2% and 6% per annum, which of the following projects would you consider investing in?*" Three response options were presented: (1) A local wind energy project, (2) A non-local wind energy project, and (3) A portfolio of wind energy projects. Respondents who indicated that they would consider investing in any of these options were also asked to indicate the amount of money that they would invest. As can be seen in Figure 5.1, the survey results revealed a strong appetite for investing in local projects and a relatively lower appetite for investing in non-local or portfolios of projects.[8] However, as shown in Figure 5.2, the respondents generally preferred to invest low sums of money in each of the project types, such as €500 or less, or €501–€1,000.[9] These findings are consistent with those of Salm et al. (2016) who found that German citizens preferred to invest in community renewable energy projects in their own neighbourhood as opposed to projects in their state or elsewhere in Germany. The findings also concur with those of Curtin et al. (2019) who found that Irish citizens who were willing to invest in distributed renewable technologies preferred to invest low sums of money.

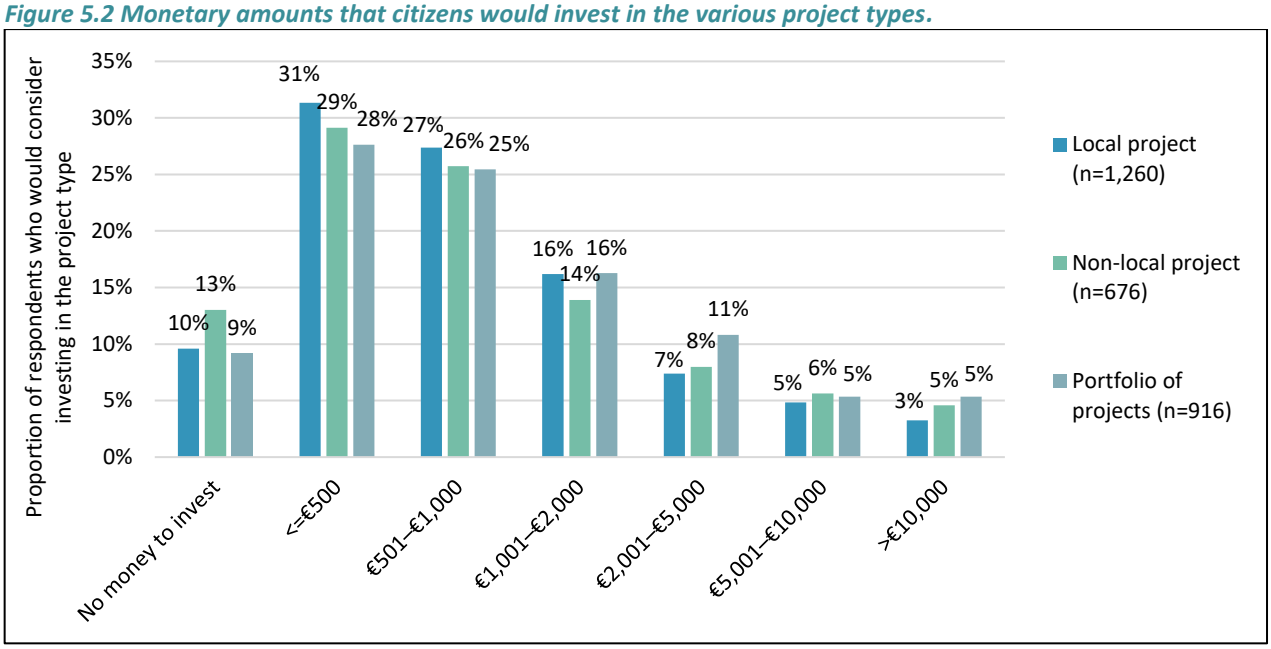
Figure 5.1 Citizens' willingness to invest in the various project types.



[8] Cochran's Q test indicated that there was a statistically significant difference in the proportion of respondents who would consider investing in each of the project types. Post-hoc McNemar tests with Bonferroni-corrected p-values were subsequently conducted to identify pairwise differences. Respondents were significantly more likely to invest in local projects relative to both non-local projects, and portfolios of projects. Respondents were also significantly more likely to invest in portfolios of projects relative to non-local projects. The results of these tests are available from the authors on request.

[9] Further analysis of this data can be found in a paper published in the *Energy Policy* journal titled "An analysis of the factors affecting Irish citizens' willingness to invest in wind energy projects". This paper can be accessed at the following weblink: https://doi.org/10.1016/j.enpol.2022.113364.

Figure 5.2 Monetary amounts that citizens would invest in the various project types.



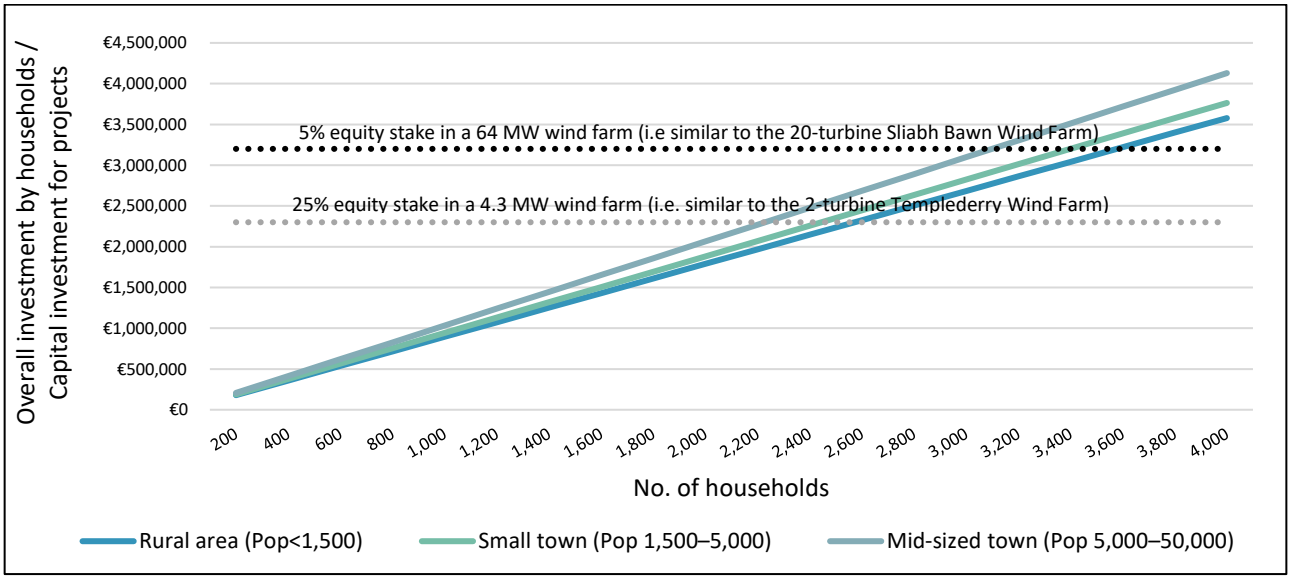
Our findings of a strong appetite for citizen investment in local wind farms suggest that such opportunities could potentially be utilised as part of a package of measures to share the benefits from local developments. However, citizens' general preference for investing low sums of money suggests that many communities may not have the financial capacity to invest. Indeed, communities that do have the capacity to invest may only be able to raise enough equity finance to establish a small wholly community-owned project or buy a minority stake in a large-scale co-owned project. This is illustrated in Figure 5.3 which shows projections of the overall amount of money that communities could potentially raise depending on the size of the community, in terms of the number of households, and whether the community comprised of people from rural areas, small towns or mid-sized towns.[10] As this figure shows, rural communities would need around 2,500 households to be able to raise enough equity finance to establish a small two-turbine wholly community-owned wind farm similar to the Templederry Wind Farm, or around 3,500 households to buy a 5% stake in a large-scale co-owned development similar in size to the 20-turbine Sliabh Bawn Wind Farm.[11] Communities from small towns and mid-sized towns would have a greater capacity to raise equity finance than rural communities, but they would still need around 2,200 to 2,400 households to be able to raise enough equity finance to establish a project similar to the Templederry Wind Farm, or around 3,000 to 3,400 households to buy a 5% stake in a project similar to the 20-turbine Sliabh Bawn development.

Citizens' preference for investing low amounts of money has a number of implications for policymaking on community ownership/co-ownership of wind farms. Firstly, it highlights the importance of financial assistance for enabling communities to participate in projects. The provision of financial supports through the SEAI's RESS Community Enabling Framework should therefore be considered a critical policy tool for enabling citizen participation. Secondly, citizens' preference for investing low sums of money suggest that share price affordability would likely be a critical factor in the success of any co-ownership policies. If such policies were to be introduced, policymakers may need to encourage developers to adopt measures to reduce

[10] In Figure 5.3, the € amount for the overall investment by households in a particular area (i.e. rural area, small town or mid-sized town) is calculated by multiplying the proportions of households from the area that would invest various categorical amounts (i.e. <=€500, €501–€1,000, €1,001–€2,000, €2,001–€5,000, €5,001–€10,000 or >€10,000) by the point estimates for these categories (i.e. €250, €750, €1,500, €3,500, €7,500 and €12,500) and then multiplying by a number of households (e.g. 200, 220, 240 etc.). The capital investment requirements for the two wind farm projects (i.e., the 5% equity stake in a 64 MW wind farm and the 25% equity stake in a 4.3 MW wind farm) are based on an upper estimate of capital investment costs of €2 million per MW (Curtin et al., 2019).

[11] The example of the wholly community-owned wind farm is based on the community sourcing 75% of the overall capital investment costs through debt finance (i.e., the project has a debt-equity gearing ratio of 75%). A debt-equity gearing ratio between 70% and 80% is common for wind farm projects (Curtin et al., 2019; IEA-RETD, 2016).

Figure 5.3 Projected investment in a local wind farm by communities in rural areas, small towns, and mid-sized towns.



the upfront cost of purchasing shares. For example, developers could offer loans to citizens to enable them to acquire shares, which could be paid back from the revenues generated from a wind farm, as has previously been done in Scotland (Haggett et al., 2014).[12] Developers could also give citizens the option to capitalise their community benefit fund payments towards an investment, as has been suggested by the Scottish Government (Scottish Government, [13] Thirdly, citizens' preference for investing low amounts of money means that community ownership/co-ownership may only be financially viable for communities with a large number of households, as already outlined in Figure 5.3. For community ownership/co-ownership to be financially viable in smaller communities, investment would likely be needed from citizens outside of the local area in order to raise sufficient equity capital. On this point, it is also worth noting that our survey results suggest that non-local investors would likely provide higher levels of equity finance if they had the opportunity to invest in portfolios of wind farms as opposed to individual projects.

In order to better understand citizen decision making on wind farm investments, econometric models were used to examine the factors influencing their decisions to invest in the various project types (i.e., local, non-local and portfolios of projects).[14,15] Across these models, a number of common factors were observed to have a statistically significant effect on citizens' decisions to invest. Table 5.1 provides a summary of these factors. As can be seen, males were more willing to invest in each of the project types, compared to females. Johansen and Emborg (2018) also found that males were more inclined to invest in the Danish wind farm co-

[12] According to Haggett et al. (2014), developers in Scotland were legally permitted to lend citizens money in order to acquire shares in projects. However, Haggett et al. (2014, p.19) also noted that offering citizens loans for this purpose was "administratively and legally complex" which meant it was not widely replicated across Scotland. In this project, we did not examine how such loans would be implemented in Ireland in practice.

[13] Scottish Government (2019) did not go into detail on how a community would capitalise their community benefit fund payments towards an investment or on the types of investment vehicles that could be used. A thorough examination of these questions also fell outside the scope of this project. It is worth noting however that in the case of a community capitalising their community benefit fund payments towards an investment, there would likely be a trade-off with the community having to forgo community benefit fund payments in order to receive an ownership stake.

[14] The results from these models were published in the *Energy Policy* journal in the paper titled "An analysis of the factors affecting Irish citizens' willingness to invest in wind energy projects". The paper can be accessed at the following weblink: https://doi.org/10.1016/j.enpol.2022.113364.

[15] Specifically, a series of logit models were estimated to examine the factors affecting citizens' decisions to invest in local, non-local and portfolios of projects. In these models, the dependent variable was equal to one if a respondent indicated that they would consider investing in the particular project type and if they also reported that they had money to invest. The explanatory variables included in the models comprised of a wide range of socio-demographic, locational, community and attitudinal variables.

ownership scheme. Landowners were also more likely to invest in each of the project types, relative to non-landowners. This could be due to a wealth effect, or the financial benefits that landowners receive from local wind farms (Jacquet, 2012). People with financial investment experience were more willing to invest in each of the project types, compared to people without such experience. Curtin et al. (2019) also found that financial investment experience was an important factor affecting Irish citizens' willingness to invest in distributed renewable technologies. People in higher income households were more willing to invest in each of the project types, compared to people in lower income households. Johansen and Emborg (2018) also found that income was a key driver of citizen investment in planned local wind farms in Denmark. City residents were more willing than rural dwellers to invest in each of the project types, a finding possibly attributable to their higher incomes and their greater concern about climate change, relative to rural dwellers. People living within 10 km of a large wind turbine/farm were also more likely to invest in each of the project types, compared to people living more than 50 km away. Previous studies have shown that living in close proximity to wind farms can increase peoples' acceptance of projects (Braunholtz, 2003; Hoen et al., 2019, Warren et al., 2005). People living in communities with a strong spirit were also more willing to invest in each of the project types, compared to people living in other communities. Prior studies have shown that community spirit increases citizens' willingness to participate in local energy projects (Sperling, 2017; Wirth, 2014). Concern about climate change was also found to increase citizens' willingness to invest in each of the project types, which is in line with evidence that people who are concerned about climate change tend to be more supportive of wind energy projects (Devine-Wright and Batel, 2017; Swofford and Slattery, 2010). Attitudes towards wind energy also impacted citizens' investment decisions, consistent with Johansen and Emborg (2018). In this regard, people who agreed there was a role for both on-shore and off-shore wind energy were more willing to invest in each of the project types, compared to people who disagree.

Table 5.1 Statistically significant factors affecting citizens' decisions to invest common to each of the project types (local, non-local and portfolios of projects) (p-value <0.1).

Factor	Higher willingness to invest	Lower willingness to invest
Gender	Male	Female
Land holding	Landowner	Not a landowner
Financial investment experience	Experienced	Not experienced
Income	Living in a higher income household	Living in a lower income household
Rural/urban location	City	Rural
Distance from a large wind farm/turbine	Living within 10km of a large wind farm/turbine	Living more than 50km away from a large wind farm/turbine
Community spirit	Living in a community with a strong spirit	Living in a community without a strong spirit
Concern about climate change	More concerned about climate change	Less concerned about climate change
Wind energy attitude	Agree there is a role for both on-shore and off-shore wind energy	Disagree there is a role for both on-shore and off-shore wind energy

Other factors were also found to have a statistically significant effect on citizens' decisions to invest in local, non-local and portfolios of projects, respectively. These factors are summarised in Table 5.2. In the case of local projects, people aged 18–34 years were more likely to invest, compared to people aged 55 years or older, suggesting that investments in local wind farms are more attractive to younger people, consistent with Johansen and Emborg (2018). People who had been living in their community for over 10 years were also more likely to invest, compared to people who had been living in their community their entire life, supporting the view that weaker place attachment increases acceptance of local wind farms (Devine-Wright and Howes, 2010). People living in an area with an SEC also had a higher willingness to invest, compared to people living in an area without an SEC. This is consistent with studies that have shown that SECs foster increased participation in renewable energy projects (European Commission, 2018; Romero-Rubio and Andrés Díaz, 2015). In addition, people who disagree that wind farms do more environmental harm than good, can

negatively impact tourism, or bring discord into communities, are all more willing to invest, compared to people who agree. Johansen and Emborg (2018) also found that Danish citizens' wind energy attitudes impacted their decisions to buy shares in local wind farms.

In relation to non-local projects, it was found again that people aged 18–34 years were more likely to invest, relative to people aged 55 years or older, suggesting that investments in non-local projects are also more attractive to younger people. People who live in Dublin were also more willing to invest, compared to people living in the Midlands, South-East and West, which is not surprising given the low levels of wind farm development in the Dublin region and the high levels in the Midlands, South-East and West regions. Furthermore, the environmental impacts of wind farms also weigh into citizens' decisions to invest in non-local projects, with people who disagree that wind farms do more environmental harm than good, more likely to invest, compared to people who agree.

Table 5.2 Statistically significant factors affecting citizens' decisions to invest in local, non-local and portfolios of projects (p-value <0.1).

Project type	Factor	More willing to invest	Less willing to invest
Local projects	Age	18–34 years old	55 years or older
	Years living in community	Living in community for over 10 years	Living in community entire life
	Presence of an SEC	SEC in area	No SEC in area
	Wind energy attitude	Disagree that wind farms do more environmental harm than good	Agree that wind farms do more environmental harm than good
		Disagree that wind farms can negatively impact tourism	Agree that wind farms can negatively impact tourism
		Disagree that wind farms bring discord into communities	Agree that wind farms bring discord into communities
Non-local projects	Age	18–34 years old	55 years or older
	Regional location	Living in Dublin	Living in the Midlands, South-East or West
	Wind energy attitude	Disagree that wind farms do more environmental harm than good	Agree that wind farms do more environmental harm than good
Portfolio of projects	Educational attainment	Third level or higher	Primary or secondary
	Familiar with wind energy investments	Currently investing in wind energy	Not currently investing in wind energy
	Regional location	Living in Dublin	Living in the West
	Presence of an SEC	SEC in area	No SEC in area
	Wind energy attitude	Agree that wind energy is key to achieving Ireland's carbon reduction commitments	Disagree that wind energy is key to achieving Ireland's carbon reduction commitments
		Agree there is a role for both on-shore and off-shore wind energy	Disagree there is a role for both on-shore and off-shore wind energy
		Disagree that wind farms can negatively impact tourism	Agree that wind farms can negatively impact tourism
		Disagree that wind farms bring discord into communities	Agree that wind farms bring discord into communities

In the case of portfolios, people with higher levels of educational attainment were more likely to invest. Portfolios are likely to be an unfamiliar investment type for many citizens and may be more appealing to those who are better educated. People who were currently investing in wind energy also had a higher willingness to invest, compared to people who are not currently investing, consistent with evidence that more experienced investors feel more competent engaging in less familiar types of investments (Abreu et al., 2011; Lütje and Menkhoff, 2007). People living in Dublin were also more likely to invest in portfolios, compared to people living

in the West, which again is likely due to reasons cited previously. People living in an area with an SEC also have a higher willingness to invest, compared to people living in an area without an SEC. This indicates that the positive effect of SECs on citizens' investment appetite is not solely limited to local wind farms but also spills over to portfolio investments. Citizens' attitudes towards wind energy were also found to impact their decisions to invest in portfolios. Specifically, people who agreed that wind energy was key to achieving Ireland's carbon reduction commitments and that there was a role for both on-shore and off-shore wind energy were both more likely to invest, compared to people who disagreed. People who disagreed that wind farms can negatively impact tourism, or that they bring discord into communities, were also more willing to invest, compared to those who agreed.

The factors affecting the monetary amount that citizens are willing to invest in local, non-local and portfolios of projects were also examined using econometric models.[16,17] Across these models, there were a number of common factors that had a statistically significantly effect on the monetary amount that citizens were willing to invest in each of the project types. Table 5.3 provides a summary of these factors. As this table shows, males were more likely to invest a high amount in each of the project types, relative to females. This is consistent with a gender effect observed in the wider economics literature whereby males tend to be more willing to invest higher amounts due to their lower aversion to risk (Charness and Gneezy, 2012). Landowners were also more willing to invest high amounts, relative to non-landowners. People who own land tend to be wealthier than those who don't, which may explain this result. In addition, people in high income households were also more willing to invest high amounts, compared to people in low-income households. Gamel et al. (2016) also found that German citizens who had greater financial resources were more likely to invest larger amounts in wind energy investments.

Table 5.3 Statistically significant factors affecting the monetary amount that citizens are willing to invest in all project types (local, non-local and portfolios of projects) (p-value <0.1).

Factor	More likely to invest a high € amount (Over €1,000)	More likely to invest a low € amount (€500 or lower)
Gender	Male	Female
Income	High household income	Low household income
Landowner	Landowner	Not a landowner

Other factors were also found to have a statistically significant effect on the monetary amount that citizens would invest in local, non-local and portfolios of projects, respectively. Table 5.4 provides a summary of these factors. In the case of local projects, people aged 55 years or older were more likely to invest a high amount, relative to people aged 18–34 years. This result is likely due to a wealth effect whereby older people have a greater capacity for investing. Unsurprisingly, people with financial investment experience were also more likely to invest a high amount, compared to people without such experience. People who own their own accommodation were also more likely to invest a high amount, compared to renters; a finding likely due to renters having relatively less disposable income.

In relation to non-local projects, people with financial investment experience were again more likely to invest a high amount, compared to people without such experience. City residents were more willing to invest a high amount, compared to rural dwellers. People living within 10 km of a large wind turbine/farm were more likely to invest a high amount, compared to people living over 50 km away, suggesting that familiarity with wind turbines/farms increases the amount that citizens would invest. People who had been

[16] The results from these models also formed part of the analysis in the paper titled "An analysis of the factors affecting Irish citizens' willingness to invest in wind energy projects" which was published in the *Energy Policy* journal and which can be accessed at the following weblink: https://doi.org/10.1016/j.enpol.2022.113364.

[17] Specifically, a series of ordered logit models were estimated to examine the factors affecting the monetary amount that citizens were willing to invest in local, non-local and portfolios of projects. The dependent variables in these models had three categories: (1) Low € amount (€500 or lower); (2) Medium € amount (€501–€1,000); and (3) High € amount (Over €1,000). Respondents who indicated that they would consider investing in the particular project type but who also indicated that they had no money to invest were excluded from the analysis. The explanatory variables included in the models comprised of a wide range of socio-demographic, locational, community and attitudinal factors.

living in their community for over 10 years were also more likely to invest a high amount, compared to people who had been living in their community all their life. This suggests that weaker place attachment may increase citizens' willingness to invest higher amounts. Notably however, this effect is not observed for people who have more recently moved into their community, possibly due to relocation costs. Attitudes towards wind energy also impacted the amount that citizens were willing to invest. In this regard, people who agreed that wind energy is a clean renewable energy source were more likely to invest a high amount, compared to those who disagree. Similarly, people who disagreed that wind farms do more environmental harm than good were also more likely to invest a high amount, relative to those who agreed.

Turning to portfolios, people aged 55 years or older were more likely to invest a high amount, compared to people aged 18–34 years. Dublin residents were also more likely to invest a high amount, compared to people living in the Border or South-East and city dwellers were more likely than rural dwellers to invest a high amount. Familiarity with wind farms also affected the amount that people would invest, with people living within 10 km of a large wind turbine/farm, or 11–50 km away, more likely to invest a high amount, compared to people living over 50 km away. People who disagreed that wind farms do more environmental harm than good were also more willing to invest a high amount, compared to those who agreed.

Table 5.4 Statistically significant factors affecting the monetary amount that citizens are willing to invest in local, non-local and portfolios of projects (p-value <0.1).

