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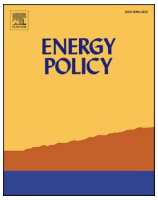

# Crowdsourcing social acceptance: Why, when and how project developers offer citizens to co-invest in wind power

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ABSTRACT

Citizen co-investment in wind energy projects has recently received a lot of attention among scholars and policymakers as a way to finance renewable energy projects and increase community acceptance of these projects. Citizen co-investment refers to the process by which members of the local community can financially participate in renewable energy projects prior to or shortly after construction. While previous research has often been cross-sectional and focused on the preferences of citizen-investors, this paper focuses on the perspective of project developers and asks why, when and how they offer citizens the opportunity to co-invest in wind farms. The work is based on the analysis of fourteen in-depth interviews with a sample of experienced German wind energy developers. The analysis shows that the decision to offer co-investment is driven by citizen demand and local stakeholder preferences, rather than financial needs. We shed light on how experienced developers deal with key trade-offs in terms of the timing of their offering and the choice of capital structure. As a result, we offer a number of testable propositions for further research on the nuanced relationship between citizen co-investment and social acceptance and derive recommendations for policymakers.

## 1. Introduction

Thanks to economies of scale and technological learning, wind energy is now one of the cheapest sources of electricity (Lazard, 2021). Due to its large resource potential and low cost, further expansion of wind power generation plays a central role in many national climate plans. Seven European countries already get more than 20% of their electricity from wind power, led by Denmark with a share of 48% (Wind Europe). The wind industry has undergone significant professionalization in recent years. In the early days, it was driven by the passion of individual farmers or grassroots initiatives who put up a few wind turbines. By now, multinational utilities are building large wind farms, and smaller, specialized developers are often working on an entire portfolio, allowing them to diversify the risk and redeploy their skills after selling completed projects to larger investors.

The trend towards professionalization and economies of scale has helped to improve the commercial viability of wind power, but it comes with its own challenges. Unless the communication process between project developers and local residents is properly managed, there is a risk that the greater distance between communities and wind power investors results in social acceptance challenges. However, even proper communication is not a guarantee for acceptance. Also, the increasingly competitive environment created by auctions and other policy schemes aimed at minimizing cost may decrease the diversity of actors (Côté et al., 2022), as citizen-led initiatives, such as wind farms owned and operated by community members, are being crowded out of the market (Weiler et al., 2021).

One suggestion to address the social acceptance challenges is to improve distributional justice by sharing the financial benefits with the local community. Some project developers voluntarily offer citizens the opportunity to invest in their projects, while others have set up community benefit schemes, which involve payments to the municipality or directly to citizens of the host community. Several governments in Europe have recently moved towards introducing regulatory frameworks for such schemes, or even making them mandatory. In contrast to community benefit schemes, co-investment implies that citizens do not only share the benefits, but it also requires them to put their own money at risk. A variety of financial instruments are being used for citizen co-investment, including equity- and debt-based models.

While the intuition that a fair distribution of risks and benefits improves acceptance is quite compelling, there are two important shortcomings in the prior literature linking citizen co-investment to social

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acceptance. First, much of the research is cross-sectional in nature, therefore failing to capture the dynamic processes of social acceptance. In our work, we address the period between the start of planning and the commissioning of the wind farm and explore why, when and how project developers use financial participation during this period. Second, while several scholars have investigated co-investment from the perspective of citizens and their willingness to invest (Ebers Broughel and Hampl, 2018; Goedkoop and Devine-Wright, 2016; Lienhoop, 2018; Linnerud et al., 2019; Vuichard et al., 2019; Yildiz, 2014), less attention has been paid to the perspective of the project developers and their design choices, or their decision to offer such schemes in the first place.

The present paper addresses both gaps by asking the following question: "Why, when and how do project developers offer citizens the opportunity to co-invest in wind power?" To answer our research question, we conducted fourteen qualitative interviews with a set of experienced project developers active in the German wind energy market. The rich industry experience of our interview partners allows us to come up with a nuanced conceptual framework of the role that co-investment play at key points in the project development process. Our findings suggest that improving social acceptance, rather than merely tapping into an additional source of financing, is the main driver for offering citizens to co-invest. They also illustrate how experienced developers deal with key trade-offs when designing such schemes, including the trade-off between allowing early participation and offering a secure investment, and the trade-off between pursuing an inclusive approach and keeping complexity manageable, and hence ensuring financial viability of the project. Finally, our results show that experienced developers are critically aware of the dynamics of community acceptance not just within a given project, but also with regard to their ability to implement future projects in the same region.