Project type	Factor	More likely to invest a high € amount (Over €1,000)	More likely to invest a low € amount (€500 or lower)
Local projects	Age	55 years or older	18–34 years old
	Financial investment experience	Experienced	Not experienced
	Own or rent accommodation	Own accommodation	Rent accommodation
Non-local projects	Financial investment experience	Experienced	Not experienced
	Rural/urban location	City	Rural
	Distance from a large wind farm/turbine	Living within 10km of a large wind farm/turbine	Living more than 50km away from a large wind farm/turbine
	Years living in community	Living in community for over 10 years	Living in community entire life
	Wind energy attitude	Agree that wind energy is a clean renewable energy source Disagree that wind energy does more environmental harm than good	Disagree that wind energy is a clean renewable energy source Agree that wind energy does more environmental harm than good
Portfolio of projects	Age	55 years or older	18–34 years old
	Regional location	Living in Dublin	Living in the Border region or South-East
	Rural/urban location	City	Rural
	Distance from a large wind farm/turbine	Living within 10km of a large wind turbine/farm	Living more than 50km away from a large wind turbine/farm
	Wind energy attitude	Disagree that wind energy does more environmental harm than good	Agree that wind energy does more environmental harm than good

Considering the wide range of factors that influence both the decisions of citizens to invest in projects and the monetary size of their investments, it is instructive to highlight the factors that were found to be most important.[18] Table 5.5 reports the key factors that influenced citizens' decisions to invest in each of the project types. In relation to investing in local projects, the presence of an SEC in a person's area was a key factor, as

[18] The most important factors are identified based on the size of marginal effects associated with the explanatory variables in the econometric models.

was having a positive perception about the impact of wind farms on the environment. In contrast, wealth (i.e., being a landowner) and location (i.e., living in a region with scarce opportunities for investing in wind farms) were key factors increasing citizens' willingness to invest in non-local projects. In the case of investing in portfolios of projects, familiarity with wind farms (i.e., living within 10 km of a large wind turbine/farm) and wind energy investments (i.e., having a current investment in wind energy) were key factors. In addition, financial investment experience emerged as a common key factor that increased citizens' likelihood of investing in each of the project types. These findings have important implications for policymakers who may seek to encourage citizen investment in wind farms. For example, investment opportunities in local wind farms may have greater uptake if accompanied by an expansion of the SEC network and information provision on the positive environmental effects of wind farms. Providing citizens with financial guidance and advice on how to purchase shares could also help to facilitate investment among citizens who lack experience with financial investing.

Table 5.5 Key factors affecting citizens' decisions to invest in local, non-local and portfolios of projects.

Project type	Factor	High willingness to invest	Low willingness to invest
Local projects	Presence of an SEC	SEC in area	No SEC in area
	Wind energy attitude	Disagree that wind farms do more environmental harm than good	Agree that wind farms do more environmental harm than good
	Financial investment experience	Experienced	Not experienced
Non-local projects	Land holding	Landowner	Not a landowner
	Regional location	Living in Dublin	Living in the West
	Financial investment experience	Experienced	Not experienced
Portfolio of projects	Familiar with wind energy investments	Currently investing in wind energy	Not currently investing in wind energy
	Distance from a large wind farm/turbine	Living within 10km of a large wind turbine/farm	Living more than 50km away from a large wind turbine/farm
	Financial investment experience	Experienced	Not experienced

Table 5.6 summarises the key factors that impacted the monetary amount that citizens were willing to invest in the various project types. In the case of local projects, having financial investment experience or being aged 55 years or older were critical factors increasing citizens' willingness to invest a high amount. In relation to non-local projects, being male or a landowner were important factors associated with larger sized investments. For portfolios of projects, being a landowner or having a positive perception about the impact of wind farms on the environment were key factors increasing citizens' willingness to invest a high amount. Across all project types, having a high household income was also key factor that raised the citizens' levels of investments. For policymakers, these findings point to income and wealth (i.e., older in age, being a landowner or having financial investment experience) as critical factors in determining the size of citizen investments. Accordingly, any policies to enable citizen investment are likely to be best suited to improving acceptance among more affluent citizens who are more likely to invest greater amounts and thus receive a greater share of the benefits from wind farms. To ensure distributional justice, policymakers should consider utilising such policies as part of a package of measures that share benefits equally with less affluent citizens.

Table 5.6 Key factors affecting the monetary amount that citizens are willing to invest in local, non-local and portfolios of projects) (p-value <0.1).

Project type	Factor	High willingness to invest a high € amount (Over €1,000)	Low willingness to invest a high € amount (Over €1,000)
Local projects	Financial investment experience	Experienced	Not experienced
	Age	55 years or older	18–34 years old
	Income	Living in a higher income household	Living in a lower income household
Non-local projects	Gender	Male	Female
	Landowner	Landowner	Not a landowner
	Income	Living in a higher income household	Living in a lower income household
Portfolio of projects	Landowner	Landowner	Not a landowner
	Wind energy attitude	Disagree that wind energy does more environmental harm than good	Agree that wind energy does more environmental harm than good
	Income	Living in a higher income household	Living in a lower income household

5.2 Insights from Community Survey

The *Community Survey* examined the topic of community ownership/co-ownership among residents living in communities where there was a wind farm either in pre-planning/planning, construction, or operation. The survey offers unique insights into Irish citizens' views on community ownership/co-ownership, being the first Irish survey to comprehensively examine the topic. Specifically, the survey assessed a variety of issues related to community ownership/co-ownership including: (1) the impact of different types of community ownership/co-ownership arrangements on residents' acceptance of a local wind farm; (2) the willingness of residents to invest and volunteer in different types of community owned/co-owned developments: (3) the factors affecting residents' willingness to invest and volunteer in different types of community ownership/co-ownership arrangements; and (4) the willingness of residents to invest in a local wind farm across the different stages of project development.

As previously mentioned, a large body of literature has pointed to community ownership/co-ownership of wind farms as a means to increase project acceptance, but there has been no research examining how specific types of community ownership/co-ownership arrangements would impact acceptance. The *Community Survey* addressed this question by asking the respondents if they would be more or less supportive of their local wind farm under different types of arrangements including wholly-community ownership, joint ventures, split ownership agreements and shared revenue arrangements. The specific descriptions of these arrangements that were given to the respondents are shown in Table 5.7.[19]

[19] It is important to note that while 20% was used as the percentage of the revenues/turbines/project that the community would receive/own under the various arrangements, this percentage could be higher or lower in practice. It is also worth noting that the split ownership arrangement would require either separate grid connections for the developer and the community or an agreement between both parties to share the grid connection. While such arrangements have been successfully implemented in other countries (IEA-RETD, 2016), it was not determined throughout the course of this project if split ownership would or would not be possible in Ireland from a legal perspective.

Table 5.7 Descriptions of the community ownership/co-ownership arrangements used in the survey.

Type of arrangement	Description of arrangement
Shared revenue	• Community receives 20% of the revenues from the wind farm. • Community does not own/manage any of the wind farm.
Split ownership	• Community owns 20% of the total number of turbines e.g., one out of every 5 turbines. • Community is fully responsible for managing these turbines.
Joint venture	• Community owns a 20% share of the entire wind farm. • Community is partly responsible for managing the wind farm.
Wholly community-owned	• Community owns the entire wind farm. • Community is fully responsible for managing the wind farm.

As can be seen in Figures 5.4 to 5.6, all of the arrangements had a generally positive impact on the acceptance of projects across each of the stages of project development. However, the positive effect of the arrangements was generally stronger for wind farms that were in operation, compared to those in pre-planning/planning or construction.[20] Of the various types of arrangements, shared revenue agreements had the most positive effect on acceptance, particularly in the pre-planning/planning and operation stages.[21] In this regard, 48.1% of residents who lived near a pre-planned/planned wind farm indicated that they would be more supportive of the wind farm under the shared revenue agreement, while only 9.5% said they would be less supportive. In communities with an operational wind farm, 65.1% of residents said they would be more supportive of their local wind farm under the shared revenue arrangement, while only 5.4% said they would be less supportive. These results pointing to a more positive effect of shared revenue agreements on project acceptance suggest that Irish citizens may generally prefer shallower forms of co-ownership involving less responsibility, a lower workload, and a lower requirement for expertise within the community.

[20] For each of the arrangements, Kruskall-Wallis tests were conducted to test for differences in the mean rank in acceptance across the stages of project development. Statistically significance differences were observed in the case of shared revenue agreements, split ownership arrangements, and joint ventures, but not in the case of wholly community-ownership. Post-hoc Dunn tests with Bonferroni-corrected p-values were subsequently conducted to identify pairwise differences. Shared revenue agreements had a significantly more positive impact on the acceptance of operational wind farms relative to wind farms in pre-planning/planning and construction. Split ownership arrangements had a significantly more positive effect on the acceptance of both operational wind farms and wind farms in construction, relative to wind farms in planning/pre-planning. Joint ventures had had a significantly more positive effect on the acceptance of operational wind farms relative to those in planning/pre-planning. The results of these tests are available from the authors on request.

[21] For each stage of project development, a Friedman test was conducted to test for differences in the change in acceptance under each of the arrangements. Statistically significant differences were observed in the pre-planning/planning stage, construction stage, and operation stage. Wilcoxon signed-rank tests were subsequently used to test whether shared revenue arrangements had a significantly more positive impact on acceptance in each of the stages of project development, relative to the other types of arrangements. In the pre-planning/planning stage, shared revenue arrangements had a significantly more positive impact on acceptance compared to wholly community ownership and split ownership agreements, but no statistically significant difference was observed with respect to joint ventures. In the construction stage, no statistically significant differences were observed, that is, shared revenue arrangements did not have a significantly more positive impact on acceptance relative to wholly community ownership, joint ventures, or split ownership agreements. In the operation stage, shared revenue arrangements had a significantly more positive impact on acceptance than wholly community ownership, joint ventures and split ownership agreements. The results of these tests are available from the authors on request.

Figure 5.4 Change in acceptance under different community ownership/co-ownership models: pre-planning/planning stage.

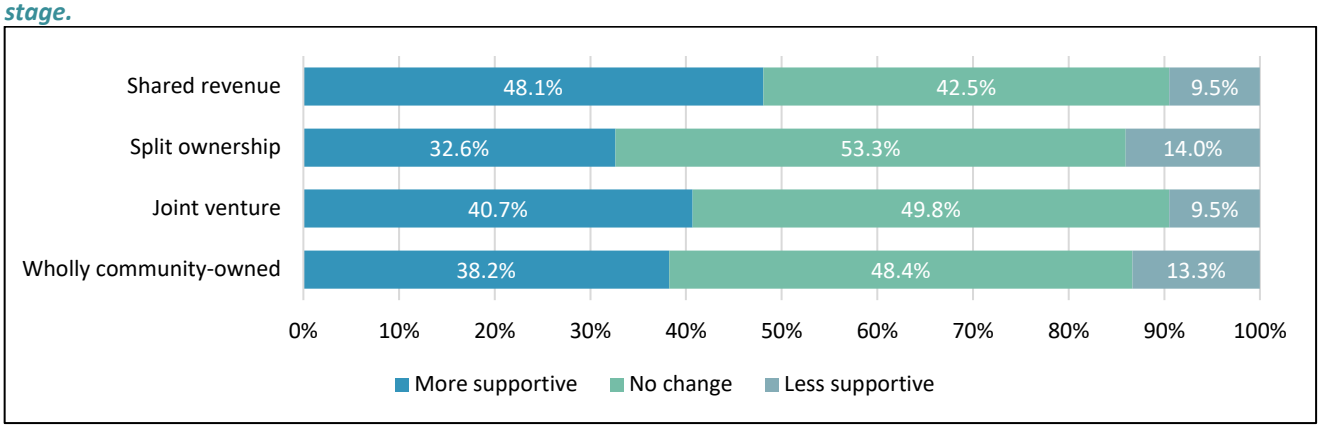


Figure 5.5 Change in acceptance under different community ownership/co-ownership models: construction stage.

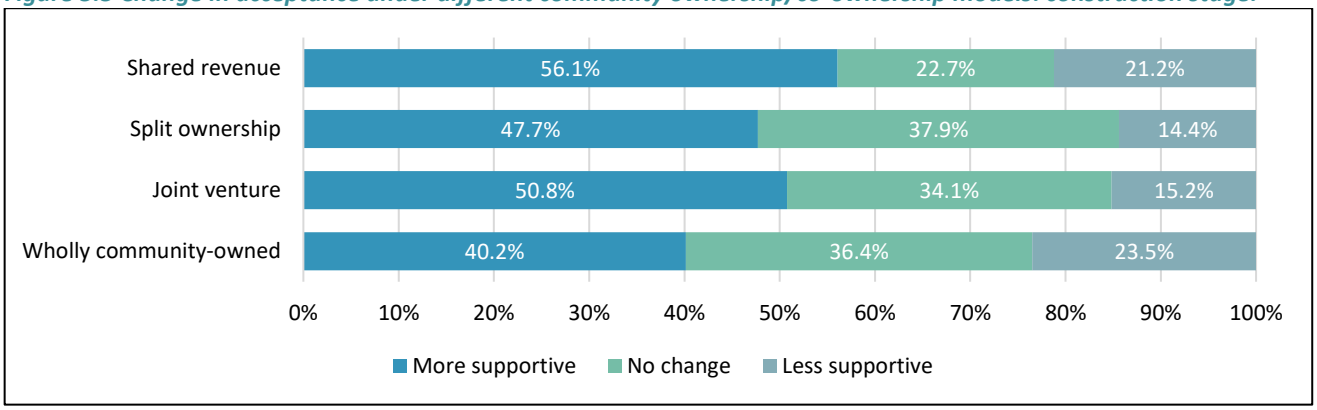
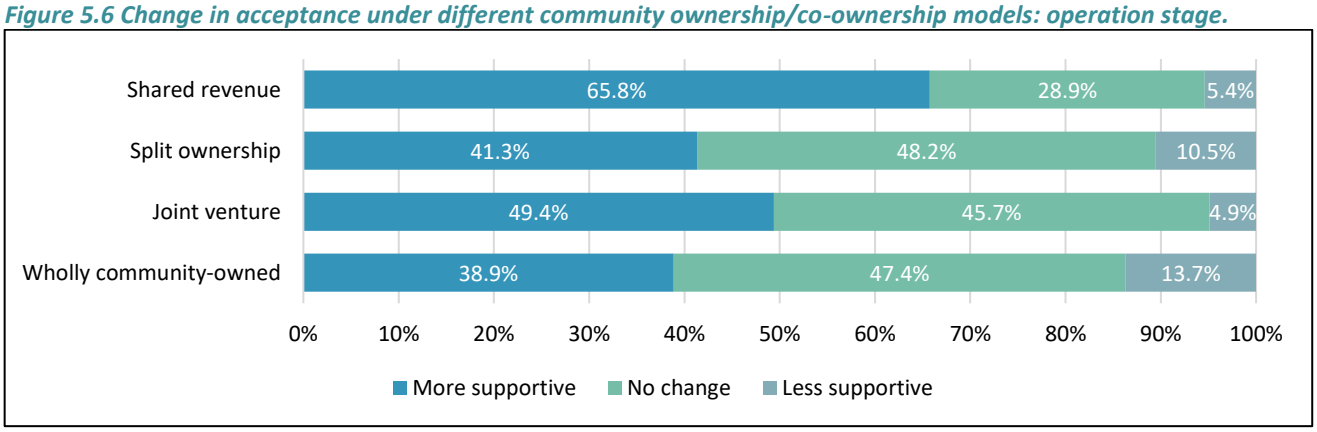


Figure 5.6 Change in acceptance under different community ownership/co-ownership models: operation stage.



The impacts of the ownership/co-ownership arrangements on project acceptance differed however between residents who were supporters and opponents of the wind farms.[22] As illustrated in Figure 5.7, which shows the mean scores for the change in local wind farm acceptance under the various types of arrangements, the arrangements generally had a more positive effect on acceptance among supporters than opponents across

[22] Supporters are defined as those respondents who indicated they were supportive or very supportive of the wind farm that was either in planning/pre-planning, construction or operation in their locality. In contrast, opponents are defined are those respondents who indicated they were opposed or very opposed to the wind farm.

the different stages of project development.[23,24] Of the various types of arrangements, shared revenue agreements had the most positive effect on supporters in both the pre-planning/planning (Mean score = 0.54) and operation (Mean score = 0.64) stages[25], while joint ventures had the most positive effect in the construction stage (Mean score = 0.39).[26] In contrast, among opponents, wholly-community ownership had an equally positive effect as shared revenue arrangements in the pre-planning/planning (Mean scores = 0.07) and operation (Mean scores = 0.19) stages[27], while it had the most positive effect of all the arrangements in the construction stage (Mean rank score = 0.21).[28] Based on these findings, it appears that residents who are supportive of local wind farms generally prefer shallower forms of co-ownership that involve less responsibility and a lower workload (i.e. shared revenue agreements), while those who are opposed tend to prefer deeper forms of ownership which would offer their community more control over the project and a greater say in project decision making (i.e. wholly community-ownership).

[23] The mean scores for the change in local wind farm acceptance under each of the arrangements are calculated by taking the average of the following scores for the respondents' answers to the question that asked them if they would be more or less supportive of the wind farm under each of the arrangements: 1=More supportive, 0=No change in support, and -1=Less supportive.

[24] For each of the arrangements, Mann Whitney U tests were conducted to test for differences in the mean rank acceptance between supporters and opponents in each of the stages of project development. In the pre-planning/planning stage, all of the arrangements (wholly community-ownership, joint ventures, split ownership arrangements and shared revenue agreements) had a significantly more positive impact on acceptance among supporters than opponents. In the construction stage, joint ventures and shared revenue agreements had a more positive impact on acceptance among supporters than opponents, but no statistically significant differences were observed in the case of wholly community-ownership and split ownership arrangements. In the operation stage, joint ventures, shared revenue agreements, and split ownership arrangements had a statistically more positive impact on acceptance among supporters than opponents, but no statistically significant differences were observed in the case of wholly community-ownership. The results of these tests are available from the authors on request.

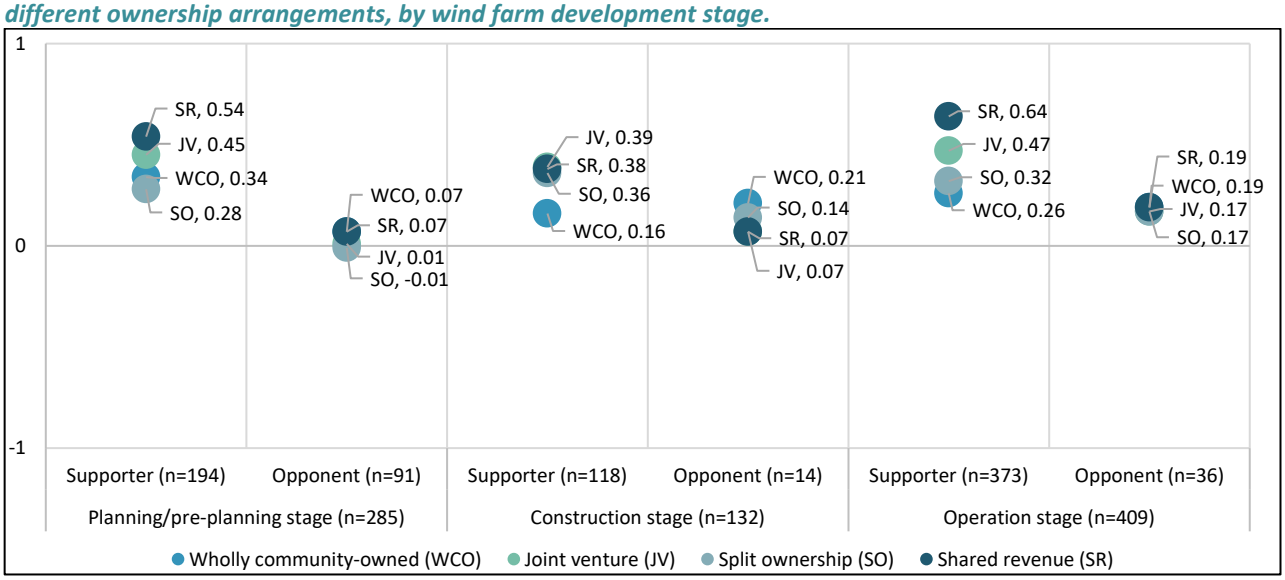
[25] Wilcoxon signed-rank tests with Bonferroni-corrected p-values were used to test whether shared revenue arrangements had a significantly more positive impact on acceptance among supporters in each of the stages of project development, relative to the other types of arrangements. In the pre-planning/planning stage, shared revenue arrangements had a significantly more positive impact on acceptance compared to wholly community ownership and split ownership agreements, but no statistically significant difference was observed with respect to joint ventures. In the construction stage, shared revenue arrangements had a significantly more positive impact on acceptance compared to wholly community ownership, but no statistically significant differences were observed in the case of joint ventures or split ownership agreements. In the operation stage, shared revenue arrangements had a significantly more positive impact on acceptance than wholly community ownership, joint ventures and split ownership agreements. The results of these tests are available from the authors on request.

[26] Wilcoxon signed-rank tests with Bonferroni-corrected p-values were used to test whether joint ventures had a significantly more positive impact on acceptance among supporters in the construction stage, relative to the other types of arrangements. Joint ventures had a significantly more positive impact on acceptance compared to wholly community ownership, but no statistically significant difference was observed with respect to split ownership agreements or shared revenue arrangements. The results of these tests are available from the authors on request.

[27] Wilcoxon signed-rank tests with Bonferroni-corrected p-values were used to test whether wholly community-ownership and shared revenue agreements had a significantly more positive impact on acceptance among opponents in each of the stages of project development, relative to the other types of arrangements. In each of the stages, no statistically significant differences were observed, that is, neither wholly community-ownership nor shared revenue agreements had a significantly more positive impact on opponents' acceptance relative to any of the other types of arrangements. The results of these tests are available from the authors on request.

[28] Wilcoxon signed-rank tests with Bonferroni-corrected p-values were used to test whether wholly community-ownership had a significantly more positive impact on acceptance among opponents in the construction stage, relative to the other types of arrangements. No statistically significant differences were observed, that is, wholly community-ownership did not have a significantly more positive impact in the construction stage, relative to any of the other types of arrangements. The results of these tests are available from the authors on request.

Figure 5.7 Mean scores for the change in local wind farm acceptance among supporters and opponents under different ownership arrangements, by wind farm development stage.



Note: 1=more supportive, 0=no change in support, -1=less supportive.

The impacts of the arrangements on acceptance also differed between residents who lived proximally close (<2km) and proximally distant (2-10km) from the wind farms. As illustrated Figure 5.8, which again shows the mean scores for the change in acceptance under the different types of arrangements, the arrangements generally had only a weak positive impact on the acceptance of planned/pre-planned wind farms among residents who would live in close proximity to these projects, while wholly-community ownership even had an overall negative impact (Mean rank score = -0.03). In contrast, the arrangements had a more positive impact on acceptance among residents who would live a further distance away from these planned developments.[29] These results show that while community ownership/co-ownership is generally beneficial in terms of increasing acceptance it is not a silver bullet for improving acceptance of planned projects among residents who would be living in close proximity. However, when wind farms that were in construction, the arrangements generally had a more positive effect on acceptance among proximally close residents[30], suggesting that the benefits of community ownership/co-ownership in terms of improving acceptance are greater among proximally close residents when it becomes more certain that a project will go ahead as planned. In contrast, in the operation stage, the arrangements again generally had a more positive impact on acceptance among proximally distant residents.[31] It is also worth noting that of the various types of arrangements it was split ownership that had the largest positive impact on proximally close residents in both

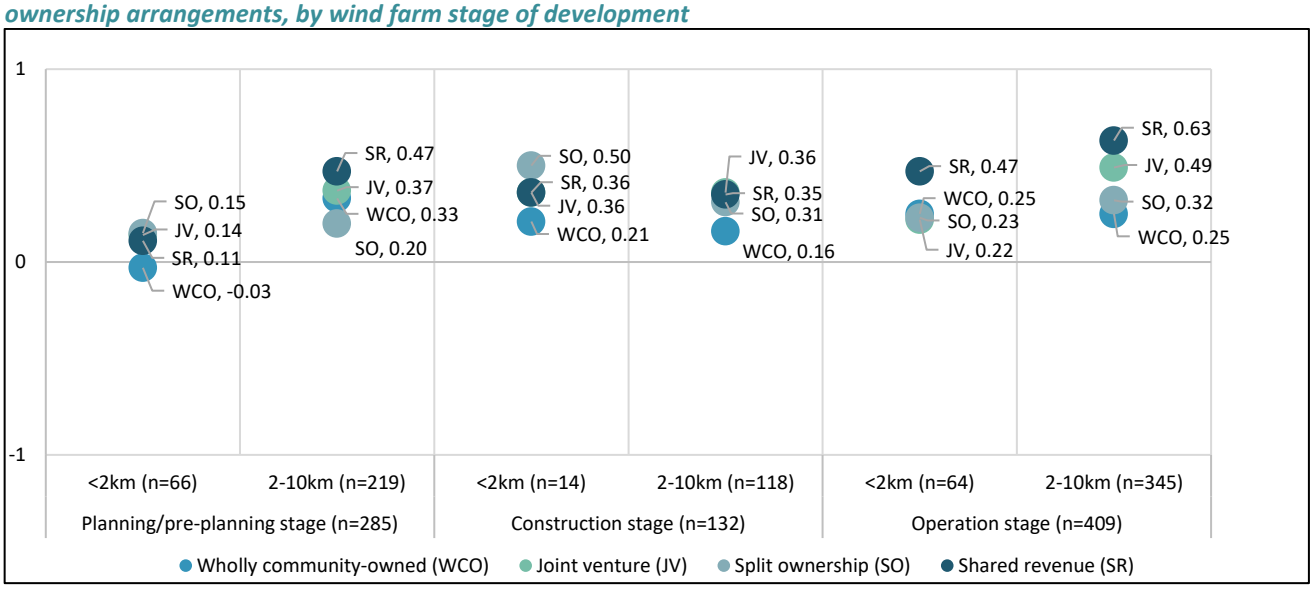
[29] For each of the arrangements, Mann Whitney U tests were conducted to test for differences in the mean rank acceptance between proximally close and proximally distant residents in the pre-planning/planning stage. Wholly community-ownership, joint ventures and shared revenue agreements had a significantly more positive impact on acceptance among proximally distant residents relative to proximally close residents. No statistically significant difference was observed in the case of split ownership arrangements. The results of these tests are available from the authors on request.

[30] For each of the arrangements, Mann Whitney U tests were conducted to test for differences in the change in acceptance between proximally close and proximally distant residents in the construction stage. No statistically significant differences were observed, that is, neither wholly community-ownership, joint ventures, split ownership arrangements or shared revenue agreements had a more positive impact on acceptance among proximally close or proximally distant residents. The results of these tests are available from the authors on request.

[31] For each of the arrangements, Mann Whitney U tests were conducted to test for differences in the change in acceptance between proximally close and proximally distant residents in the operation stage. Joint ventures had a significantly more positive impact on acceptance among proximally distant residents. No statistically significant differences were observed in the cases of wholly community-ownership, split ownership arrangements or shared revenue agreements. The results of these tests are available from the authors on request.

the pre-planning/planning (Mean rank score = 0.15) and construction (Mean rank score = 0.50) stages.[32] This suggests that those residents living closest to projects may be more accepting of them if they had ownership and control of particular turbines.

Figure 5.8 Mean scores for the change in local wind farm local acceptance among two distance, under different ownership arrangements, by wind farm stage of development



Note: 1 = more supportive, 0 = no change in support, -1 = less supportive.
Distance groups: proximally close (<2km) and proximally distant (2-10km).

Residents' willingness to volunteer to help manage community owned/co-owned projects was also examined in the survey. As shown in Figures 5.9 to 5.11, willingness to volunteer in each of the ownership/co-ownership arrangements was generally lowest during the pre-planning/planning stage and highest during the construction stage. Looking at those respondents who were very willing to volunteer, participating in a shared revenue arrangement was preferred in the pre-planning/planning and operation stages[33], while participating in a wholly community-owned project was preferred in the construction stage.[34] The preference for volunteering under a shared revenue agreement in the pre-planning/planning and operation stages is not surprising given that such arrangements would involve less responsibility and a lower workload for volunteers. A preference for participating in wholly community-owned projects when wind farms are in the construction

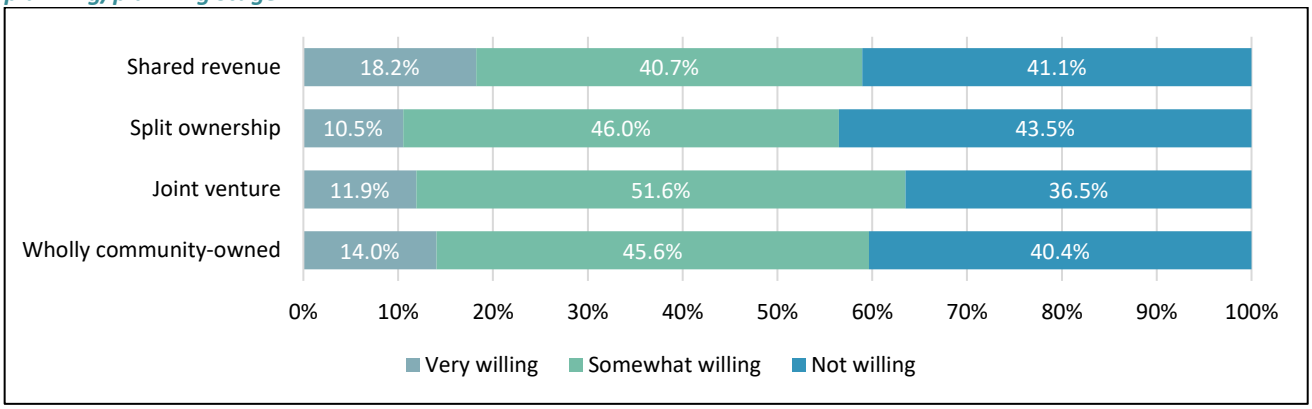
[32] Wilcoxon signed-rank tests with Bonferroni-corrected p-values were used to test whether split ownership agreements had a significantly more positive impact on acceptance among proximally close residents in the pre-planning/planning and construction stages, relative to the other types of arrangements. In both of these stages, no statistically significant differences were observed, that is, split ownership agreements did not have a significantly more positive impact on opponents' acceptance relative to any of the other types of arrangements. The results of these tests are available from the authors on request.

[33] Wilcoxon signed-rank tests with Bonferroni-corrected p-values were used to test whether respondents were significantly more willing to volunteer under shared revenue agreements in the pre-planning/planning and operation stages, relative to the other types of arrangements. In the pre-planning/planning stage, respondents were significantly more willing to volunteer under shared revenue arrangements relative to split ownership agreements, but no statistically significant difference was observed with respect to wholly community-ownership or joint ventures. In the operation stage, respondents were significantly more willing to volunteer under shared revenue agreements relative to wholly community-ownership, joint ventures and split ownership agreements. The results of these tests are available from the authors on request.

[34] Wilcoxon signed-rank tests with Bonferroni-corrected p-values were used to test whether respondents were significantly more willing to volunteer under wholly community-ownership in the construction stage, relative to the other types of arrangements. No statistically significant differences were observed, that is, respondents were not significantly more willing to volunteer under wholly community-ownership relative to any of the other types of arrangements. The results of these tests are available from the authors on request.

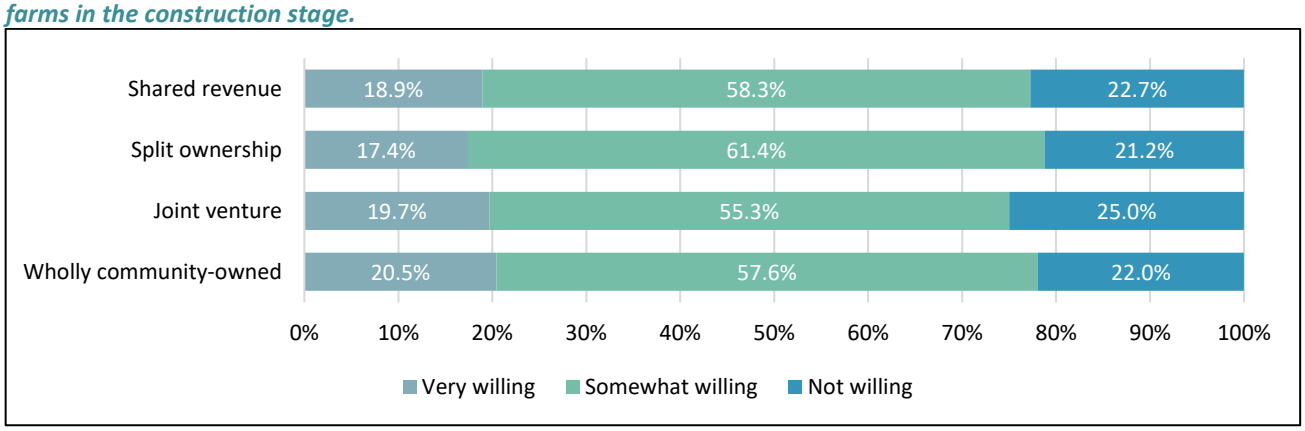
stage is also not surprising given that projects would be substantially de-risked at that point with feasibility studies completed and planning approval acquired. For community volunteers, the workload would be substantially reduced at this stage, compared to during the planning or pre-planning stages. In practice however, since most planned wind farms in Ireland are large-scale multi-million-euro developments, it is unlikely that any communities would have the capacity to raise enough finance to acquire an entire project that was in construction.

Figure 5.9 Willingness to volunteer under different community ownership/co-ownership for wind farms in the pre-planning/planning stage.



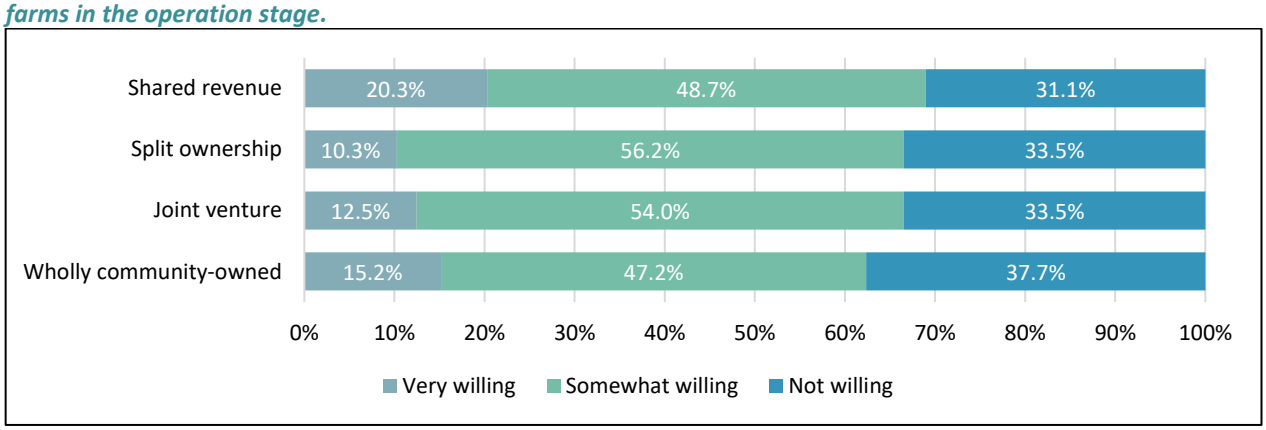
Note: n=285

Figure 5.10 Willingness to volunteer under different community ownership/co-ownership arrangements for wind farms in the construction stage.



Note: n=132

Figure 5.11 Willingness to volunteer under different community ownership/co-ownership arrangements for wind farms in the operation stage.



Note: n=409.

In order to better understand citizen decision making with regards to volunteering in community owned/co-owned wind farms, a series of econometric models were used to examine the factors influencing residents' willingness to volunteer under each of the community ownership/co-ownership arrangements. Table 5.8 summarises the results from these models. In relation to wholly community-ownership, joint ventures, and split ownership arrangements (i.e., arrangements in which communities would have a degree of input into project decision making), volunteering was dependent on citizens' knowledge about wind farm development, with local residents who were at least somewhat knowledgeable about developing wind farms more likely to volunteer. For wholly community-ownership and split ownership projects, willingness to volunteer was also higher in the construction stage when most of the development work is complete, compared to in the earlier pre-planning/planning stage. Taken together, these findings point to an awareness among citizens that embarking on a community owned/co-owned project is a challenging undertaking which may be more feasible for more knowledgeable people and if most of the development work is complete. For policymakers, these findings suggest that capacity building programmes that educate and advise communities on how to develop wind farms, such as the SEAI's Community Energy Resource Toolkit for onshore wind projects, are critical for enabling people to volunteer.

Other interesting results also emerged from the models. In relation to volunteering in any of the co-ownership arrangements (i.e., joint ventures, split ownership arrangements and share revenue agreements), having trust in the developer also an important factor. More specifically, for volunteering in joint ventures and shared revenue agreements (i.e. arrangements in which communities would have no control over the project's assets), willingness to volunteer was higher among residents who trusted the developer to take into account the community's interests, while in the case of split ownership agreements (i.e. arrangements in which the developer would own the majority of the wind farm and the community would own particular turbines), volunteering was more likely among those who trusted the developer to provide information on matters that affect the community. Accordingly, any policy measures that help to build trust between communities and developers could also play an important role in encouraging citizen participation in these co-ownership arrangements. In addition, for each of the co-ownership arrangements, willingness to volunteer was also higher among those who indicated that there was a strong spirit in their community. It would therefore appear that social connectedness and a close-knit community are also important for enabling citizens to work alongside other community members in co-owned projects. Being supportive of their local wind farm was another factor that influenced citizens' volunteering decisions. In this regard, residents who were supportive of their local project were more willing to participate in joint ventures and shared revenue agreements, while residents who indicated they would be more supportive if design changes were implemented were more likely to volunteer in wholly community-owned projects.

Other factors also influenced residents' volunteering decisions. In the case of joint ventures, residents who agreed that wind energy was key to achieving Ireland's carbon reduction commitments were more willing to volunteer, while for shared revenue agreements, living in an area with a SEC or having general business knowledge on starting or operating a business increased residents' willingness to participate. In addition, males were significantly more likely to volunteer in a wholly community-owned project, a split ownership arrangement or a shared revenue agreement. For all types of arrangements, younger adults were also more likely to volunteer.

Table 5.8 Statistically significant factors affecting residents' willingness to volunteer in different types of community ownership/co-ownership arrangements (p-value <0.1).

Arrangement	Factor	Higher willingness to volunteer	Lower willingness to volunteer
Wholly community-ownership	Knowledge about wind farm development	Somewhat/very knowledgeable	Not knowledgeable
	Project stage of development	Construction stage	pre-planning/planning stage
	Attitude towards the wind farm	Would be more supportive if design changes were implemented	Would not be more supportive if design changes were implemented
	Community spirit	Living in a community with a strong spirit	Living in a community without a strong spirit
	Age	18–34 years old	55 years or older
	Gender	Male	Female
Joint venture	Knowledge about wind farm development	Somewhat/very knowledgeable	Not knowledgeable
	Trust in developer	Trust the developer to take into account the community's interests	Do not trust the developer to take into account the community's interests
	Attitude towards the wind farm	Supportive of the wind farm	Opposed to the wind farm
	Wind energy attitude	Agree that wind energy is key to achieving Ireland's carbon reduction commitments	Disagree that wind energy is key to achieving Ireland's carbon reduction commitments
	Community spirit	Living in a community with a strong spirit	Living in a community without a strong spirit
	Age	18–34 years old	55 years or older
	Gender	Male	Female
Split ownership	Knowledge about wind farm development	Somewhat/very knowledgeable	Not knowledgeable
	Project stage of development	Construction stage	pre-planning/planning stage
	Trust in developer	Trust the developer to provide information on matters that affect the community	Do not trust the developer to provide information on matters that affect the community
	Community spirit	Living in a community with a strong spirit	Living in a community without a strong spirit
	Age	18–34 years old	55 years or older
	Gender	Male	Female
Shared revenue	Knowledge about starting/operating a business	Somewhat/very knowledgeable	Not knowledgeable
	Trust in developer	Trust the developer to take into account the community's interests	Do not trust the developer to take into account the community's interests
	Attitude towards the wind farm	Supportive of the wind farm	Opposed to the wind farm
	Presence of an SEC	SEC in area	No SEC in area
	Age	18–34 years old	55 years or older

The willingness of residents to invest in their local wind farm was also examined in the survey. In contrast to previous Irish studies that has only elicited citizens' general feelings about investing in wind farms (Brennan et al., 2017), the respondents to the *Community Survey* were specifically asked: (1) if they would be willing to

invest in the wind farm that was either in pre-planning/planning, construction or operation in their local area; (2) what minimum annual return they would need to make in order to invest; and (3) how much they would invest if they could make this return. The willingness of residents to invest across the different stages of project development was examined by firstly asking all respondents to imagine they had the opportunity to invest in the wind farm that was either in pre-planning/planning, construction or operation in their locality.[35] Those respondents who were willing to invest were also asked to indicate the minimum average annual return they would need to make in order to invest and the amount of money that they would be willing to invest if they could make this return. In addition, the respondents were asked if they would still be willing to invest in their local wind farm in the following circumstances: (1) the investment was tied up for 10 years (i.e. the initial investment and the returns could not be liquidated for 10 years); (2) the investment was not 100% guaranteed (i.e. there was a chance they could lose some of the money they invested); and (3) the investment returns were volatile (i.e. some years they would make lower than expected returns or no returns at all).

As can be seen in Figure 5.12, high proportions of residents were willing to invest in the construction (66.7%) and operation (60.1%) stages, while a relatively lower proportion were willing to invest in the pre-planning/planning (34.4%) stage.[36] While these results support those of the *National Survey* which also found a strong appetite for citizen investment in local wind farms, they also show that citizens are much less inclined to invest when projects are in the pre-planning/planning stage. This lower appetite for investing in the early project development stages is likely due to the high risks associated with such investments (e.g., uncertainty about projects going ahead) and citizens' general tendency to be less supportive of planned developments. Willingness to invest also fell substantially across all project development stages when the respondents were asked if they would invest if (1) the investment was tied up for 10 years, (2) the investment was not 100% guaranteed, and (3) the investment returns were volatile. In this regard, only low proportions were willing to invest if all of these circumstances applied in the pre-planning/planning stage (9.8%), construction stage (15.2%) and operation stage (13.7%).[37] These results are consistent with existing studies that have found that citizens tend to be risk averse (Hyland and Bertsch, 2018; Lienhoop, 2018) and prefer short holding periods (Curtin et al., 2019) when investing in renewables projects.

[35] Respondents who lived near a wind farm that was in the pre-planning/planning stage were asked: "Would you be willing to invest at this early stage of the development when there may still be uncertainty attached to the project?". Those who lived near a wind farm that was in the construction stage were asked "Would you be willing to invest at this stage of the development before the project is fully operational?". Respondents living near an operational wind farm were simply asked "Would you be willing to invest?".

[36] A Kruskal-Wallis test indicated that there was a statistically significant difference in the mean rank respondents' willingness to invest across the stages of project development. Post-hoc Dunn tests with Bonferroni-corrected p-values were subsequently conducted to identify pairwise differences. Respondents were significantly more likely to invest in the operation stage and in the construction stage, relative to the pre-planning/planning stage. No statistically significant difference was observed with respect to respondents' willingness to invest in the construction and operation stages. The results of these tests are available from the authors on request.

[37] McNemar tests were conducted to test for differences in respondents' willingness to invest with and without the three conditions in each of the stages of project development. Respondents were significantly less likely to invest with the three conditions in the pre-planning/planning stage, construction stage and operation stage. The results of these tests are available from the authors on request.

Figure 5.12 Willingness to invest across wind farm development stages.

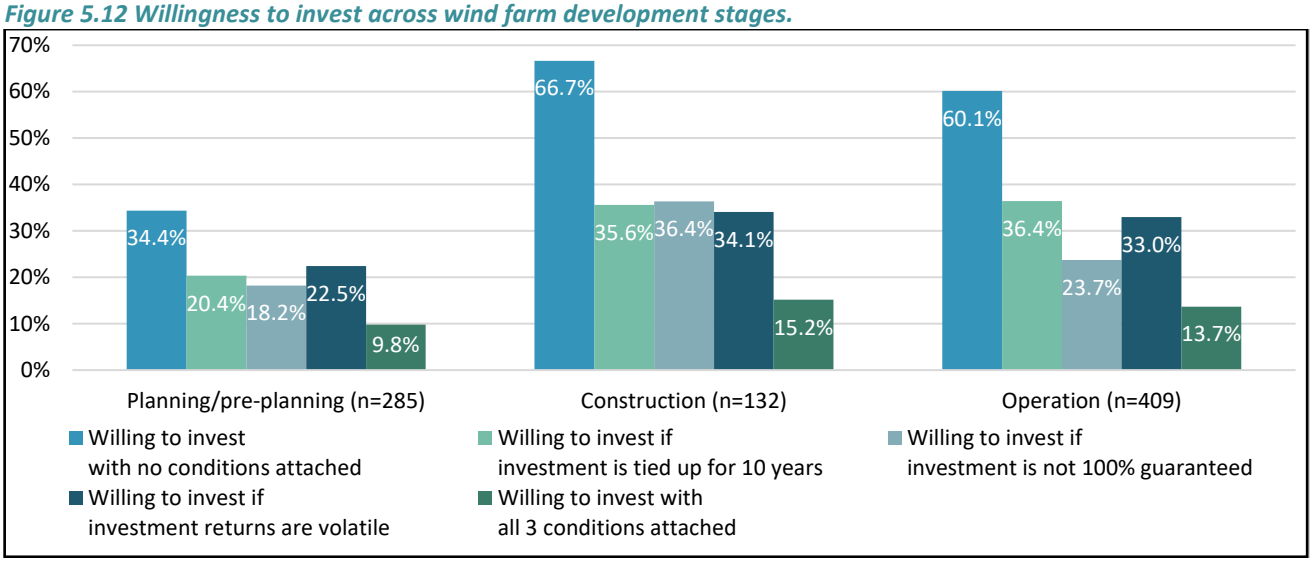


Figure 5.13 presents the results on the minimum average annual return required for citizens to invest across the different stages of project development. As this figure shows, proportionally more respondents who are willing to invest in the construction and operation stages would require a higher minimum average annual return in order to invest, compared to those who are willing to invest in the pre-planning/planning stage. Again, this result is likely due to the higher risk of investing in the earlier project development stages. Moreover, the figure shows that citizens would generally require relatively high minimum returns in order to invest. Based on our industry interviews, developers often make a project average rate of return of 7%-8% per annum. As illustrated in Figure 5.13, many respondents who indicated that they were willing to invest would require at least the same or a higher minimum annual return to engage in an investment. Figure 5.14 shows the relationship that exists between investment returns and the overall proportion of respondents who would invest across the different stages of project development. As can be seen, the proportion of respondents who are willing to invest is positively related to the minimum average annual return. In addition, higher returns appear to have a stronger effect on citizens' willingness to invest in operational wind farms and wind farms that are in construction, while they have a relatively weaker effect on citizens' propensity to invest in planned/pre-planned wind farms.