The paper proceeds as follows. Section 2 reviews the literature on wind energy project development, citizen co-investment and its influence on social acceptance. Section 3 introduces our methodological approach, Section 4 presents the results of our interviews and Section 5 concludes the paper by discussing the main findings, presenting an advanced conceptual framework, and deriving policy recommendations and opportunities for further research.

## 2. Literature review

### 2.1. Financing wind energy project development

As a mature technology, wind energy is attracting large amounts of investment worldwide. $138.2bn were invested globally in 2019 (Ajadi et al., 2020), representing about half of all global renewable energy investment combined. With a share of almost 80%, onshore wind continues to attract the largest amounts of capital. A large part of this is energy companies and institutional investors acquiring turnkey projects when they have been built (Bergek et al., 2013; IRENA, 2020). Long before such investments can be made, however, a particular type of player is laying the foundation for further growth of wind energy: project developers. Fig. 1 offers a stylized representation of the process of developing a wind project (Broughel and Wüstenhagen, 2022). The first stage is about identifying an appropriate site with conducive conditions, first and foremost sufficient wind speeds, but also access to the electricity grid and the infrastructure needed for construction and maintenance. This is then followed by securing land rights and taking wind measurements and other necessary assessments. The next stage is the permitting process, usually involving an environmental impact assessment. If and when all the necessary permits have been obtained, the actual construction of the project can start, followed by the operation phase, during which the project generates electricity and thereby revenues. At the end of the operation phase, the project is either decommissioned or replaced with new turbines (repowering). Throughout this process, the risk tends to decrease, while the value of the project tends to increase. In the very early stages, there is a high probability of failure, so similar to venture capitalists, the players investing here have developed specialized capabilities to cope with high levels of risk and uncertainty (Lam and Law, 2016).

One of the prominent risks in developing wind projects is social acceptance, and in particular community acceptance (Wüstenhagen et al., 2007). Especially when it comes to securing land rights and permits, local stakeholders can make or break a project (Enevoldsen and Sovacool, 2016). Therefore, successful project developers place particular emphasis on how to manage this risk and keep salient stakeholders satisfied throughout the entire process. The literature suggests that procedural justice, distributional justice and trust are three key factors to enhance community acceptance (Goedkoop and Devine-Wright, 2016; Schlosberg, 2007). Offering local citizens to co-invest in the project is widely seen as a promising way to address all three of those factors, and in particular distributional justice. Rather than just having to live with the impacts of a project (such as landscape change), citizens who are given the opportunity to co-invest can also get their fair share of the project's benefits, thus improving distributional justice (Leer Jørgensen et al., 2020; Musall and Kuik, 2011; Walker and Baxter, 2017; Warren et al., 2005).

Once a project has successfully made it to completion, there is often a change in ownership (or "exit"), comparable to a trade sale in venture capital (Rin et al., 2013), allowing an independent developer to sell their stake, realize profits, and redeploy capital to their next early-stage investment. Successful developers will take this exit into account in the decisions they make in previous stages of development, including the decision whether and under which conditions to invite citizens to co-invest.

### 2.2. Citizen co-investment, crowdfunding and crowdsourcing

Financing early-stage projects used to be the domain of specialized investors such as venture capitalists (Mazzucato and Semieniuk, 2018; Mollick, 2014). In recent years, enhanced by developments in