Figure 5.13 Minimum average annual investment return required for citizens to invest across wind farm development stages.

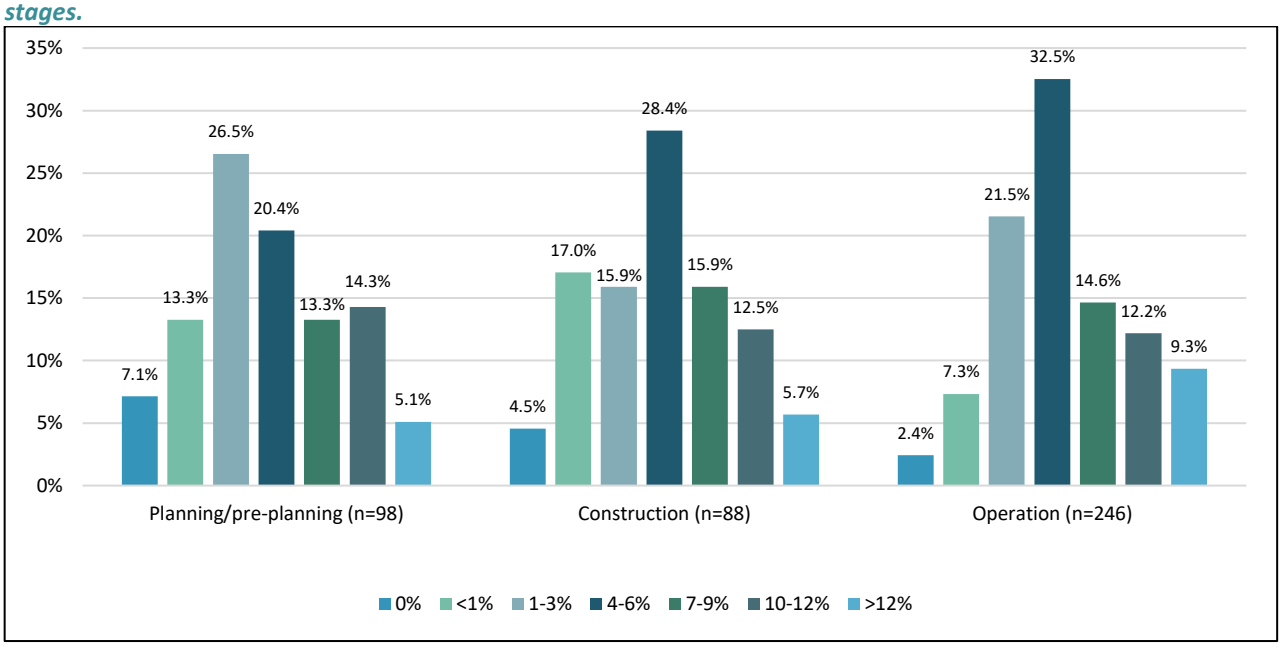
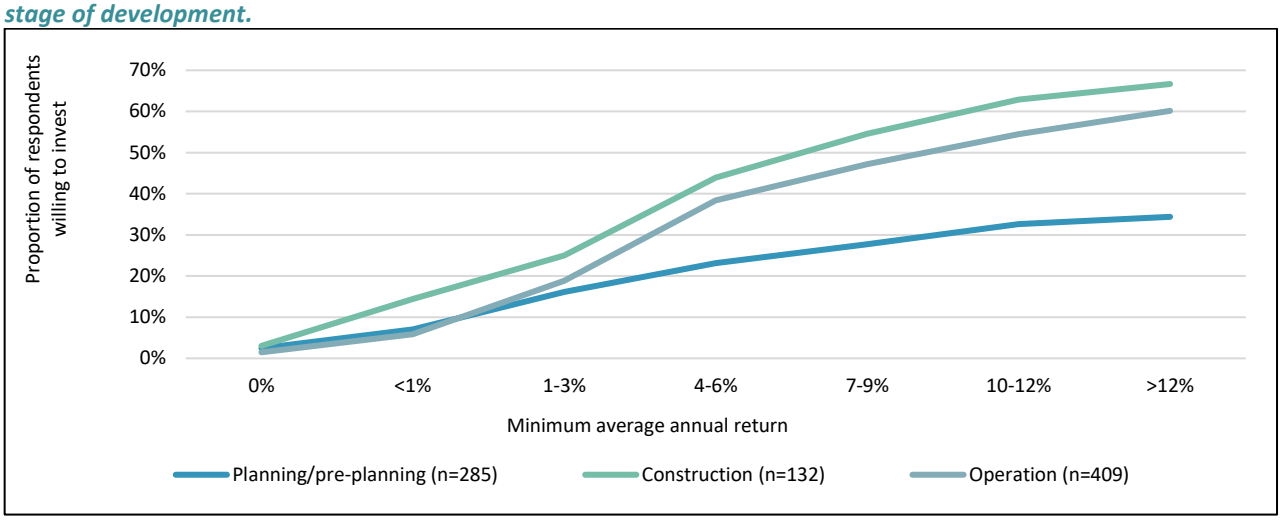


Figure 5.14 Proportion of respondents willing to invest by minimum average annual investment return and wind farm stage of development.



Figures 5.15 to 5.17 show projections of the overall amount of money that communities could raise in equity finance to engage in a community owned/co-owned wind farm, depending on the size of the community (in terms of the number of households), the minimum average annual return on the investment, and whether the wind farm was in pre-planning/planning, construction or operation.[38] In these figures, the overall level of investment rises with increases in both the minimum average annual return and the number of households in the community. In terms of the projections, what is perhaps most notable is that most communities are unlikely to be able to raise enough equity finance to invest in a planned/pre-planned wind farm. Even if returns were guaranteed to be >12% per annum, a community would still need to have around 2,000 households to be able to raise enough equity finance to establish a small wholly community-owned wind farm similar in size to the two-turbine Templederry Wind Farm, or around 2,800 households to buy a 5% stake in a large-scale co-owned development similar in size to the 20-turbine Sliabh Bawn Wind Farm.[39] If returns were 4-6% per annum, a community would need around 3,200 households to establish the wholly community-owned wind farm, or around 4,400 households to buy the 5% stake in the large-scale co-owned development. It also seems likely that only large communities would have the capacity to raise enough equity finance in the construction or operation stages to invest in community owned/co-owned ventures. For example, for a community to be able to raise enough equity finance in either the construction or operation stage to establish a small wholly community-owned wind farm, similar to the Templederry Wind Farm, it would need around 2,200 households if the minimum average annual return was 4-6%, or around 1,200 households if the minimum average return was >12% per annum. Similarly, for a community to be able to raise enough equity finance during either the construction or operation stage to buy a 5% stake in a large-scale co-owned development, similar in size to the Sliabh Bawn Wind Farm, it would need to have around 3,000 (operation stage) or 3,200 (construction stage) households if the minimum average annual return was 4-6%, or around 1,600 (operation stage) or 1,800 (construction stage) households if the minimum average annual return was >12%.

[38] In Figures 5.15 to 5.17, the € amounts for the overall investment by households are calculated by multiplying the proportions of respondents who would invest for a given minimum average annual return (see Figure 5.14) by the average amount that respondents would invest at that particular minimum return level, and then multiplying by the number of households. The average amount that respondents would invest at each return level is calculated as the weighted average of the point estimates for the categorical amounts that the respondents would invest (i.e., €250, €750, €1,500, €3,500, €7,500 and €12,500).

[39] In Figures 3.4.7 to 3.4.9, the capital investment requirements for the two wind farm projects (i.e., the 5% equity stake in a 64 MW wind farm and the 25% equity stake in a 4.3 MW wind farm) are calculated in the same manner as in Figure 3.4.3 i.e., they are based on Curtin et al.'s (2019) upper estimate of €2 million per MW. Also, consistent with Figure 3.4.3, the example of the wholly community-owned wind farm is based on the community sourcing 75% of the overall capital investment costs through debt finance i.e., the project has a debt-equity gearing ratio of 75%.

Figure 5.15 Projected investment in a wind farm in the pre-planning/planning stage.

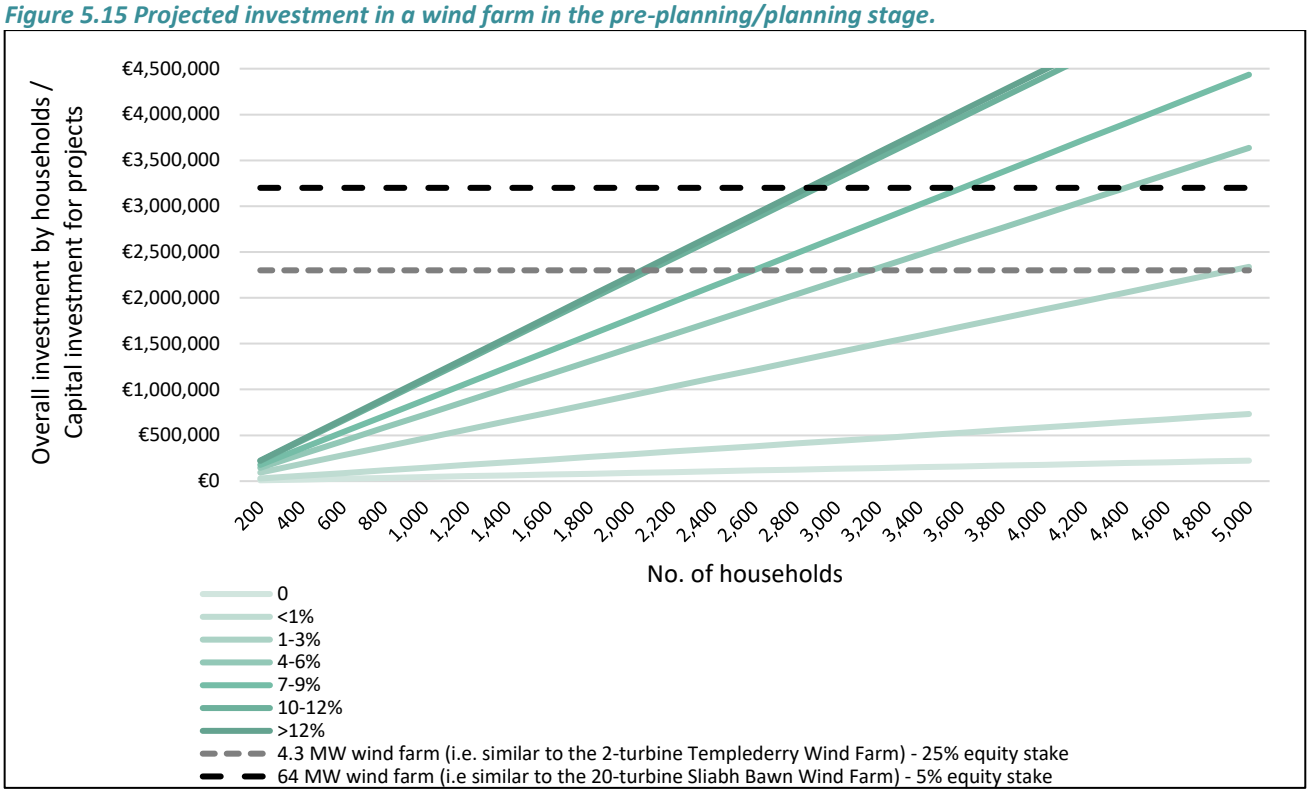


Figure 5.16 Projected investment in a wind farm in the construction stage.

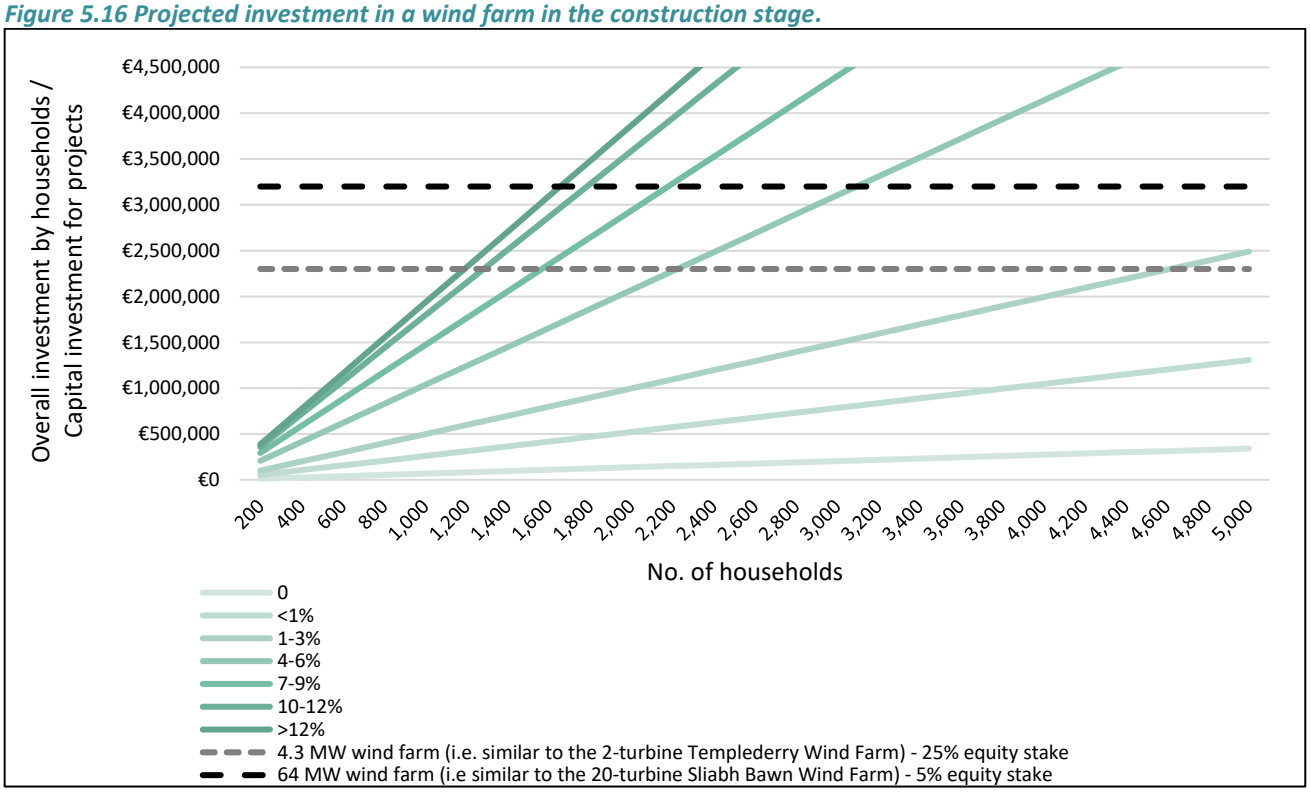
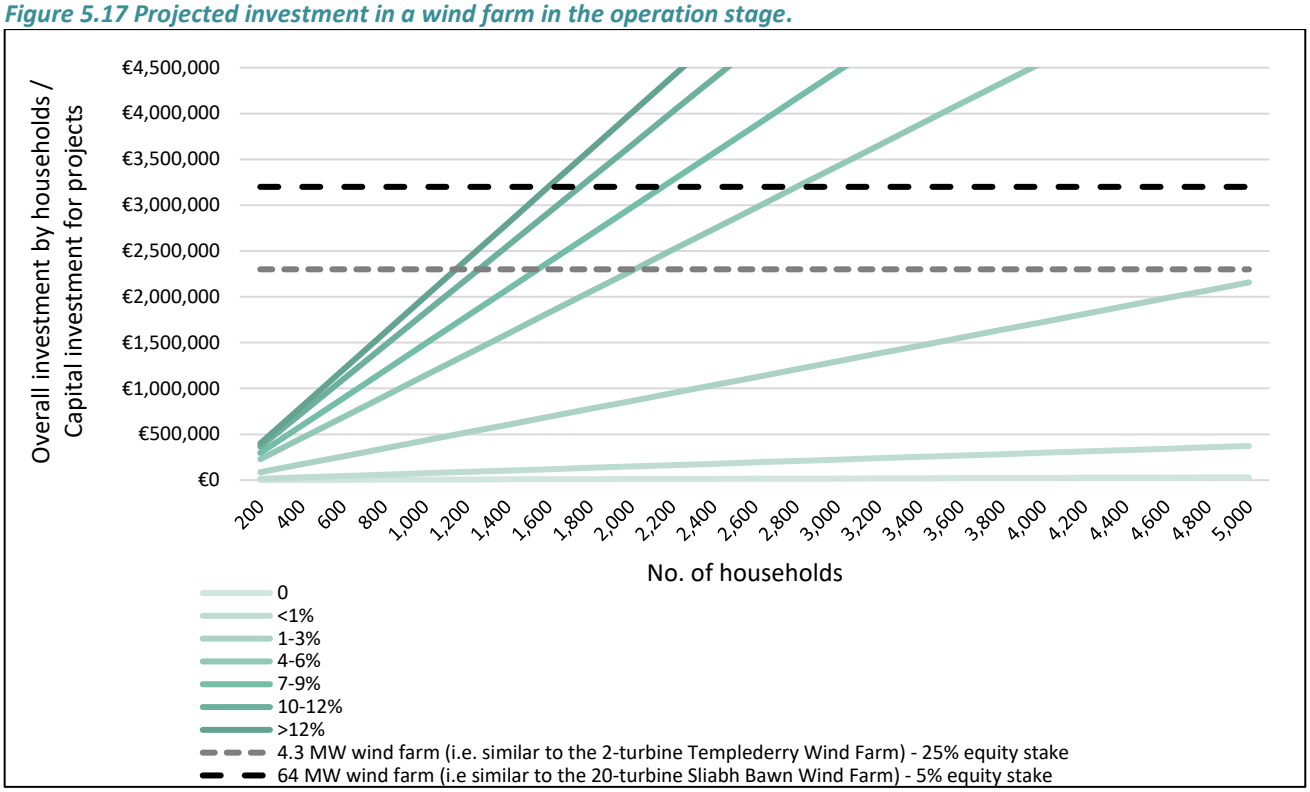


Figure 5.17 Projected investment in a wind farm in the operation stage.



In terms of policymaking, these results highlight the financial challenges facing communities that would seek to engage in community owned/co-owned wind farms, drawing further attention to the need for financial supports to enable community participation in projects. As has been outlined already, one avenue for providing these supports is the SEAI's RESS Community Enabling Framework. In addition, given the scale of the financial challenge, many communities would likely need investment from non-local investors, that is, people who live outside of the community, in order to increase the amount of equity finance that they could raise. The results that have been presented should also help to inform any co-ownership policies that may be introduced. As has been illustrated in Figures 5.15 to 5.17, a community would likely need a very large number of households to be able to raise enough equity finance to acquire only a small stake (e.g., 5%) in a large-scale wind farm development (e.g., 20-turbine project). Policymakers should therefore be cognisant that placing any restrictions on investment opportunities, such as limiting investment opportunities to only those households in the immediate community surrounding a project (e.g., within a 10 km radius), could hinder the success of such policies. However, at the same time, they also need to ensure that local people are aware of benefits of non-local investment for their community and that they consent to non-locals investing. Another issue with respect to co-ownership that our results attend to is the minimum percentage stake that a community would be allowed to acquire in a co-owned project. While developers may want a rule in place preventing situations where a few local people seek to acquire a very small stake in a project, policymakers would need to be careful not to introduce a minimum threshold that would be too high for communities to participate. In addition, our results suggest that communities would find it particularly challenging to raise sufficient equity finance to invest in a co-owned project during the pre-planning/planning stage. Therefore, any co-ownership policies that may be introduced should give due consideration to facilitating investment at a later stage in project development.

5.3 Validation/Field Work

In the *Community Interviews*, the topic of community ownership and co-ownership of wind farm was discussed with residents living in communities with either a planned wind farm or an operational wind farm. Questions were asked to assess: (1) whether residents would be more accepting of their local wind farm if their community owned or co-owned the project; and (2) whether residents would be willing to invest or volunteer to help establish such a project.

The interviewees had mixed opinions on community ownership/co-ownership, with some indicating that it would increase their acceptance of their local wind farm, and others saying it would have no influence on their feelings towards the project. While no interviewee said that community ownership/co-ownership would make them less accepting of the project, some did express concerns about the ability of their community to establish and manage such a large development. The residents who appeared to be most interested in community ownership/co-ownership were those living near planned developments who were largely supportive of wind energy but who were unhappy with certain features of the project, such as the location of turbines or roadways within the development. For these residents, ownership/co-ownership was viewed as a means to gain a degree of control over the development and have a greater say in project decision making. Notably however, most interviewees who lived near planned wind farms talked in greater detail about their concerns about the project, such as noise from the turbines, the visual impact of the turbines around their homes, and the impact of the turbines on their families' health, as opposed to talking at depth about the potential benefits of ownership/co-ownership. In contrast, most interviewees who lived near operational wind farms were generally supportive of their local project and viewed ownership/co-ownership as a potential added benefit rather than something that would change their feeling towards the project.

The interviewees also had mixed feelings about investing in their local wind farm as part of a community ownership/co-ownership arrangement, with some indicating an interest in investing, and others saying they would not be willing to invest. Of those who were interested, most appeared to be somewhat willing as opposed to very willing to invest. The interviewees who appeared to be most willing to invest were those who were supportive of their local project and who had finance available to invest. In contrast, those who were least interested were residents living near planned wind farms who are opposed to their local project. Some of these residents dismissed the idea of investing in the wind farm given that they had concerns about certain features of the development, such as the impact of the turbines on the landscape, wildlife and on their families' health. As regards volunteering to help establish a community owned/co-owned project, only a small proportion of the interviewees said they would be willing to volunteer in such a venture. These were mostly residents who were at least somewhat knowledgeable about wind farm development. For example, some of these interviewees had previously worked as engineers or had a background in engineering and were aware of what is involved in developing a wind farm. In addition, interviewees who voiced concerns about climate change also appeared to be more interested in volunteering. However, most of the interviewees expressed the view that engaging in a community owned/co-owned project would be too challenging for their community given the large-scale nature of the wind farms and the lack of expertise within the community. Many residents were unwilling to volunteer for these reasons. Many interviewees who lived near planned wind farms also dismissed the idea of volunteering due to concerns they had about the projects.

5.4 Insights from Developer Interviews

Developers' perspectives on community co-ownership were examined in the *Developer Interviews* in order to learn about the feasibility of co-ownership arrangements and the potential challenges and opportunities for implementing such arrangements. Questions were asked to assess: (1) developers' views on the benefits of co-ownership for the wind industry; (2) their awareness about different types of co-ownership arrangements including joint ventures, split ownership arrangements and shared revenue agreements; (3) their opinions on the advantages and disadvantages of these different types of arrangements; (4) their willingness to facilitate the co-ownership arrangements with communities; and (5) their views on the challenges for progressing co-ownership in Ireland.

The interviewees had mixed opinions on the benefits of co-owned projects for developers. Some interviewees believed that co-ownership would have a positive impact on project acceptance and would help them to secure planning permission for new projects or for projects that will need to be repowered. A few also commented that co-ownership may help to create support networks for projects within communities. Other interviewees believed that the positive impact of co-ownership would be conditional on "*the offer being designed right*" or "*people having the appetite for investing*." One interviewee also noted that co-ownership might not have a direct impact on project acceptance but might inadvertently bring benefits by "*forcing developers to do better engagement*." In contrast, others were less optimistic about the potential benefits for developers. In this regard, one developer said there was "*no silver bullet for acceptance*" and that although

co-ownership may go some way to reduce opposition to projects, "*two objectors can cause the same headache as 200*". Similarly, another interviewee said that that "*just giving money to people through shared ownership will not solve the problem of acceptance*" and that "*people often don't want to invest but want to be at the design table*."

In relation to the different types of co-ownership arrangements, almost all interviewees were aware of joint ventures, split ownership arrangements and shared revenue agreements, while some had experience using these arrangements to partner with communities in other countries, such as Scotland and Germany. One interviewee noted that they had previously discussed an alternative type of co-ownership opportunity with a community in Ireland but in that case the community had no interest in investing as the opportunity involved the community benefit fund being used to buy a stake in the project. The interviewee suggested that trust was an issue, saying that the community thought they were "*running off with the money*."

Almost all interviewees revealed a preference for the shared revenue model, wherein the developer owns, develops, and operates the wind farm and the community buy a share of the revenue streams but does not own an equity stake. The interviewees preferred this arrangement as it was the simplest to implement and it avoided many of the complexities associated with the other arrangements. In relation to the split ownership model, some interviewees noted that the Irish grid system rules do not allow for the splitting of a grid connection agreement between multiple owners. Others pointed to issues with the joint venture model in that it makes financing more difficult for developers, while it also makes it more difficult to sell on the wind farm. Although most developers preferred shared revenue arrangements, one interviewee discussed the added benefits that may come with other models, saying that the joint venture arrangement "*could be amazing if it was done right with communities doing the permitting and communications and the developer working on the technical and financial side*", while the split ownership arrangement might "*give people a sense of pride*" in their local wind farm.

A number of developers stated that they would be willing to facilitate community co-ownership in various ways such as covering the costs of the early stages of project development (e.g. the costs associated with feasibility studies, site investigations, planning permission and grid connections), allowing communities to buy into a project at a later stage in the project's development (e.g. after commissioning), and allowing communities to buy into a project at cost (i.e. by paying a proportion of the development and construction costs). One interviewee stated that "*if the community is providing a site that's supported locally that's worth a lot of money*" and said if the community was "*helping the project with permitting or communication or if we have real social cohesion we'd probably actually give them the shares for free*." However, other ways in which co-ownership could be facilitated were viewed as unacceptable to some developers. For example, when asked about offering communities' guarantees over revenue streams in order to de-risk their investment, one interviewee said that "*communities should be taking on the risk themselves*," while another stated "*we take the risk and they take the reward, it's a tricky one*."

Most developers noted that communities' ability to raise enough finance to buy a stake in a project was the biggest challenge for progressing co-ownership in Ireland. In this regard, many held the view that there was little to no appetite for investing in projects, with one interviewee stating, "*the investor mentality just isn't there… people like the idea but if you ask them to put their money down it won't happen*." Some interviewees also said that people who might be willing to invest would either "*want high returns and no risk*," "*a guaranteed payment with no downside risk*" or "*immediate returns*," which would inhibit communities' ability to raise equity finance. Some developers talked about extending investment opportunities to people who live outside of a community as a benefit in terms of raising finance but warned that it could negatively affect local acceptance. One interviewee said that "*locals would feel hard done by*" if outsiders were getting the same financial returns, suggesting that preferential terms would need to be offered to local people. Most interviewees also believed that a lack of skills and expertise would be another major barrier to progressing co-owned projects. In this regard, one developer said that developing a project would be a "*long journey for a non-specialist*," while another explained for communities "*to do the due diligence without experience would be very difficult*." Due to these skills' deficit, some interviewees noted that capacity building programmes would be required for co-ownership to work.

5.5 Summary of Results for Community Ownership and Co-Investment.

This section summarises the key learning outcomes from the *National Survey*, *Community Survey*, *Community Interviews* and *Developer Interviews* on the topic of community ownership/co-ownership of wind farms. The *National Survey* assessed Irish citizens' willingness to invest in different types of wind energy projects including local projects, non-local projects, and portfolios of projects. The factors affecting both the decisions of citizens to invest and the monetary amount that they were willing to invest were also examined. The *Community Survey* investigated the impact of various types of community ownership/co-ownership arrangements on local residents' acceptance of wind farms across different stages of project development. It also examined the willingness of local residents to volunteer to help establish a community owned/co-owned project under the different types of arrangements, as well as the factors influencing their willingness to volunteer. In addition, it examined local residents' willingness to invest in their local wind farm across the different stages of project development. The *Community Interviews* further explored the topic of community ownership/co-ownership by asking residents of communities with either a planned or operational wind farm if they would be more accepting of their local project if it was community owned/co-owned, and also if they would be willing to volunteer or invest to help establish such a project in their community. The *Developer Interviews* examined the perspectives of wind farm developers on the feasibility of co-ownership arrangements as well as the challenges and opportunities for implementing such arrangements in Ireland. The key learning outcomes on the topic of community ownership and co-investment can be summarised as follows:

	Key Learning outcomes
National Survey	• Irish citizens have a strong appetite for investing in local wind energy projects and a relatively lower appetite for investing in non-local or portfolios of projects. However, this is only when they are not presented with information regarding the risk associated with the investment. Moreover, they generally prefer to invest low sums of money. • The presence of an SEC in a person's locality, financial investment experience and having a positive perception about the environmental impacts of wind farms are key factors that increase citizens' willingness to invest in local wind farms. • Wealth, location, and financial investment experience are key factors that encourage citizens to invest in non-local wind farms. • Familiarity with wind farms and wind energy investments are key factors that increase citizens' willingness to invest in portfolios of wind farms. • Income and wealth are key factors that influences the monetary size of citizens' wind energy investments. • Citizens' preference for investing low sums of money points to the importance of governmental financial support for enabling communities to participate in wind farms. The provision of supports through the SEAI's RESS Community Enabling Framework could be a critical policy tool in this regard. • Any policies that may be introduced to facilitate investment opportunities in local wind farms would likely be more successful if accompanied by an expansion of the SEC network and information provision on the positive environmental effects of wind farms. • Providing citizens with financial guidance and advice on how to purchase shares in wind farms could help to facilitate investment among citizens who lack experience with financial investing. • Non-local investors would likely contribute higher levels of equity finance for wind farms if they had the opportunity to invest in portfolios of wind farms as opposed to individual projects. • Any policies to enable citizen investment in wind farms may be best suited to improving acceptance among more affluent citizens who would likely invest larger amounts. To ensure distributional justice, such policies should only be introduced as part of a package of measures that share benefits equally with less affluent citizens.
Community Survey	• The idea of community ownership/co-ownership generally has a positive impact on local residents' acceptance of wind farms and particularly operational wind farms. • Wind farms that will soon need to be repowered may gain considerably higher acceptance with co-ownership arrangements. • Community ownership/co-ownership is not a panacea for improving acceptance of planned/pre-planned wind farms among people who are opposed to the projects or among those who would live in close proximity (<2km). • Community residents who are supportive of a local wind farm and those who live proximally distant (2-10km) from the project generally prefer shallower forms of co-ownership that involve less responsibility and a lower workload (i.e., shared revenue agreements). • Community residents who are opposed to a local wind farm tend to prefer deeper forms of ownership which would give their community more control over the project and a greater say in project decision making (i.e., wholly community-ownership). • Community residents who live in close proximity (<2km) to wind farms that are in the pre-planning/planning and construction often prefer co-ownership arrangements that would give them ownership/control of particular turbines (i.e., split ownership). • Residents of communities with a wind farm that is operational or in construction have a high willingness to invest in these projects, but only if the investment is safe and liquid. • Any policies to enable community co-ownership of wind farms may be more successful if citizen investment is facilitated at a later stage of project development. • Community residents' willingness to invest in their local wind farm falls substantially when the investment is risky or illiquid. • Non-local investment from citizens living outside of wind farm communities would likely be needed for community owned/co-owned projects to be financially viable, particularly in small communities. • Capacity building programmes that educate and advise communities on how to develop wind farms are critical for encouraging participation in community owned/co-owned projects. • Building trust between communities and developers would promote citizen participation in co-ownership arrangements.

Community Interviews	• Community residents voiced concerns about their communities' ability to undertake large-scale community owned/co-owned projects. • Community residents who lived near planned wind farms and who were supportive of wind energy but were unhappy with certain features of the project appeared to be most interested in community ownership/co-ownership. • Community residents who were supportive of their local wind farm and who had finance available to invest appeared to be most willing to invest in a community owned/co-owned project. • Community residents who lived near planned wind farms who were opposed to their local project appeared to be least interested in investing in a community owned/co-owned project. • Few community residents were willing to volunteer in community owned/co-owned projects.
Developer Interviews	• Developers tend to have mixed opinions on the benefits of co-ownership in terms of increasing project acceptance, with some believing it would help to create support networks for projects and help to secure planning permission, but others believing it would do little to improve acceptance. • Developers tend to prefer shared revenue arrangements over joint ventures and split ownership agreements. • In relation to joint ventures, some developers were concerned that project financing would be difficult and that it would be hard to sell on assets. • In relation to split ownership agreements, some developers had concerns that the Irish grid system rules did not allow for the splitting of a grid connection agreement between multiple owners. • Developers were generally willing to facilitate co-ownership arrangements by covering the costs of the early project development stages, allowing communities to buy into a project at a later stage in the project's development, and allowing communities to buy into a project at cost. • Most developers believed that a lack of skills and finance within communities were the biggest challenges for progressing co-ownership in Ireland.

6.Results of Choice Experiments

Highlights
• The most important attributes influencing an individual's choice to accept a wind farm are the wind farm ownership structure and setback (distance to the nearest turbine). • Irish semi-state was the preferred ownership structure for willingness to accept when a cost penalty for community ownership is applied. • Governance of the community benefit fund was relatively more important than how the fund is distributed for willingness to accept. • Respondents preferred personal interaction for initial engagement when deciding to accept a wind farm. • The most important attributes for willingness to invest are risk of losing the investment, return on investment and location of the wind farm. • Respondents preferred to invest when the proposed wind farm was further away (>10km). • Who manages the investment was relatively more important than who is the owner of the wind farm when deciding whether to invest or not.

This section presents the results of the choice-based conjoint analysis experiments described in Section 2.3. Two choice-based conjoint analysis were developed: one focusing on willingness to accept a wind farm very close to one's home (willingness to accept CBCA), and another which focused on willingness to invest in a wind farm (willingness to invest CBCA). An advantage of an interactive CBCA approach is that it measures the relative importance of attributes involved in the decision-making process (Orme and Chrzan, 2017; Salm, 2018). The results of the analysis also reveal the preferred levels within the different attributes.

6.1 Choice-Based Conjoint Analysis (CBCA): Willingness to Accept

Willingness to accept a local wind farm involves complex decision making to arrive at a stance that, for most people, is not a black and white issue (Huijts et al., 2012). The choice experiment approach was used to examine willingness to accept a proposed wind farm in the *National Survey* in order to measure the relative importance of some of the different aspects underpinning acceptability and trade-offs that respondents make between engagement, benefit sharing and co-investment attributes of a wind farm. The attributes and attribute levels used in the Willingness to Accept CBCA are presented in Table 6.1.

The relative importance of the different attributes for the respondents of the *National Survey* in deciding on their willingness to accept are given in Figure 6.1. The results show that the developer of the wind farm (i.e., ownership structure), distance to the wind farm (setback) and governance of the community benefit fund are the three most important attributes considered by respondents for willingness to accept choices. The results establish that governance of the community benefit fund is more important than how the fund is distributed. Also, the mode of initial engagement during site selection was more important than having a community liaison officer available during the disruptive construction phase.

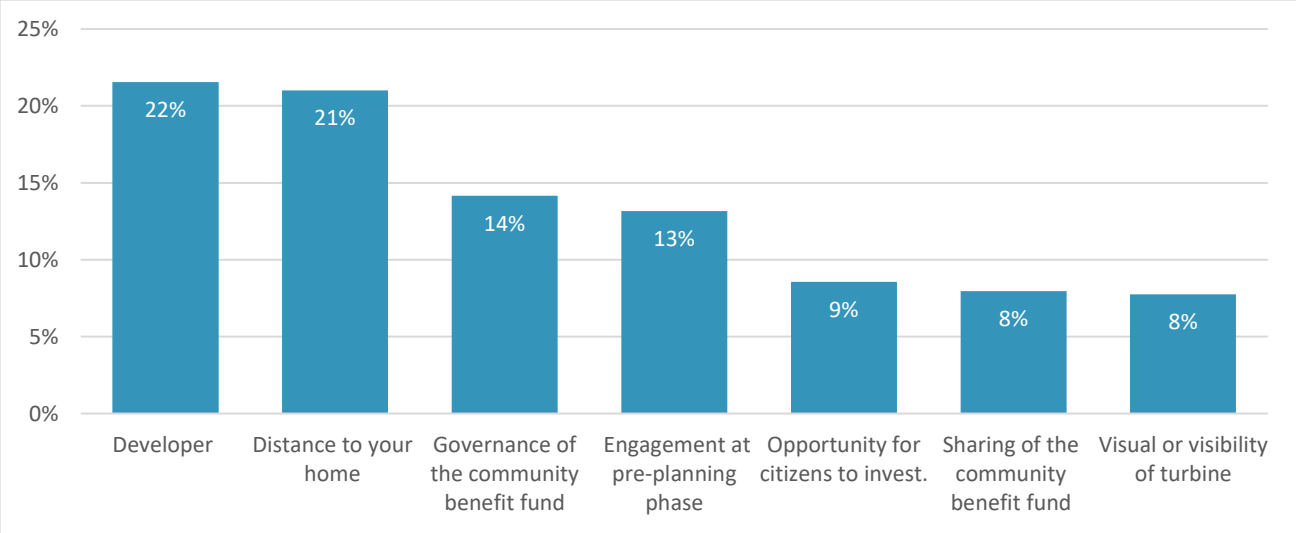
Table 6.1 The attributes and attribute levels used in the Willingness to invest CBCA.

	Part A
Prefacing question	The next section is an interactive section which will ask you to make 8 choices between two different wind farms. Your responses in this section will help us find out if there are certain attributes of a wind farm that would make you more willing to have one in your locality. Please read the explanations for the different wind farm attributes below. After that, you will be presented with 8 choices. In each choice, you will be asked to select your preferred option i.e., Wind Farm A or Wind Farm B. You will be given a chance to say if the preferred option would actually be acceptable or not.
Attribute	**Levels**
Distance to the wind farm	Outside immediate community (3 - 10km) Close to community (2 - 3km) Close to community (radius of 1 - 2km) Near neighbour (within 1km radius)
Visibility of turbines	Wind turbines visible Wind turbines not visible

Engagement during site selection	One-on-one with a community liaison officer Small meeting of residents very close to proposed site Town hall style meeting including wider community You receive a leaflet from the developer The developer uses local radio and newspaper to announce their plans
Community liaison officer	Available during construction Not available during construction
Governance of community benefit fund	Local authority Wind farm developer with community input Local enterprise development company Local development company with community input A committee composed of community members
Share of community benefit fund	Community projects: €130,000 p.a. and Near-neighbours: €50,000 p.a. Community projects: €100,000 p.a. and Near-neighbours: €80,000 p.a. Community projects: €80,000 p.a. and Near-neighbours: €100,000 p.a.
Investment opportunity	Residents within 10 km Residents anywhere within Ireland There is no opportunity to invest
Developer** (No added cost) (20% added cost) (30% added cost) (50% added cost)	Irish semi state companies Private companies or developers Joint developer and community Local landowners/farmers A community sustainable energy group New venture for an existing community network Local landowners/farmers A community sustainable energy group An existing community network group
Part B (Dual response)	
Willingness to accept your chosen wind farm?	Yes No

Note: *The different community ownership categories were given a price penalty that reflected the outcome of the first RESS auction where community-led projects (>51% citizen shareholders) had an average price offer of €104.15/MWh in the first onshore renewable energy auction in Ireland, calculated as the Deemed Energy Quantity GWh-weighted average. The average for all projects was €78.08/MWh.

Figure 6.1 Relative importance of attributes for willingness to accept for respondents in the National Survey.



Note: Percentage scores that measure how much each attribute influences the respondents' selection of acceptance choices. Data from the *National Survey*, n = 1,014. The attribute importance score shows the importance *relative* to the other attributes.

The conjoint analysis also revealed preferences within the attributes (i.e., the levels in Table 6.1). It was found that the preferred ownership structure was an Irish semi-state developer with joint developer/community venture the second preferred level (data not shown). A moderate preference level for the three wholly owned by community ownership categories at 20% extra generation costs was eliminated when the extra generation costs were presented as 50%. Increasing set back distance has a positive effect on willingness to accept. Looking at the governance of the community benefit fund, it is found that there is stronger preference for the fund to be governed by a committee composed of community members or a local development company with community input compared to the local authority or the developer with community input. This mirrors what was found in the field work where people assumed that monies to local authorities would not be ring-fenced for the impacted community. The interviewees in the *Developer Interviews* thought it was important for the developer to stay involved with the governance of the community benefit fund to maintain a connection with the community and maintain the link between the community benefit fund and the physical presence of the wind farm.

Restricting the opportunity to invest to residents living within 10km of the proposed wind farm was preferred compared to opening the offer to the wider community. The respondents preferred in person modes of engagement, one-to-one engagements with a community liaison officer, in the very early site selection stage. During the construction phase, the presence of a community liaison officer available to address local concerns had a positive influence on acceptance.

6.2 Familiarity with Wind Farms

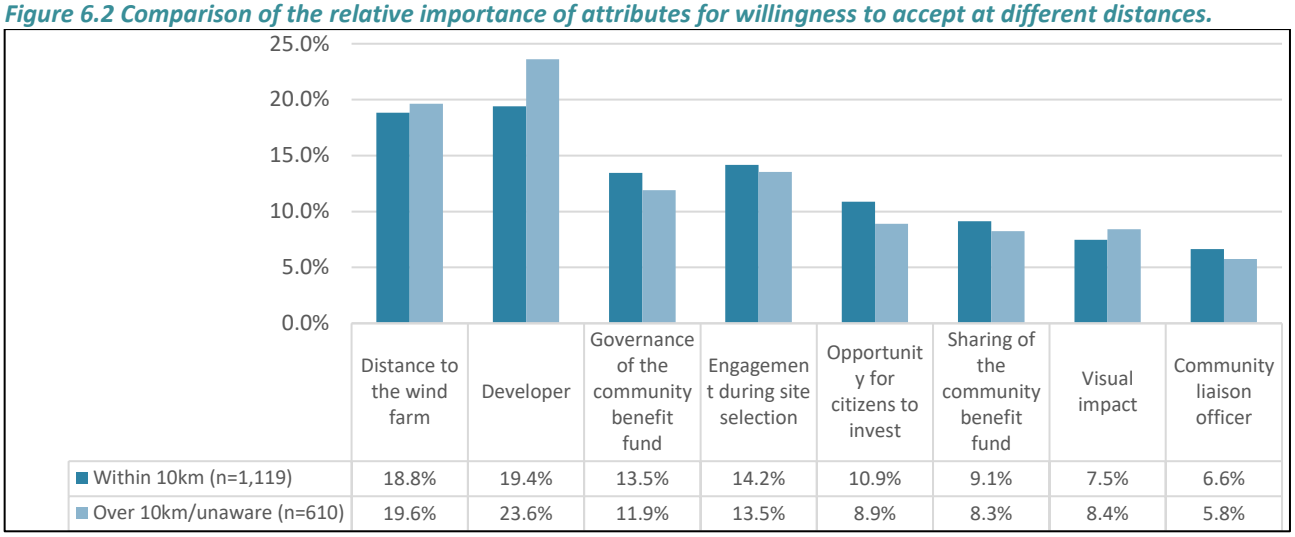
An area of increasing relevance is to understand to what extent citizens' willingness to accept onshore wind energy is conditional on their degree of familiarity with wind farms and the implementation process (Rand and Hoen, 2017; Windemer, 2023). Two approaches were undertaken:

- The effects of proximity to an existing or planned wind farm were investigated by pooling the data from the *National survey* with that of the *Community survey* and generating two independent samples: residents living within 10km of a wind farm (n = 1,119) and residents living over 10km away from a wind farm (n = 610). The aim of comparing the results of the two distance samples is to identify whether there are perceived differences or similarities between citizens who have greater specific interaction with onshore wind farms given their proximity to a residents' home.

- The effects of stage of development – whether the respondents were in the pre-planning/planning, construction, or operation stage, was investigated using data from the *Community Survey* (n = 715). The aim of comparing the results of the three development stages is to identify whether there are perceived differences or similarities between citizens who are at different stages of their experience with onshore wind farms.

The average relative importance of attributes between the two distance-based samples can be compared in Figure 6.2. The developer of the wind farm and proximity of the wind farm are the main attributes and have high relative importance to both samples. It shows that, on average, respondents living within 10km of a wind farm place comparatively more importance on the governance of the community benefit fund, engagement over site selection, opportunities for citizens to invest in the wind farm, the distribution of the community benefit fund, and the availability of a community liaison officer during construction. Contrastingly, it is interesting to note that respondents living further away (over 10km of a wind farm or unaware of a wind farm within 50km) perceive the distance to the wind farm and visual impact to have comparatively more importance on average. This would suggest that that either familiarity through proximity to wind farms has a positive effect on citizens' acceptance, or that residents unwilling to accept wind farms tend to live further away, reflecting self-selection in the area (i.e., Tiebout sorting, also see Hoen et al., 2019).