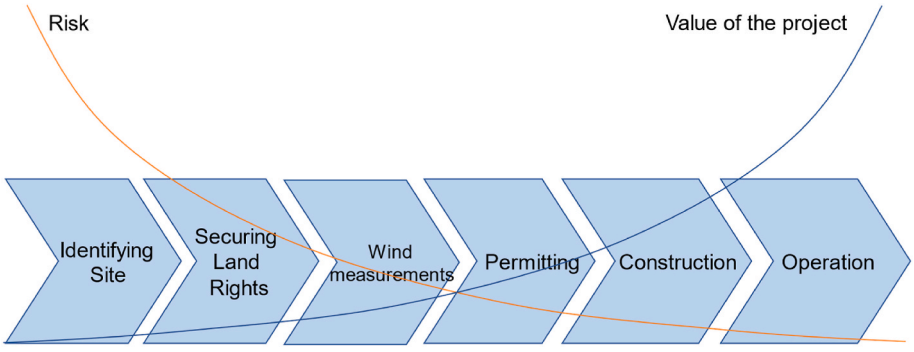


**Fig. 1.** Stages of the project development process (adapted from Broughel and Wüstenhagen (2022)).

information technology, crowdfunding has become an additional funding channel for risky entrepreneurial projects. Crowdfunding refers to an informal financing mechanism, whereby projects are briefly described on an online platform and investors can then decide which projects to find. In contrast to crowdfunding, where an investee seeks financial resources from a large number of outside players ("the crowd"), the term crowdsourcing refers to seeking non-financial resources, such as ideas, from the crowd (Allon and Babich, 2020). A range of different projects, from non-profit to for-profit and anything in between, participate in crowdfunding, and different platforms have specialized in catering to investors with a particular risk-return profile. On the for-profit side of the spectrum, crowdfunding platforms offer opportunities to invest in either debt or equity (Paschen, 2017).

When it comes to wind power projects, the idea of getting the "crowd" on board is reflected in citizen co-investment schemes. These are on one hand driven by the same trends as crowdfunding in other areas – the opportunities created by online platforms, investees' desire to identify new and uncomplicated funding channels – but are also part of a broader trend towards "democratizing" the energy system by allowing local actors to financially participate in shaping tomorrow's energy system, rather than leaving those decisions up to a small number of corporate decision makers or anonymous participants in financial markets (Solman et al., 2021; Szulecki, 2017). Similar to crowdfunding in general, citizen co-investment is offered with a variety of financial and non-financial motivations (Curtin et al., 2019; Salm et al., 2016).

One of the promises of both crowdfunding and citizen co-investment is that it circumvents the inconveniences of financial market regulation and offers an unbureaucratic way for entrepreneurs to tap into new sources of capital (Rossi, 2014). This, however, might be a transient phenomenon, as crowdfunding has repeatedly been criticized for representing an unprofessional investment environment, giving uninformed retail investors access to high-risk investments that they poorly understand. Similarly, high-profile failures tend to lead to calls for more stringent regulation, as it was the case in Germany after the collapse of Prokon Wind, a financial service provider specializing in raising funds from retail investors for wind power projects.[1]

### 2.3. Financial participation and social acceptance

From the point of view of a project developer, allowing citizens to financially participate in wind projects has a dual appeal: It represents an additional source of financing, and it is supposed to have positive spillover effects on social acceptance. As mentioned above financial participation can come in different forms. Citizens can either become co-owners of a wind farm by investing in equity, or they can become lenders to the project by investing in debt (see Fig. 2) (Beery and Day, 2015). The most common form of equity investment in Germany is the limited partnership, which gives equity investors full voting rights (Holstenkamp, 2014). In terms of debt investment, subordinated loans allow developers to raise up to 6 million Euros per project with a maximum of 25,000 Euros per person. The corporate finance literature would suggest that developers prefer issuing debt because it lowers the cost of capital and allows them to retain full ownership (Graham and Harvey, 2001). However, in the early, high-risk stages of a project, debt may not be readily available.

A third option are community benefit schemes that allow citizens (e.g., through their local municipality or an independent fund) to participate without investing (Cowell et al., 2011; Kerr et al., 2017; Strachan et al., 2015). All these options appear to be related to an increase in distributional justice compared to a situation where there is no financial participation (Beery and Day, 2015; Lienhoop, 2018). Vuichard et al. (2019) have investigated which of the three options is most effective at increasing acceptance among citizens in Switzerland and found somewhat inconclusive effects. Their results show a small but not significant effect of community benefit schemes on social acceptance compared to a scenario where there is no financial participation. As for co-investing in a wind farm via equity or debt, they find a slight preference for equity. Distinguishing between different investor segments, it becomes evident that some forms of financial participation can even decrease social acceptance, whereas it is most effective in increasing acceptance among citizens with a progressive-centrist political orientation. These findings offer an interesting starting point for our investigation. We build on prior research by adding the project developers' perspective and hope to shed more light on some of the nuances and moderating factors through a qualitative approach.

## 3. Data and methods

This study is based on fourteen semi-structured interviews with German wind energy project developers who had experience in designing financial participation models. While the sample included a range of different developers, our focus on experienced developers excluded organizations on the pure grassroots end of the spectrum. We consider both professional and citizen energy organizations as independent developers.

The interviewees all had more than 2 years of experience with project development and stakeholder management. Some had more than 20 years of experience. We studied developers and utilities of various sizes, from sole proprietors to international corporations. Some companies operate only locally, others all over Germany, across Europe or even worldwide. Whether small citizen energy associations or large corporations, all companies are subject to the same approval mechanisms. Financial citizen participation in the form of co-investments was not required by federal or state laws at the time of the interviews.

Germany was chosen as the empirical focus of the study because it represents one of the largest European onshore wind markets. The German case is also of interest because new installations had been slowing down in recent years, which was largely attributed to social acceptance issues (Ruddat, 2022; Stede et al., 2021). The country has a long tradition of community and cooperative ownership in the energy sector, and both federal and state-level governments have recently started experimenting with regulation aimed at increasing social acceptance via local financial participation.

Interviews were conducted between April and July 2021 by phone or videoconference and were recorded, fully transcribed, and analyzed. All respondents consented to the recording under conditions of confidentiality. Anonymized information about the sample can be found in Appendix I.

The interview guideline (Appendix II) started with open-ended questions about the background of the project developer and their views on wind energy in Germany, followed by a set of questions about participation in general, and financial participation in particular, especially co-investment models. Interviewees were invited to talk about their most successful and unsuccessful projects, and the reasons for success or failure from their perspective. To ensure that all the topics that the interviewees considered important were covered, the interviews were ended by asking if there was anything else they would like to say that had not yet been addressed. Based on the insights from the initial interviews and in light of the experience level of respondents, it turned out to be effective to let interviewees talk relatively freely about their projects, and only revert to the survey instrument in case important aspects were left untouched.

All interviewees had designed at least one co-investment model for an existing wind farm or a project that is currently under development. The sample consists of developers with experience in different locations across Germany and a variety of organizational backgrounds. The initial contacts resulted from a secondment of one of the co-authors with one of

[1] Holtermann, F., Iwersen, S., Nagel, L.-M., Verfürden M. (2021): "Im grüngrauen Sumpf" ["In the green-grey swamp"]. Handelsblatt, September 17, 2021, pp. 44–50.

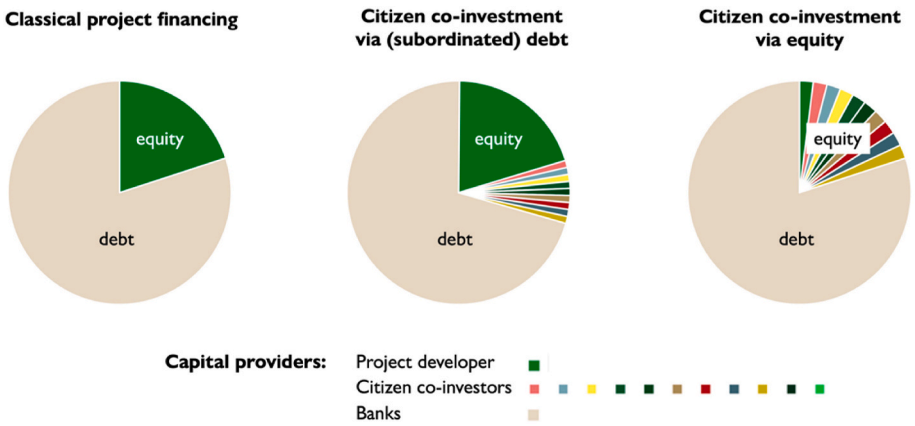


**Fig. 2.** Types of co-investments considered in this study (Note that the size of each segment varies from project to project).

the leading consulting firms for citizen co-investment models in Germany, which helped to establish introductions to a set of high-quality interviewees with significant experience in the field. through referrals and contact information on crowdfunding platforms and project websites. Of the fourteen interviews, six were referred through business relationships. Two others were recommended by interviewees, but there was no business relationship between them. The remaining six interviewees were found through crowdfunding platforms and extensive online searches.