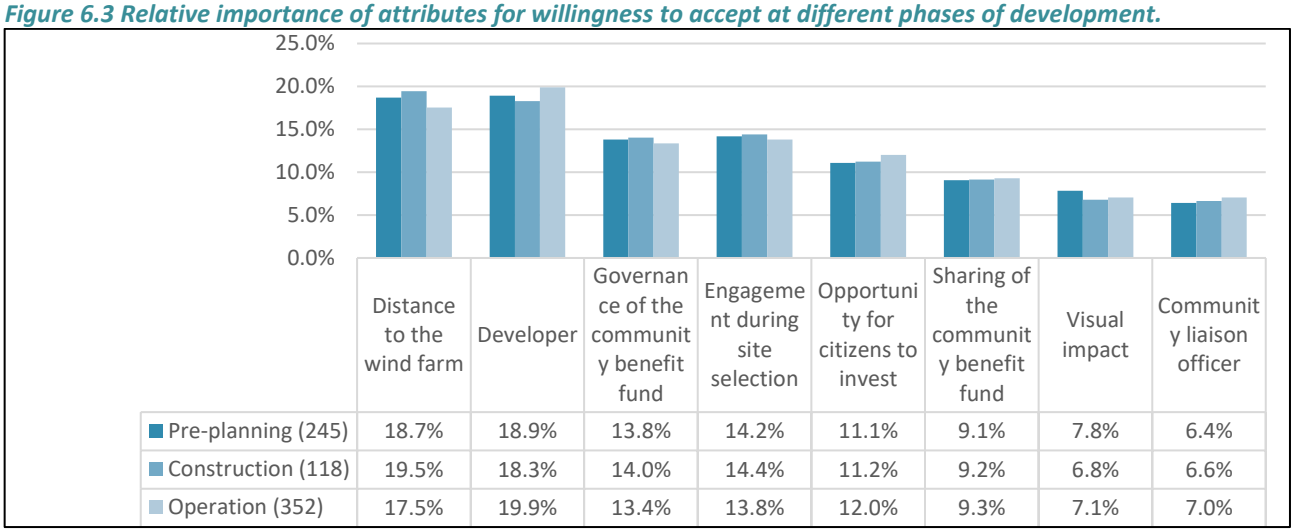
Figure 6.2 Comparison of the relative importance of attributes for willingness to accept at different distances.



	Distance to the wind farm	Developer	Governance of the community benefit fund	Engagement during site selection	Opportunity for citizens to invest	Sharing of the community benefit fund	Visual impact	Community liaison officer
Within 10km (n=1,119)	18.8%	19.4%	13.5%	14.2%	10.9%	9.1%	7.5%	6.6%
Over 10km/unaware (n=610)	19.6%	23.6%	11.9%	13.5%	8.9%	8.3%	8.4%	5.8%

Note: Percentage scores that measure how much each attribute influences the respondents' acceptance. Data pooled from the *National Survey* and *Community survey*, n = 1,729. The attribute importance score shows the importance *relative* to the other attributes.

Figure 6.3 Relative importance of attributes for willingness to accept at different phases of development.



	Distance to the wind farm	Developer	Governance of the community benefit fund	Engagement during site selection	Opportunity for citizens to invest	Sharing of the community benefit fund	Visual impact	Community liaison officer
Pre-planning (245)	18.7%	18.9%	13.8%	14.2%	11.1%	9.1%	7.8%	6.4%
Construction (118)	19.5%	18.3%	14.0%	14.4%	11.2%	9.2%	6.8%	6.6%
Operation (352)	17.5%	19.9%	13.4%	13.8%	12.0%	9.3%	7.1%	7.0%

Note: Percentage scores that measure how much each attribute influences the respondents' selection of investment choices. Data from the *Community Survey*, n = 715.

To further examine the effect of familiarity, the average relative importance of attributes was compared between respondents to the *Community survey* grouped by experience of a specific wind farm at different phases of development, see Figure 6.3. Again, the developer of the wind farm and proximity of the wind farm are the main attributes and have high relative importance. Differences in relative importance occurs where the attributes for the distance to the wind farm and the visibility/visual impact of the wind farm have a slightly higher relative importance during the early stages of wind farm development. At the operation stage of development, the developer of the wind farm and the opportunity for citizens to invest into the wind farm have slightly higher importance for residents' choices for wind farm development within the community.

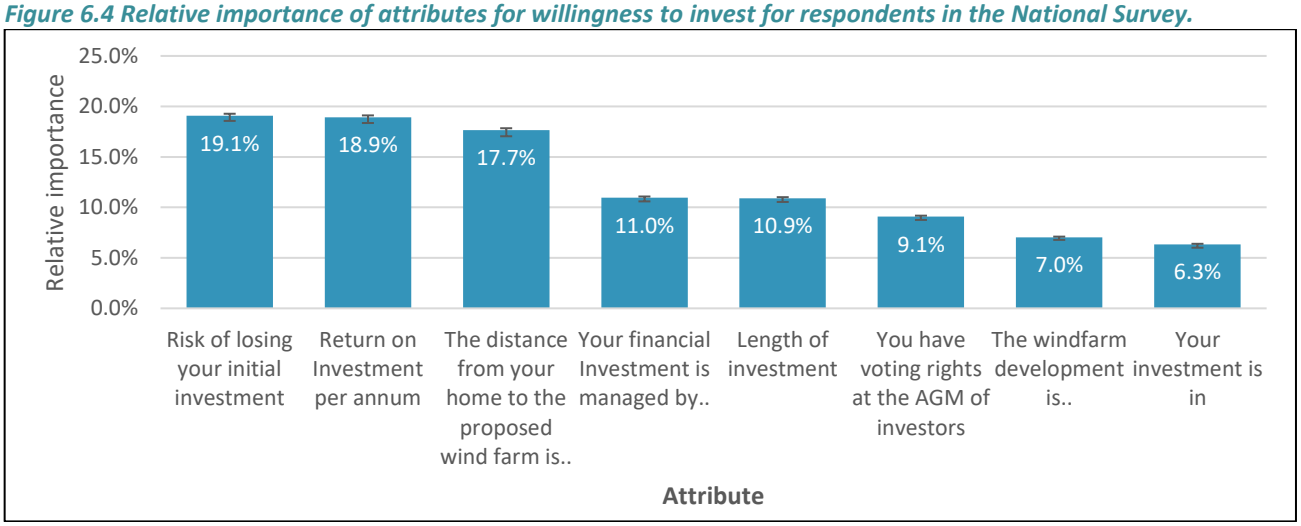
6.3 Choice-Based Conjoint Analysis: Willingness to Invest in a Wind Farm

Multi-criteria decision making also applies to the decision on whether to invest in a wind farm or not (e.g., Curtin et al., 2019; Gamel et al., 2016). Willingness to invest was examined in the *National Survey* using typical investment attributes such as risk and expected return, but also using some attributes particular to wind farm development such as who is the developer and how close a turbine would be to the respondents' home (setback). The attributes and attribute levels used in the Willingness to invest CBCA are presented in Table 6.2. The relative importance of the attributes is presented in Figure 6.4.

Table 6.2 The attributes and attribute levels used in the Willingness to invest CBCA.

Part A	
Prefacing question	In real life it is hard to find the perfect investment with all the attributes we want. In this interactive section we want to investigate the importance of different investment attributes that would influence your willingness to invest in a wind farm development. Imagine that you have €1,000 to invest. Please read the explanations for the investment attributes presented and select your preferred option (i.e., Investment A or Investment B) in the eight choices which follow. You will be given a chance to say if you would actually invest or not.
Attribute	***Levels***
Return on investment (p.a.)	6% p.a. 4% p.a. 2% p.a.
Risk of losing initial investment	No risk of losing your initial €1000 investment Low risk (€800 of your initial €1,000 investment is guaranteed) Moderate risk (€500 of your initial €1,000 investment is guaranteed)
Location of the proposed wind farm(s)	Outside your community (outside radius of 10km) Close to your community (within a radius of 2 to 10km) In your neighbourhood (within a radius of 2km)
Manager of financial investment	Government or semi-state organisation An investment management company A financial institution (e.g., bank, credit union)
Minimum length of investment	5 years 6 - 10 years > 10 years
Voting rights at the AGM of investors	Yes No
Developer of the wind farm(s)	A specialised wind farm developer A community-led development A joint developer/community development
Single / portfolio investment	A specialised wind farm developer A community-led development
Part B (Dual response)	
Would you invest in your chosen wind farm?	Yes No

Figure 6.4 Relative importance of attributes for willingness to invest for respondents in the National Survey.

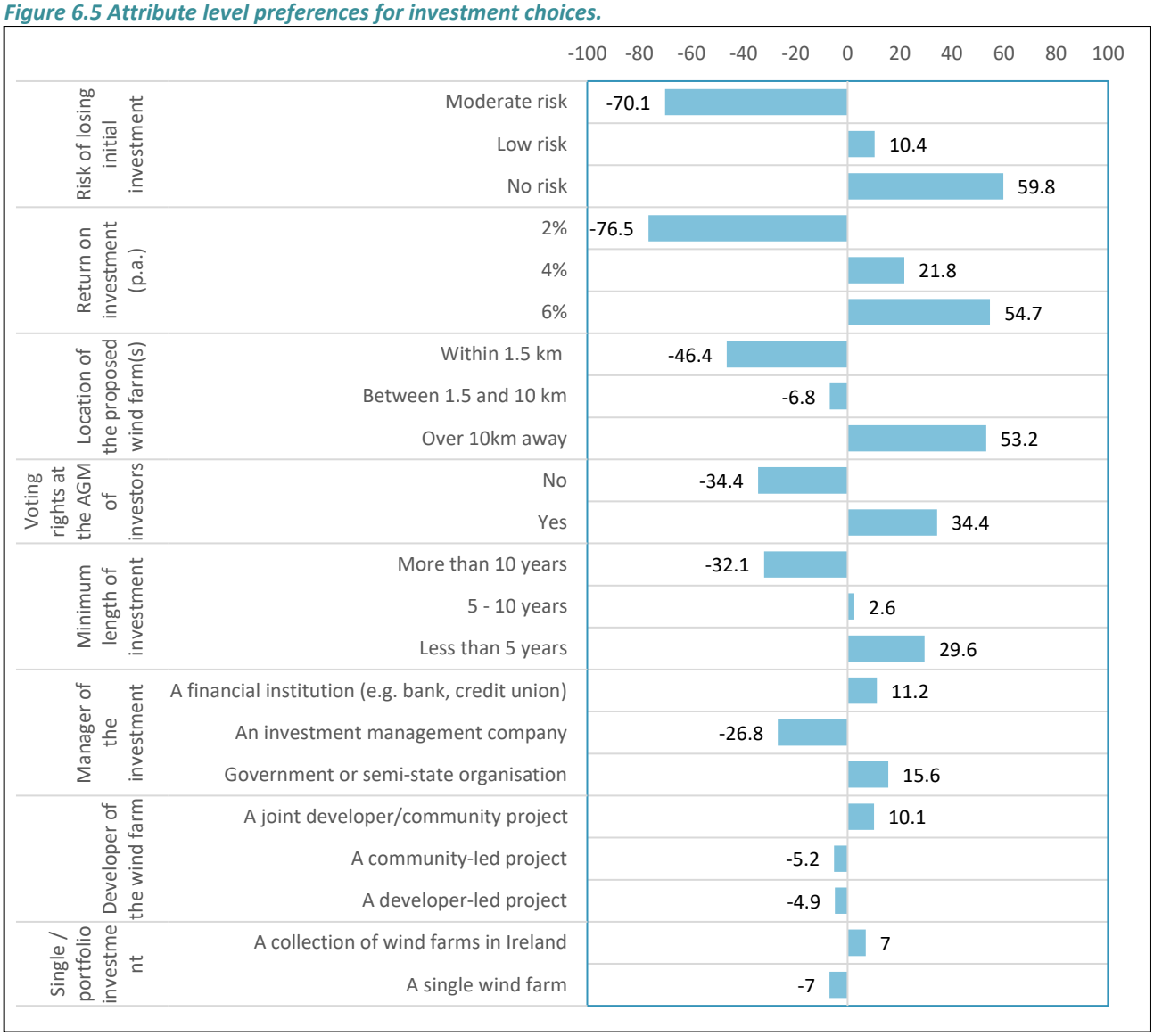


Note: Percentage scores that measure how much each attribute influences the respondents' selection of investment choices. Data from the *National Survey*, n = 1,009. The attribute importance score shows the importance *relative* to the other attributes. Error bars show standard deviations across individuals.

Although 55% of the sample had no investment experience, the results revealed typical expected investor behaviour with the associated risk and return for the two most important attributes for investment. Location of the wind farm, distance from your home, was also a strong attribute. The management of the investment, maintaining access to the investment and AGM voting rights were relatively more important for the respondents' choices than the developer profile. The option of whether to invest in a single wind farm or spread the investment over a number of wind farms was the least important attribute for willingness to invest relative to the other attributes.

Looking at preferences for levels within the attributes in willingness to invest in Figure 6.5, respondents had a preference for the minimum investment period of under five years compared to longer durations. Respondents would rather that the wind farm they invest in was over 10 km away. An investment management company was the least preferred option relative to management of the investment by a government or semi-state organisation or a financial institution. This preference might reflect that the inexperienced respondents felt more secure with familiar institutions. The developer profile was not a strong driver of the choice decisions. A preference for joint developer-community projects was the most preferred option for developer profile attribute. The least important attribute of whether to invest in a single or portfolio of wind farms showed there was a preference to spread the investment over a portfolio of wind farms rather than just one.

Figure 6.5 Attribute level preferences for investment choices.



Note: Percentage scores that measure how much each feature influences the respondents' selection of investment choices. Data from the *National Survey*, n = 2,023. The results are presented in decreasing attribute importance. Level values indicate the preferences of respondents within each attribute relative to each other.

6.4 Summary of Results from Choice-Based Conjoint Analysis

Key learning outcomes
• The most important attributes for willingness to accept are the wind farm ownership structure, setback (distance to the nearest turbine). • Irish semi-state was the preferred ownership structure for willingness to accept when a cost penalty for community ownership is applied. Joint developer/community venture was the second preferred level. • Governance of the community benefit fund was relatively more important than how the fund is distributed for willingness to accept. • There was a moderate preference level for the three wholly community-owned ownership categories for willingness to accept when extra generation costs were set at 30% but community-ownership was negative when the extra costs was set at 50%. • Increasing set back distance has a strong positive effect on willingness to accept. Visibility of the turbines was relatively less important than proximity to wind turbines. • Respondents preferred personal interaction for initial engagement for willingness to accept. • The main attributes for willingness to invest are risk of losing the investment, return on investment and location of the wind farm. • Respondents preferred to invest when the proposed wind farm was further away (>10km). • Who manages the investment was relatively more important for willingness to invest than who is the owner of the wind farm. • Respondents had a preference for the minimum investment period of under five years compared to longer durations for willingness to invest.

7.Review of An Bord Pleanála Appeals

Highlights

- The success rate for third party appeals is about 39%.
- The most important variable in the successful appeal process is the planning inspectors' report.
- Third-party appeals to An Bord Pleanála by groups have better success than appeals by individuals.

There is very little recently published research regarding the factors of successful planning appeals of onshore wind farms in Ireland. An earlier study by Van Rensburg et al. (2015) investigated the determinants of successful and non-successful planning applications in a subset of applications (both initial applications and subsequent appeals) in Ireland between 1990 and 2011. They found that about 20% of the projects in their sample were approved. Looking at predictor variables for success, they found that institutional process variables of the duration of the local appeal process, original decisions of local authorities and inspectors, identities of the appellants (the developer, individual or group appellants to an original decision) were the most important predictors of approval. Factors relating to project size were positive predictor variables (large areas, numbers of turbines and mast heights) indicating that large scale projects have the greatest probability of planning success (Van Rensburg et al., 2015). The authors found that appeals by local individuals and local groups were low and did not have a significant impact on planning outcomes during this timeframe (Van Rensburg et al., 2015). They found that the most important variables for predicting planning refusals and quashing related to conflict with the strategic development plans, and to a lesser extent visual impacts of the wind farm. Of particular interest is that the authors found that the association between 'proximity to dwellings' and refusal were insignificant. The authors reason that developers were adhering to the guidelines existing at that time and this reduced the potential of 'proximity to dwellings' to negatively impact planning success.

There is strong indication that information obtained from studying planning outcomes may not be generally applicable between jurisdictions. Part of the challenge of comparing wind farm planning processes and outcomes is that regulatory and procedural guidelines for wind farm planning differ considerably across jurisdictions. In agreement with the Van Rensburg et al. (2015) study, Schwarz (2020) examined four case studies in Germany and found that the influence of individuals on planning was not always strong and often had to depend on another more influential person or group to intercede on their behalf. On the other hand, Toke (2005) conducted a review of the important factors identified in previous research regarding wind farm planning in England and Wales. He finds that the attitude of people in the immediate vicinity of proposed windfarms is the most important factor in the decisions made by local authorities and that local attitude is influenced by perception of the economic impact and the national political environment. Roddis et al. (2018), also in the UK, found that between 1990 and 2017, 57% of onshore wind applications in Britain had a positive outcome for the applicants compared to the 20% figure in Van Rensburg et al. (2015) for a similar timeframe in Ireland. Roddis et al. (2018) found that significant variables impacting approval were: impact on scenic recreation, impact on wildness and project size, a social deprivation score, the year of the planning application, and population density.

It was considered that an updated examination of the determinants of successful and unsuccessful on shore wind farm planning would be useful considering that (1) the planning and permitting timeframes have been identified as a major bottleneck for the development of onshore wind farms in Ireland (IWE, 2020), (2) the lack of published research pertaining to Ireland and (3) the apparent unreliability of applying information from other jurisdictions to the Irish situation. The review of third-party appeals in this research examined variables such as the number and type of appellants, identified the most widely cited reasons for third party appellant submissions, inspector recommendations and other factors influencing successful third-party appeals to An Bord Pleanála. This section presents the results from a review of third party appeals to An Bord Pleanála from 1999 to 2020. As noted in Section 2.6., the results here are based on a sample which only includes appeals lodged between 1999 and 2020 which have concluded. Therefore, these are preliminary results and further work, incorporating an expanded number of appeal outcomes, will be conducted with a view to publication.

7.1 Third Party Appeals to An Bord Pleanála

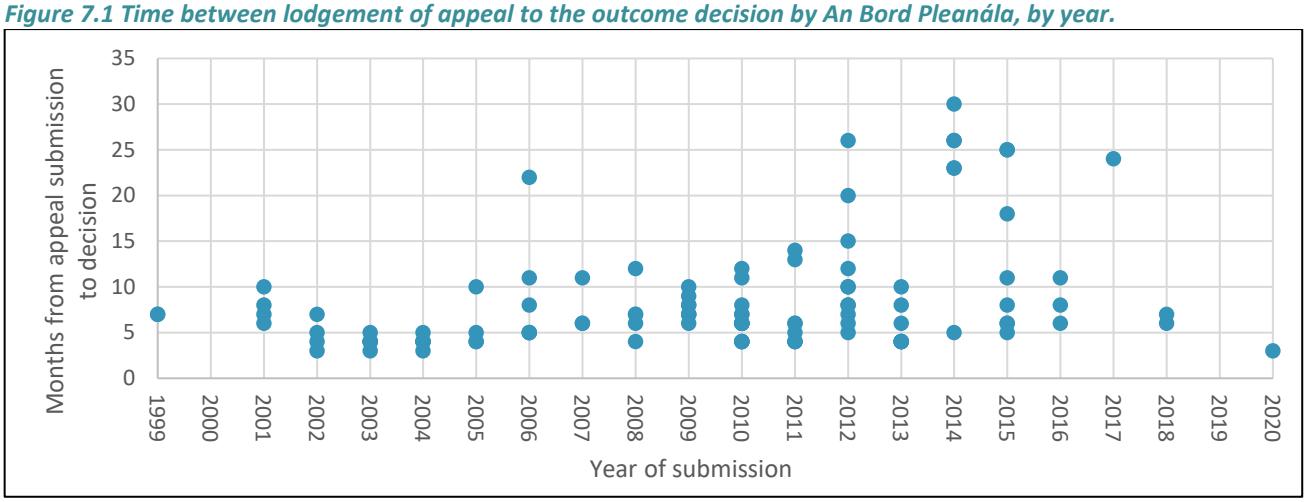
The number of concluded third-party appeals which were lodged with An Bord Pleanála between 1999 and 2020 ranged from 15 concluded appeals from 2010 to zero concluded appeals from 2019, see Table 7.1. Figure 7.1. shows time taken between initiation of the appeal to the outcome decision by An Bord Pleanála by year of submission for our sample. This period ranged from three months to thirty months. The frequency of appeal decisions taking ten months and longer increases after 2005. However, there is much variation in the time taken to complete the appeal within the later years examined.

Table 7.1 The number of concluded appeals to ABP per initiation year, and average number of appellants per case.

Year of initiation	No. of concluded appeals	Avg. no. of third-party appellants per appeal*
1999	2	1.0
2001	4	3.3
2002	4	1.8
2003	6	3.7
2004	6	1.5
2005	4	2.0
2006	6	2.2
2007	3	2.3
2008	5	2.2
2009	8	1.8
2010	15	3.0
2011	8	2.5
2012	11	3.4
2013	8	2.5
2014	6	3.0
2015	8	2.8
2016	3	5.7
2017	1	2.0
2018	2	3.5
2019	0	0
2020	1	1.0

Note: *Third-party appellants may be individuals or groups such as resident groups or conservation groups. The sample included appeals lodged between 1999 and 2020 which had concluded with a decision.

Figure 7.1 Time between lodgement of appeal to the outcome decision by An Bord Pleanála, by year.

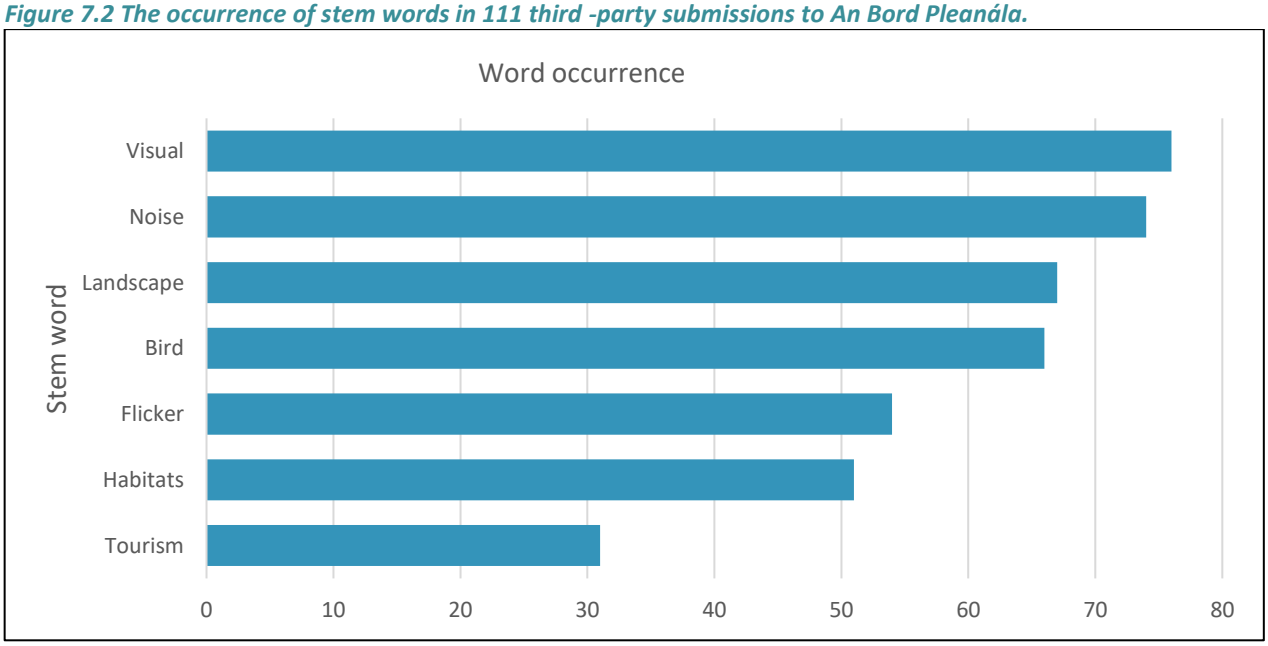


Note: The sample included appeals lodged between 1999 and 2020 which had concluded with a decision at the time of writing. The results will be updated to include later decisions closer to the time of publication.

7.2 Opposition to Onshore Wind Farm Developments

The submissions were examined and the reason(s) for opposition to the development was surmised by text analysis. The key stem words and their appearance in third-party appeals are given in Figure 7.2. If appearing in a submission the word was given a score of 1. Preliminary analysis shows that within the 111 third-party submissions examined so far, the most common stem words were *visual, noise* and *landscape.* The words were used in 76, 74 and 67 submissions, respectively. There was no apparent pattern for the use of these words over time, see Table 7.2.

Figure 7.2 The occurrence of stem words in 111 third -party submissions to An Bord Pleanála.



Note: Each appellant makes a submission to the court. The stem words were given a score of 1 if they occurred at least once in a submission. The sample included appeals lodged between 1999 and 2020 which had concluded with a decision at the time of writing.

Table 7.2 Word frequency analysis. The number of appeals in which the word occurs at least once, by year.

Year	Number of appellants	Stem word						
		Visual	Noise	Landscape	Bird	Flicker	Habitats	Tourism
1999	2	2	2	0	0	0	0	0
2001	4	4	2	2	2	0	2	2
2002	4	3	1	3	0	1	0	0
2003	6	6	6	5	4	3	3	1
2004	6	5	1	5	4	2	3	2
2005	4	2	2	3	2	1	2	0
2006	6	6	5	4	4	2	4	1
2007	3	3	2	2	1	1	0	1
2008	5	2	4	1	3	4	1	1
2009	8	3	4	3	5	4	2	2
2010	15	10	10	9	9	11	7	4
2011	8	3	2	6	5	3	2	3
2012	11	8	9	8	8	5	5	4
2013	8	5	5	6	5	5	4	2
2014	6	4	5	3	4	3	6	3
2015	8	6	8	3	6	4	5	2
2016	3	1	3	1	2	2	3	2
2017	1	1	1	1	1	1	1	1
2018	2	2	2	2	1	2	1	0
2019	0	0	0	0	0	0	0	0
2020	1	0	0	0	0	0	0	0
Overall	111	76	74	67	66	54	51	31

Note: The sample included appeals lodged between 1999 and 2020 which had concluded with a decision at the time of writing. The results will be updated to include later decisions closer to the time of publication.

7.3 Group and Individual Third-Party Appeals

The success rate for third-party appeals was 39%. For this analysis, an appeal is considered successful if the Bord's decision agrees with the appellant and decides that the development does not go ahead. The planning officer's recommendation is the most pertinent factor in deciding whether the appeal has a positive or negative outcome. The board agreed with the planning officer's recommendation in 85% of the appeals (94/111). Approximately half of the appeal submissions were by groups (56/111). The types of groups involved are summarised in Table 7.3. Preliminary results suggest that appeals by groups were significantly more likely to result in a favourable planning officer recommendation and Bord decisions in agreement with the appeal. It is likely that groups may be better able to relate their appeal to points of planning law in that they may encompass more knowledge or be better resourced to afford expertise (Jans and Marseille, 2010). Armeni (2016) and Rydin et al. (2015) surmise that planning authorities prioritise expert knowledge over public views.

Table 7.3 The groups involved in third-party appeals to An Bord Pleanála.

Group type	No.
Conservation/environment	32
Wind action or similar	8
Community	11
Other	5

8. Synthesis and Policy Implications

The objective of the research undertaken was to better understand the impact of engagement on community acceptance of onshore wind energy developments. We focused on different aspects of engagement with emphasis on public participation in decision-making, benefit-sharing schemes, and community-ownership/co-ownership of developments. Community engagement appears to be generally accepted as good practice (IWEA, 2013; Aitken et al., 2016; DCCAE, 2016). Both Gaynor and Walsh (2018) and Van Rensburg et al. (2018) note the potential positive outcomes that can be achieved in relation to wind farm development in Ireland when partnership and citizen power are acknowledged. Both the Code of Practice for Wind Energy Development in Ireland (DCCAE, 2016) and the Wind Energy Development Guidelines 2006 (DHPLG, 2006, under review) address wind farm development engagement with local communities. Wind energy developers are therefore now required, in advance of submitting applications for planning permission, to take active steps to: inform local communities as they begin to develop their proposals; take the views of local communities into account in designing their proposals; demonstrate what practical effect that process of engagement has had; and, set out how the project will perform as a good neighbour in the context of the long-term economic and social development of the community or communities within which the development is situated.

8.1 Public Participation in Decision-Making

The guidelines for community engagement *The Code of Practice for Wind Energy Development in Ireland* (DCCAE, 2016) state that engagement should start at the feasibility stage and the *Wind Energy Development Guidelines* (DHPLG, 2006) discuss developer engagement with the community beginning at the concept stage. This is in agreement with what near-neighbours communities of existing wind farms would prefer. The research showed that there is a mismatch in the timing of engagement initiation by the developers and the communities. Wind farm developers tend to wait until after the feasibility stage and deploy engagement resources when there is a commitment to the site. There was also concern that engaging without information available is not perceived positively by the community and that anti-wind energy groups from outside the area could frame the situation as the developer being evasive. The research suggests that near-neighbours would be receptive to very early engagement.

A community liaison officer is a very important link between the developer and the community. Ideally, information will flow in both directions. As no two communities are the same, the community liaison officer can facilitate contextualised approaches for communities. The field work undertaken showed that people kept and read the information received from developers. However, many were not inclined to phone the community liaison officer with questions. In the Community Survey, it was found that about 60% of local residents that have issues with shadow flicker or noise do not contact the developer. It is difficult at this stage to say how much the Covid pandemic had affected the link between local residents and the community liaison officer. However, there does seem to be an opportunity for developers to further emphasis their openness for contact.

The Code of Practice for Wind Energy Development in Ireland (DCCAE, 2016) require that developers submit a Community Report with their planning application which demonstrates their compliance with how they enabled the community to inform the decision-making processes of the proposed wind energy development. The *Community Survey* respondents' thought that independent intermediaries were the most efficient mechanism to influence the wind farm project. Brennan and Van Rensburg (2016) found similarly that a temporary community representative that can negotiate on behalf of the community significantly increases acceptance.

Rather than only focusing on the engagement activity of wind farm developers with community members as receivers of engagement, our research also included the respondents' activity and motivation during the planning process. The research did find that the Irish communities are more active in the planning stage than research in other jurisdictions would have forecast (Fleming et al., 2022; Hall et al., 2013). However, we did not find a large supportive 'silent majority' reported in studies conducted in other regions (Fleming et al., 2022; Hall et al., 2013). Firstly, the respondents were not silent. We found that about 50% take some action. Secondly, the engaged respondents included both supportive and opposing individuals. Some wind farm developments in Australia have conducted local mini-referenda to determine local support (Bishop and

Davis, 2002). Although the respondents were not 'silent,' they were not necessarily reaching out to the owners/operators of the local wind farm. It would be more beneficial in the long run to direct concerns and issues towards the developer. The research found that developers have proved to be good at resolving issues when they are brought to their attention. It may be useful to carry out periodic pulse[40] surveys to facilitate upward communication.

Examining case studies in Denmark, Germany, India, and the USA, Sovacool and Ratan (2012) find that, generally, projects are contentious at the planning stage, but that opposition reduces significantly after the projects are completed. A key issue for wind farm development is that the pathways to build trust between the community and the developer are often underdeveloped in the early stages of wind farm development. Therefore, this research particularly focused on engagement in the early stages of wind farm development and the building of trust. The research found that agreeing that the developer was transparent, that the planning process was fair, and that the community could influence the design of the project all increased acceptance of a local wind farm. Improvements in public participation in decision-making offers an opportunity for developers to improve relationships with local residents in the crucial pre-planning/planning stage. Concerns of local residents should be sought out and, if at all possible, addressed at the design stage. Including the residents in the problem-solving exercise has been found to have a positive effect on the perception of fairness. It would be important to hear people's concerns, accommodate mitigations where possible and at a minimum understand each other's perspective. While public participation in detailed project design has limited scope, the developer could seek out other ways to allow active participation by community members. For example, in the design of an amenity that will accompany the wind farm.

Aiken et al. (2016), who looking at engagement practices in Great Britain and four other European countries, found that wind farms that had community-led engagement, such as a community group or individual spokesperson, encountered least opposition. Boyle et al. (2021) suggest that in Ireland national organisations which have locally-embedded volunteer-based chapters, such as Tidy Towns, have the potential to provide network development and trust building and to act as intermediaries in the energy transition. The SEAI encourage this network approach through support of local Sustainable Energy Communities (SECs), which often evolve from established community groups. A positive impact of Sustainable Energy Communities on acceptance has been found in both CoWind surveys. The Sustainable Energy Communities approach is to follow a Learn, Plan, Do process; Learn about the network, develop an energy master Plan for your community and then the Do occurs as the plan is implemented. The coming together of communities to consider their community energy requirements may overlap somewhat with the co-creation process of problem solving together. It appears that having gone through the 'Learn, Plan, Do' process within an SEC, members are more receptive to hosting a wind farm in their area.

Good engagement cannot eliminate the possibility of individuals or groups challenging planning permission to a higher authority. Planning authorities must have regard for national renewable energy policy and regional development plans when examining applications and appeals. The general impetus is to facilitate national renewable energy projects unless their development would contradict development plans or other legal obligations such as habitat protections. When developers submit planning applications with all environmental due diligence covered, the projects tend to go ahead. The research found that individuals had less probability of successful appeals than organised groups which are likely to be better resourced. It has been found in other countries that there is a tendency to allow developments through with conditions attached to mitigate the reasons cited in the third-party appeal. It is likely that this is also the case in Ireland. Success for a third-party appeal could involve a condition applied to mitigate rather than a complete overturn of planning permission. Overall, better quality information could be obtained if a public database for renewable energy development planning was maintained, such as the UK Renewable Energy Planning Database.[41]

[40] A pulse survey is a short, quick survey that is conducted on a regular basis to track engagement levels, understand if engagement activities are working so you can make modifications quickly and to demonstrate that community feedback is important to the developer. The social licence statements listed in Table 2.6 provide a guide to the pulse survey design.

[41] https://www.gov.uk/government/publications/renewable-energy-planning-database-monthly-extract

8.2 Benefit Sharing

The most evident benefit sharing mechanisms are monetary based recurring annual payments into a community benefit fund or direct household payments. Prior to the reduction of RESS, community benefit funds and near-neighbour payments existed on a voluntary ad-hoc manner but are now mandatory within RESS. The community benefit fund is set at a contribution by the developer of €2/MWh of loss-adjusted metered quantity. In the National Survey, the set rate of €2/MWh was considered fair by most respondents in the operational stage but too low by most respondents in the pre-planning/planning stage. At the same time, many residents of communities where there is an operational or planned wind farm are not aware if their community has or will receive many types of benefits. It may be that pre-RESS wind farms are not providing community benefit funds. It is somewhat surprising that respondents in the pre-planning/planning stage are completely unaware that a community benefit fund will be provided. As wind farm generating capacity is increasing, the community benefit funds can quickly reach substantial levels. Developers are still cautious of promoting notional community benefit funds early in the planning stage as the perception of community benefit funds can change from a positive fair benefit-sharing exercise to a bribe with negative connotations. The messaging around community benefits funds needs to be carefully managed to avoid any negative connotations arising such as accusations of bribes or sell-out. Perhaps, with good framing, the prospect of the community benefit fund could be promoted in the pre-planning stage to better demonstrate the level of benefit sharing associated with the development. Developers stated that they would be more comfortable if some pre-generation drawdown of the community benefit fund was allowed so that local benefit-sharing and its influence on community relationships could begin earlier. The national community benefits register will provide good information to communities and developers alike.

A similar result was found for the minimum annual near-neighbour payment of €1,000, with most residents living in communities where there is an operating wind farm believing that this payment is fair and residents in pre-planning/planning believe that the payment is too low. This figure may be too low, and the value may need to be revisited in future RESS iterations. The purchasing power of €1,000 has already been substantially reduced due to inflation since its introduction.

The RESS regulations have addressed two areas which Aitkin (2010) found to be contentious issues: (1) who was to be counted as 'the local community' and (2) what was to be considered a legitimate project to fund. This is where the most diversity in opinion was found in the Community Interviews.

While a lot of focus has been placed on the community benefit fund and direct household payments, the research showed that non-monetary community benefits, such as the development of local amenities, or upgrades to local infrastructure, have a more positive impact on acceptance for people living up to 10 km from a project. Jorgensen et al. (2020) found monetary-based benefit schemes did not address the array of non-monetary values affected by the wind projects. Amenity development might address some of the respondents concerns such as landscape intrusion. Enjoying the benefits of amenity development and infrastructure upgrades are not predicated on proximity or belonging to a club, etc. Amenity development can be a method to ensure that everyone gets a benefit. There is an opportunity for developers to make more of these types of benefit sharing.

8.3 Community Ownership/Co-ownership

National policy discourse on community ownership/co-ownership of wind farms is largely driven by the energy citizen concept which aims to promote fairness and inclusion as well as increased public support for the energy transition more generally. Both types of ownership, that is, community ownership as well as community co-ownership, provide a pathway for participation in the energy transition for people who are living in communities that are hosting wind farms, while also offering citizens (and communities) the opportunity to invest in and profit from the generation of green energy. Much existing research has also suggested that community ownership/co-ownership can increase peoples' acceptance of wind farms in their local area (Berka et al., 2017; Brennan et al., 2017; Ek and Persson, 2014; Haggett et al., 2013; Jobert et al., 2007; Musall and Kuik, 2011; Warren and McFadyen, 2010; Toke et al., 2008). This positive impact is often based on the view that community owned/co-owned projects can provide greater economic benefits to local communities (Slee, 2015), while they can also create a psychological sense of ownership in the minds of local citizens (Warren and McFadyen, 2010). In addition, ownership or co-ownership may be seen as a fast route to psychological

identification with a wind farm, the top of Arnstein's Ladder of citizen participation (Arnstein, 1969) and the apex of Thomson and Boutilier's Social Licence to Operate scale (Thomson and Boutilier, 2011).

In line with previous studies, the research herein supports the general conclusion that community ownership and co-ownership have a positive impact on local residents' acceptance of wind farms. However, as revealed by the more detailed analysis undertaken as part of this report, the impact on acceptance is not straightforward. For example, it was found that community ownership/co-ownership arrangements do not totally eliminate opposition, especially for people who have very strong resistance to a specific project and for those who would live in very close proximity to a project. It was also found different types of community ownership/co-ownership arrangements have differing effects on peoples' acceptance of local wind farms, with their effect depending on factors such as a project's stage of development, whether citizens are supportive or opposed to a project, and the distance they live from a project. Additionally, it was found that there was wide variation in the willingness of citizens to volunteer or invest in wind energy projects. A low willingness to participate in projects could hinder the fairness and inclusion objectives of community ownership/co-ownership and could result in a rather muted effect on acceptance.

Our results have important implications for informing policy on community ownership/co-ownership. Currently, the Irish Government's provides support for wholly community-owned wind farms between 0.5 and 5 MW in size under the RESS scheme (Irish Government, 2021). However, there are currently no policies in place on wind farm co-ownership. The *Community Survey* examined citizens' preferences with respect to four models of community ownership/co-ownership which differ in terms of their participation level for citizens. These ranged from full community-ownership where the community is empowered to plan and make decisions and carry out the responsibilities associated with the project, to the shared revenue model, which is a more passive type of partnership where planning and decision-making responsibilities reside with the wind farm developer and the community benefits through a share of the revenues. Between these two models are joint ventures and split ownership agreements which would allow the community some control over the wind farm, possibly over the entire project in the case of joint ventures, or control over specific turbines in the case of split ownership. Our results showed that while citizens generally prefer the less participative shared revenue model. However, they favour the more participatory type models if they are opposed to a project or if the wind farm is located in close proximity to their home and is in the planning or construction stage. In this regard, community residents who were opposed to a local wind farm were found to have a preference for wholly community-ownership, while those living within 2km of a wind farm that was in pre-planning/planning or construction were found to prefer split ownership agreements. However, among community residents in general, shallower forms of ownership were preferred (i.e., the shared revenue model), and this was also the preference of developers.

Our results also draw attention to the financial challenges facing communities that seek to establish community owned/co-owned wind farms. The results of both the *National Survey* and the *Community Survey* showed that citizens have a preference for investing low amounts of money in wind energy investments, which has implications for the feasibility of community owned/co-owned projects as well as distributive justice. Perhaps the main issue is that community ownership/co-ownership may only be financially viable in communities where there is a large number of households. For community ownership/co-ownership to be financially viable in smaller communities, investment would likely be needed from citizens outside of the local area in order to raise sufficient equity capital. Another implication is that policy measures enabling citizen investment in wind farms may be best suited to improving acceptance among more affluent citizens who would more likely invest larger amounts. To ensure distributional justice, policymakers should ensure that such policies are only introduced as part of a package of measures that share benefits equally with less affluent citizens. A further implication of citizens' preference for investing small amounts is that share price affordability would likely be a critical factor in the success of any co-ownership policies. If such policies were to be introduced, policymakers may need to encourage developers to adopt measures to reduce the upfront cost of purchasing shares. For example, developers could offer loans to citizens to enable them to acquire shares, which could be paid back from the revenues generated from a wind farm, as has previously been done in Scotland (Haggett et al., 2014). Developers could also give citizens the option to capitalise their community benefit fund payments towards an investment, as has been suggested by the Scottish Government (2019). Notably, in our interviews with the wind farm developers, many interviewees noted that they would be willing

to facilitate co-ownership arrangements by easing the financial burden on communities, for example by covering the costs of the early project development stages and allowing communities to buy into a project at cost.

One option for increasing levels of citizen investment would be to set up a wind energy or renewable energy fund to allow citizens to invest in a portfolio of projects. In the *National Survey*, it was found that citizens would have a stronger appetite for investing in portfolios of wind farms as opposed to investing in individual non-local projects. A renewable energy fund that would allow citizens to invest in a portfolio of projects could help to raise additional equity capital for projects while also enabling citizen participation in the energy transition. Although such a fund would be unlikely to eliminate opposition to specific projects, it would likely help to foster increased interest in the energy transition and could help to maintain the high levels of support for wind energy among Irish citizens. However, as explained to us by wind farm developers and government officials, such a fund may be subject to legal rules covered by the EU Markets in Financial Instruments Directive (MiFID) which came into effect in 2007 and was strengthened in MiFID II in 2018. Under MiFID, investment firms must evaluate clients based on the client's knowledge and experience of financial instruments, their financial situation and investment objective. In this regard, MIFID II identifies three types of clients:

- Retail clients: local collectives, small and medium enterprises, and individual persons;
- Professional clients: people with experience, knowledge, and the required skills to make their own investment decisions and correctly evaluate risks; and
- Eligible counterparties: banks and other investment firms.

Under MiFID, investment firms have a duty to ensure that they take all sufficient steps to obtain the best possible results for their clients. The investment firm must ensure that the recommended financial instruments are appropriate for the client and must provide suitable information to the client on the financial instruments and their risks. This information is adapted according to the client's classification. The *Community Survey* revealed that more than half of respondents living in wind farm communities had no financial investment experience. Similarly, over half of the respondents who stated they were willing to invest in wind energy projects had no such experience. These cohorts would be classified as the most unsophisticated retail clients. The concerns raised by developers included the ability of local residents to make sound investment decisions based on their understanding of wind farm investment including, amongst other things, the risk of planning delays, the necessity to repay debt before making returns, their seniority in relation to other financers and low returns in low-wind years. Addressing the MiFID requirements for retail investors in terms of co-ownership of wind farms would involve much guidance to individuals and de-risking of the offer. The same issues appear to have been a factor in the Irish Government setting aside a proposed citizen investment scheme in 2019, called the "Renewable Energy Participation Scheme (REPS)". According to the Irish Government (2020), this scheme was set aside due to concerns about the financial risks for citizens and the administrative burden that would be placed on developers.

The financial challenges for communities in establishing community owned/co-owned wind farms also points to the importance of governmental financial assistance for enabling communities to participate in projects. In this regard, the provision of financial supports through the SEAI's RESS Community Enabling Framework should be considered a critical policy tool for enabling community ownership. Currently, the RESS Community Enabling Framework provides financial support for community projects in the early phases of development such as grants of up to €25,000 per project for feasibility studies, development loans of up to €150,000 per project, and grants for the cost of professional advice covering all aspects of project delivery (e.g., legal, financial, and technical). The results from the *Community Survey* highlight the importance of this support for project development by showing that people are less willing to invest in projects in pre-planning/planning stage due to uncertainty about projects actually going ahead. It is also important to note however that community ownership/co-ownership simply may not be financially viable in small communities where there are not enough households to raise a sufficient amount of equity finance. In these communities, project acceptance will likely depend on engagement efforts and benefit sharing other than through an ownership stake.

In conclusion, our results do show that community owned/co-owned wind farms would be more acceptable to people living in the communities that are hosting these projects, whether they own shares or not. However, as is also evident from our research, there are also considerable barriers to community ownership/co-ownership. While Irish communities seeking to engage in a community-owned wind farm development can receive support through the SEAI's RESS Community Enabling Framework, developing a wind farm is still an enormous task, and the number of community-owned wind farms in Ireland remains low. Our results showing that citizens have a preference for investing low sums of money in projects, as well as those showing the large number of households that would be required for communities to raise the equity finance to establish a small community owned project, or to buy share in a co-owned project, points to the financial challenges for communities in developing these projects. Our results highlighting the low willingness of citizens to participate as volunteers in projects further point to difficulties in getting these projects off the ground. This is not to say that policymakers should abandon the idea of community ownership/co-ownership. Our results also show that citizens' willingness to invest in local wind farms could be enhanced through the provision of financial advice and by expanding the SEC network as well as providing citizens with information on the positive environmental effects of wind farms. Citizens' willingness to volunteer in local wind farms could also be enhanced through capacity building programmes that educate and advise communities on how to develop wind farms, while their willingness to engage in co-owned projects could be enhanced by building trust between communities and developers. Indeed, over the longer term, as people become more aware of the financial benefits of hosting a wind farm and see how their neighbouring communities are benefitting from community benefit fund investment, the financial advantages of owning or co-owning a project may become more appealing. However, in the short to medium term, there may be greater value sharing opportunities in the engagement and benefit-sharing space.

8.4 The Importance of Proximity

Throughout the study, special focus was placed on people living near-neighbours. The research shows that the respondents in the near-neighbour group, under 2km, stand out from the other respondents in much of the analysis conducted. Close proximity to a wind farm development reduces acceptance of the development. It must be acknowledged that would be true for most people. Setback rules govern the distance between a wind energy turbine and a residential house. Of course, increased set back distances would ameliorate the proximity issue, but this has to be balanced with maximising the wind potential of a site for commercial interests and for national renewable energy targets. In Ireland, the recommended minimum setback is contained within the Wind Energy Guidelines and planning authorities reference the guidelines in their decisions. The 2006 Guidelines have a set-back requirement of 500m. A draft of updated Wind Energy Guidelines for Ireland was published in December 2019. The proposed setback is four times the turbine tip height with the 500m minimum maintained.

Developers of wind energy projects in Ireland worry that excessive set-back requirements will drastically reduce the number of potential development sites. A set-back requirement of 10 times turbine height for turbines over 25m was proposed for Ireland, but not enacted, in 2012. A Bill put forward, but not passed, to the Oireachtas in 2012 proposed a scale of setback distances from residential property depending on the height of the turbine (from 500m setback for turbine height up to 50m to 2km where the turbine height is over 150m).[42] The settlement pattern of rural Ireland meant that there was very little area remaining when these exclusion zones were mapped. A similar law was enacted in Bavaria and Germany in 2014, referred to as the '10H', regulating the minimum setback distance at least ten times the height of the proposed wind turbine. This law reduced the number of newly installed wind energy plants in Bavaria significantly (Langer et al., 2016).

In the absence of significantly increased setback, preferential treatment of near neighbours living within a close proximity to a wind farm is justified in engagement, benefit sharing, priority of investment etc. The RESS community benefit fund does provide for direct household payments for near neighbours of new wind farms. This figure may need to be examined. Most respondents felt the current rate is too low. Indeed, the developer interviewees were quick to point out that this is a minimum figure.

[42] https://www.oireachtas.ie/en/bills/bill/2012/98/

8.5 Summary

The research shows that acceptance of new wind farm developments can be promoted by meaningful transparent engagement, fair planning processes and benefit sharing with local communities in a fair and open manner. It is clear from the research that there is a need for very early, contextualised, meaningful and ongoing engagement that is relevant and appropriate for the community and for individuals when they seek it. Meaningful engagement is more important than benefit sharing mechanisms and co-ownership or co-investment opportunities. While guidelines and regulations indicate the minimum requirements, the research showed that engagement that includes citizens as part of the decision-making processes has a positive impact on acceptance of new developments. Overall, the research shows the importance of focusing on fair participation processes (i.e., procedural justice), rather than focusing on the acceptance outcome per se. This produces positive intermediate outcomes such as trust, informal mediation, and network building. All required as building blocks for acceptance.

The research shows that distributional fairness in the form of providing local benefit-sharing mechanisms and opportunities for co-ownership can boost the relationship building between the developer and community. In addition, bringing the communication and participatory decision-making approach into the benefit sharing aspect could have a further multiplier effect.

A focus on participatory processes and local outcomes is especially important for near-neighbours and in the pre-planning/planning stage. It is fair that residents who are impacted the most receive a higher allocation of benefits and the focus on near-neighbours contributes to everyone's perception of procedural and distributive fairness which in turn helps to build trust in project developers.

To have a *Social License to Operate* involves gaining ongoing tolerance or approval of the people that live and work in the area of impact. Establishing and maintaining good relationships with local communities is complex and requires on-going effort from a dedicated skilled community engagement/stakeholder team throughout the project life cycle. Participatory processes can be difficult to implement, will not always work effectively in every community and there is a need to manage expectations and ensure everyone is heard. However, the approach has a positive effect for increased acceptance of specific projects and for the onshore wind sector generally. The trust and good relations built in one wind farm development improves the reputation of all developers as fair and trustworthy actors. This is important as new developments are planned and permission is sought for the repowering of older wind farms.

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Appendix 1: National Survey and Community Survey sample description.

The descriptive characteristics for the National Survey sample are given in Table A.1. The sample size for the *National Survey* was 2,023 respondents. The survey was designed to be nationally representative by stratifying the population by age and sex based on the census 2016 data, see Table A.1. Geographical regions for the survey were slightly modified compared to the census data. Rural regions with a high proportion of wind farms, either operational or planned, were slightly over-represented in the quotas by reducing the quota size for Dublin and the mid-East, see Table A.1. However, the survey data can easily be adjusted to be nationally representative. Sociodemographic data for the respondents was collected under the headings: individual characteristics, household characteristics and location characteristics, see Table A.1.

Table A.1. Descriptive characteristics of the National Survey sample.

	% of 2016 census	% of sample	n
Individual characteristics			
Sex			
Male	49%	49%	992
Female	51%	51%	1031
Age			
18–24 years	11%	11%	218
25–34 years	18%	19%	374
35–44 years	21%	21%	420
45-54 years	18%	17%	355
55-64 years	14%	14%	292
65 years or over	18%	18%	364
Educational attainment			
Primary		6%	125
Intermediate/junior certificate		6%	125
Leaving certificate		26%	532
Third level or higher		61%	1241
Employment status			
Working full-time (30 hours or more per week)		48%	961
Working part-time (30 hours or less per week)		16%	323
Unemployed		4%	78
Student		5%	110
Homemaker		7%	132
Retired		17%	345
Unable to work due to health reasons		4%	74
Financial experience[1]			
Yes		45%	917
No		55%	1106
Landowner or farmer			
Yes		24%	482
No		76%	1541
Years living in community			
< 1 year		3%	68
1–5 years		19%	378
6–10 years		15%	299
11–20 years		23%	458
> 20 years		27%	553
Always lived here		13%	267
Household characteristics			
Annual household income			
< €23,400		25%	503

	% of 2016 census	% of sample	n
€23,400–€62,349		48%	976
> €62,349		27%	544
Household size			
1 person		15%	294
2 people		30%	605
3 or more people		55%	1124
Child in household			
Yes			
No		41%	823
Elderly person in household		59%	1200
Yes			
No		29%	596
Tenure			
Own with mortgage or loan		35%	698
Own outright		38%	762
Rent		25%	497
Live here rent free		3%	66
Location characteristics			
Region			
Border	8%	11%	211
Dublin	28%	17%	349
Mid-East	15%	11%	224
Midlands	6%	8%	153
Mid-West	10%	12%	248
South-East	9%	11%	223
South-West	14%	20%	391
West	10%	11%	224
Rural/urban			
Rural area		36%	719
Small town		20%	413
Mid-sized town		23%	470
A city		21%	421
Distance to nearest large wind turbine (rounded to nearest km)			
< 500m		2%	48
500m–1km		4%	89
2–3km		8%	164
4–5km		11%	225
6–10km		16%	327
11–50km		31%	636
Not aware of any large wind turbine within 50km		26%	534
Community spirit			
There is a strong community spirit in my community		77%	1566
There is not a strong community spirit in my community		23%	457

The descriptive characteristics for the Community Survey sample are given in Table A.2. The survey was restricted to those living within 10 km of the nearest wind farm. The *Community Survey* had 826 respondents across three different wind farm development stages: 409 in the operational stage; 132 in the construction stage; and 285 in the pre-planning/planning stage.

Table A.2. Descriptive characteristics of the Community Survey sample.

Variable	% of sample	n
Wind farm development stage		
pre-planning/planning	34.5%	285
Construction	15.9%	132
Operational	49.5%	409
Individual characteristics		
Sex		
Male	40%	322
Female	60%	504
Age		
18–24 years	19.6%	162
25–34 years	25.7%	212
35–44 years	17.5%	145
45-54 years	14.6%	121
55-64 years	13.6%	112
65 years or over	8.9%	74
Educational attainment		
Primary	3.0%	25
Intermediate/junior certificate	6.1%	50
Leaving certificate	24.3%	201
Third level or higher	66.6%	550
Employment status		
Working full-time (30 hours or more per week)	54.7%	452
Working part-time (30 hours or less per week)	18.0%	149
Other	27.2%	225
Financial experience		
Yes	38.2%	316
No	61.7%	510
Farmer		
Yes – full-time	10.7%	88
Yes – part-time	18.8%	155
No	70.3%	581
Years living in community		
< 1 year	3.7%	31
1–5 years	19.1%	158
6–10 years	12.3%	102
11–20 years	21.5%	178
> 20 years	19.8%	164
Always lived here	23.4%	193
Household characteristics		
Annual household income		
Low (< €23,400)	33.3%	275
Medium (€23,400–€62,349)	49.3%	407
High (> €62,349)	17.4%	144
Child in household		
Yes	50.9%	420
No	49.1%	406
Tenure		
Own with mortgage or loan	33.8%	279
Own outright	40.5%	335
Rent	20.3%	168

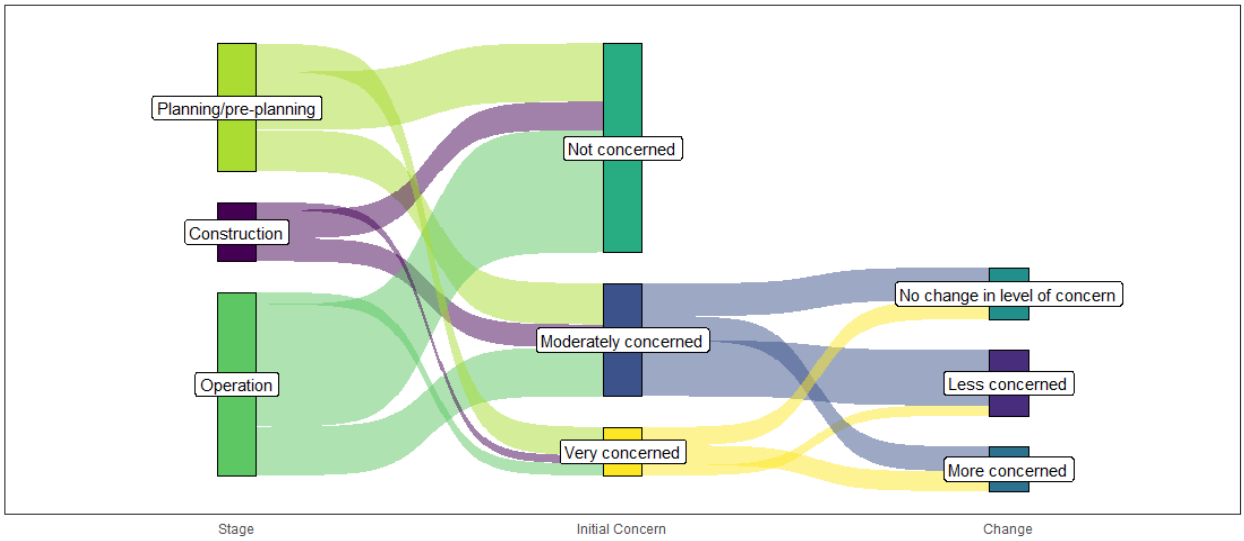
Variable	% of sample	n
Live here rent free	5.3%	44
Location characteristics		
Rural/urban		
Rural area	51.1%	422
Small town	22.9%	189
Mid-sized town	19.2%	159
A city	6.8%	56
Distance (to nearest large wind turbine (rounded to nearest km)		
< 2 km	17.4%	144
2 – 5 km	34.1%	282
>5 – 10 km	48.4%	400
Community spirit		
There is a strong community spirit in my community	87.2%	720
There is not a strong community spirit in my community	12.8%	106

Appendix 2: Changes in level of concern after the Planning stage.

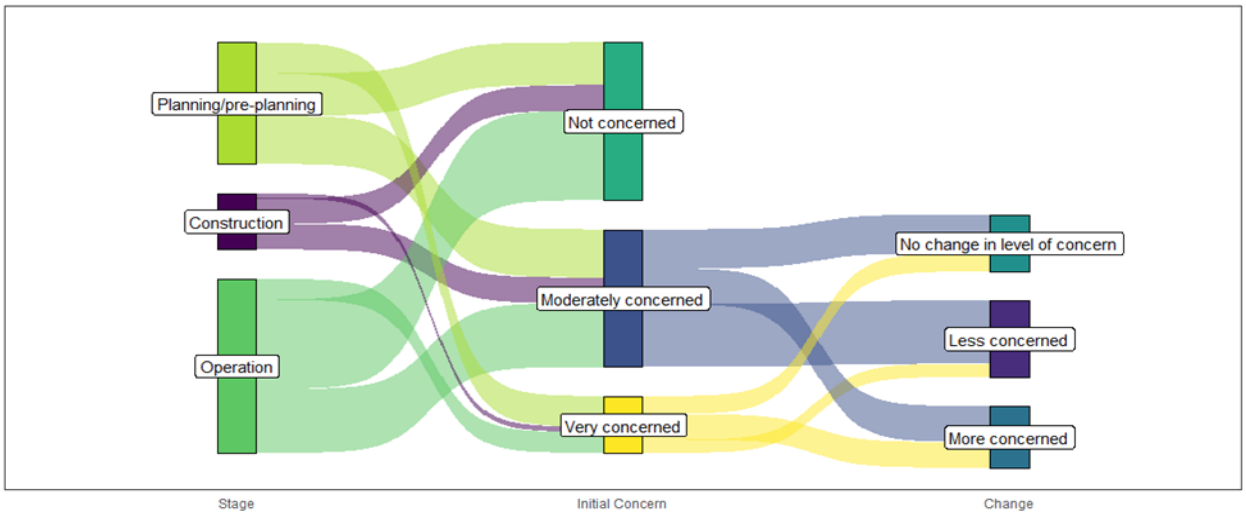
The respondents to the *Community Survey* were asked to think back to the time they first heard that the wind farm was planned for their area and indicate the level of concern they felt at that time about seven issues. The seven issues were: shadow flicker, excessive noise and impacts on wildlife, tourism, heritage, health, and house prices. The level of concern was 'not concerned,' 'moderately concerned and 'very concerned.' The respondents that are currently in the construction or the operation stage and that had expressed concern about an issue were later asked if their level of concern had changed: 'no change in level of concern,' 'less concerned' or 'more concerned.' The sankey graphs below provide an overview of initial concern levels expressed by respondents in the different wind farm stages and changes in concern levels for respondents that were past the planning stage. Shadow flicker and excessive noise are examined more closely in Section 3.2.1.

The sankey diagrams illustrate the change in concern level for respondents from when they first heard about the wind farm to their current level of concern. The graphs flow from left to right starting with bar lengths representing sample size in each wind farm stage ('pre-planning/planning, 'construction' and 'operation'). The lengths of the middle bars represent the sample size in each of the initial concern category ('not concerned', 'moderately concerned', 'very concerned'). The width of the streams joining the wind farm stage bars and the initial concern bars indicate the proportion from each wind farm stage that makes up the initial concern categories. The information flow stops here for respondents that did not have an initial concern and for respondents that are still in the initial pre-planning/planning stage. For respondents that did have an initial concern and that are now past the pre-planning/planning stage, the bar lengths on the right represent the sample size in each change of concern category ('no change in level of concern,' 'less concerned' or 'more concerned'). The width of the streams joining the initial concern bars and the change in concern bars indicate the contribution from *moderately concerned* and *very concerned* that make up the change in concern category.

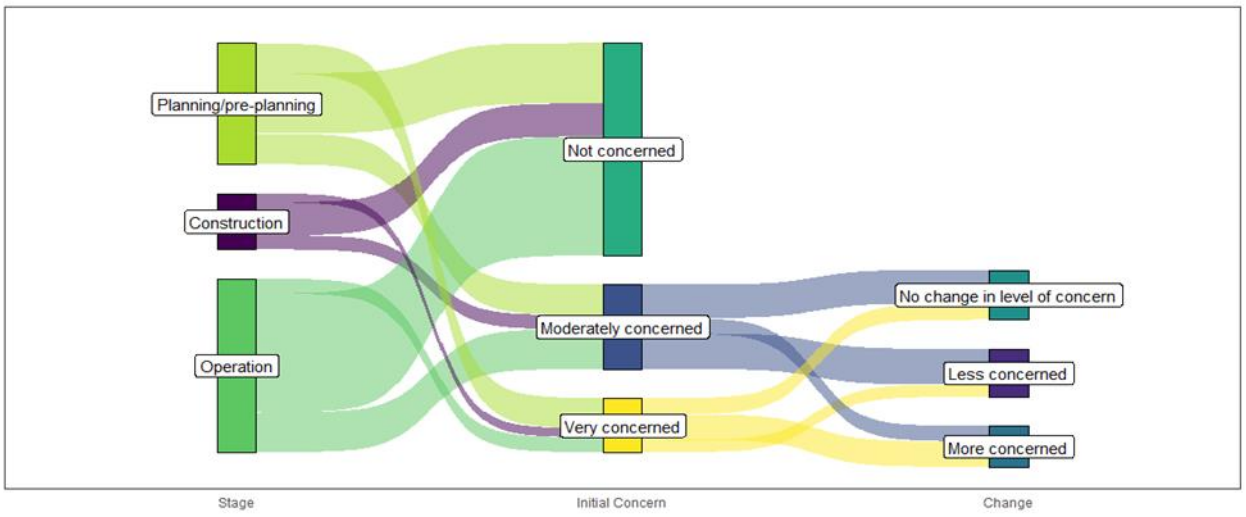
Shadow Flicker



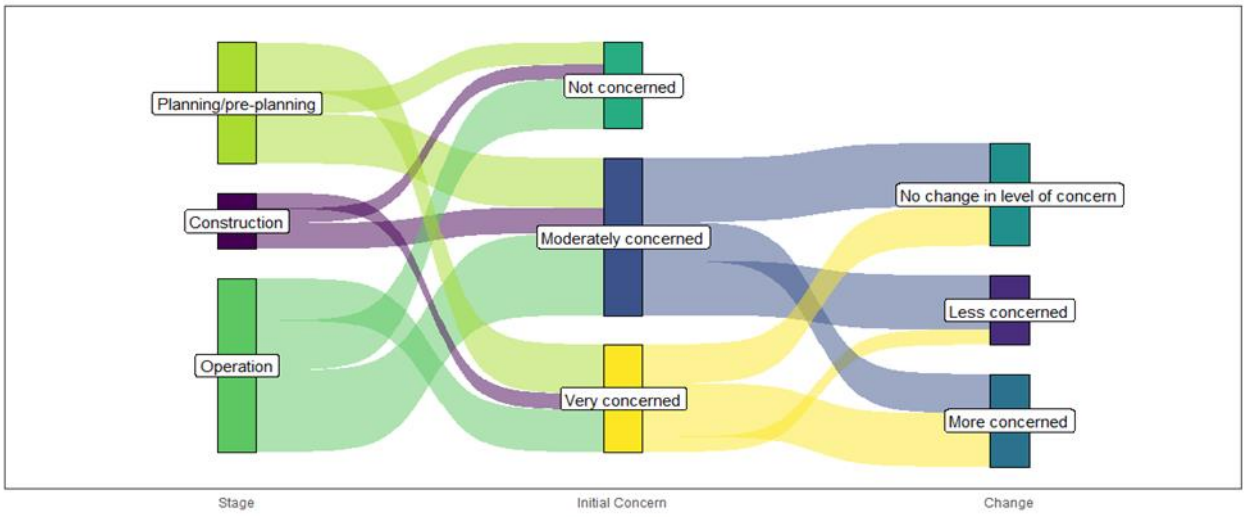
Excessive Noise



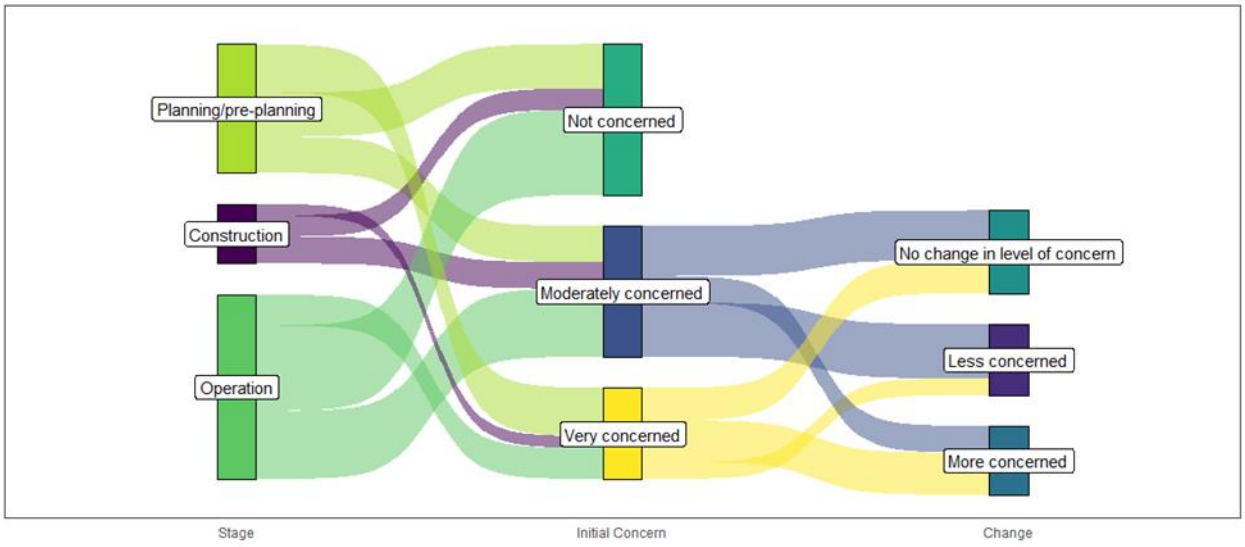
Tourism



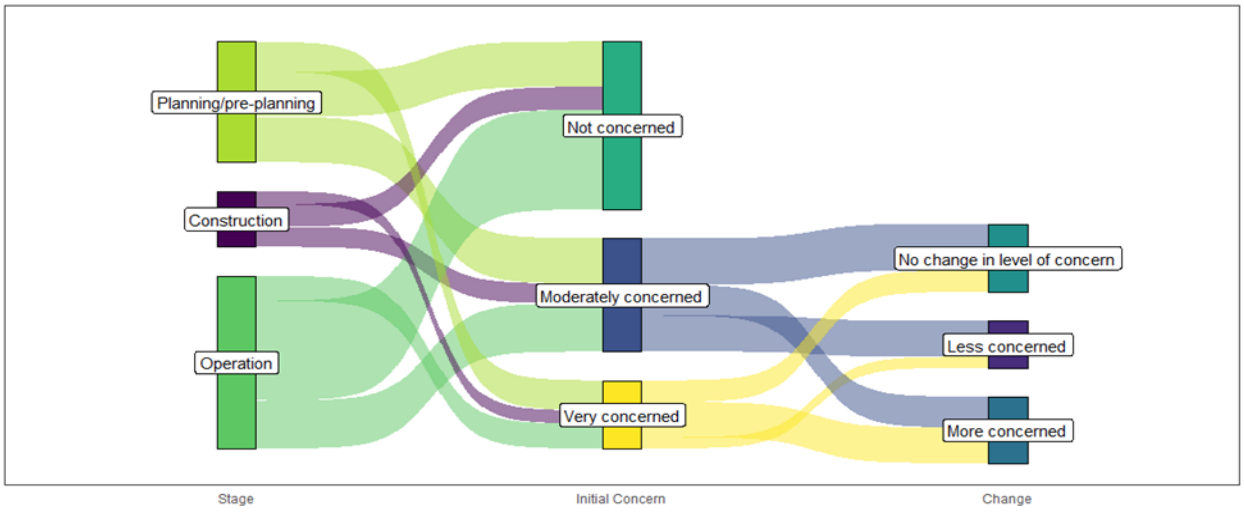
Wildlife



Heritage



Health



House Prices