While our qualitative research approach was not aiming at a representative sample per se, how do our interviewees compare to the overall population of German project developers? Given the broad spectrum of players and the changing nature of this industry, it is difficult to determine the exact size and structure of the target population. The Fachagentur Windenergie an Land (FA Wind[2]), a public-private partnership involving government agencies at federal and state level, firms, industry associations and environmental NGOs to support the development of onshore wind in Germany, lists 16 major corporate members from the energy industry, all of whom are active in wind energy project development. A major German renewable energy industry portal[3] lists the names of 15 developers, eight of which overlap with the FA Wind membership directory. Based on these numbers, we assume that there are about 20–25 major project developers in the German market. In line with Deutsche WindGuard, we expect those 20 to 25 major developers to account for about two thirds of all installed capacity in Germany. The remaining third of the market is very diverse and involves a large number of small and medium-sized players, often only active on a local scale. We estimate that several hundred players have developed onshore wind projects in the different German regions in the past, but many of them are no longer active today. Our sample reflects this diversity of the population of project developers by including respondents working for a balanced mix of small, medium-sized and large organizations, and by including both electric utilities as well as independent project developers (including citizen energy organizations).

The transcribed interviews were analyzed according to the bottom-up thematic analysis as described by Braun and Clarke (2006). The first step of the method includes listening, transcribing, and reading the interviews. Based on this, the second step involved the researcher creating the initial codes. The codes are based on the findings that emerged after the initial engagement with the data. This engagement with the data resulted in a long list of codes, which were combined into themes in a third step. In a fourth step, the themes were revised. This involved re-coding the interviews once again. It was checked if the results fit the themes or if they had to be adjusted again. After some iterative steps, the themes presented in the following section emerged as to why project initiators offer co-investment. The final step of the analysis is reporting of the results.

## 4. Results

This section will report on the main findings along four main clusters that emerged from the expert interviews. Each of the following sections will address one of the following sub-questions:

1. Why do project developers offer citizen co-investment?
2. When do project developers offer citizen co-investment?
3. To whom do project developers offer citizen co-investment?
4. Which type of citizen co-investment do project developers offer?

Taken together, the insights gathered with regard to those sub-questions will allow us to answer the overall research question of the paper. To strike the right balance between conveying the rich nuances emerging from the interviews and capturing the main findings in a condensed form, we will on one hand present specific interview quotes supporting the argument in each subsection, and on the other hand end each subsection with testable propositions for further research. At the end of this section, we will present a revised model of the project development process to visualize the main findings.

### *4.1. Why do project developers offer citizen co-investment?*

At first glance, it may seem obvious why a project developer would invite new investors: financing a wind farm requires substantial amounts of capital, and the more sources of funding the developer can tap into, the better. But is financing really the bottleneck for onshore wind projects in Germany? Evidence from great number of our interviews suggests that this is not necessarily the case. Several developers pointed out that the demand for wind power investment opportunities tends to exceed supply, as this statement illustrates:

> "[For citizen investors,] it's highly interesting. It's going to be ripped out of your hands. (…). So there's no need to worry about that." (Interview 8)

One interviewee mentioned an experience with offering citizen the opportunity to co-invest in a specific project saying "we needed four million Euros for this wind park. (…). People offered 14.5 million Euros. That is more than three and a half times." (Interview 2)

In addition to the strong demand from citizens expressed by these respondents, there are also other funding sources. Several developers mentioned that bank financing has become much easier in the maturing German wind market. So how, then, do developers decide which funding sources they prefer, and what is the rationale for using citizen co-

[2] https://www.fachagentur-windenergie.de/ueber-uns/mitglieder/.
[3] https://www.windbranche.de/firmen/info-298-projektierer.

investment? Some of the literature would suggest that funding from citizens would offer a low-cost source of capital, and thereby allow project developers to reduce financing cost (Salm et al., 2016). The developers in our sample, however, regardless of whether independent developer or utility company, seemed to disagree, especially in light of the current low-interest rate environment as the following quote suggests:

> "Of course we could have refinanced ourselves much more cheaply [if we] raised funds on the market than through citizen participation. (…). So I think these are quite expensive projects, the citizen co-investment projects. Because, as I said, the interest rate is 1–1.5 percent higher than how you can refinance on the capital market." (Interview 3)

**Proposition 1**. *When it comes to financing German onshore wind projects, supply of capital exceeds demand. Therefore, project developers do not rely on citizen co-investment as a source of financing.*

**Proposition 2**. *Offering citizen co-investment opportunities increases, rather than decreases, a wind project's cost of capital.*

If there is no shortage of other sources of capital, and if the cost of acquiring citizen co-investment is indeed higher than tapping into alternative sources of capital, there must be other reasons that lead project developers to consider co-investment offerings. An important driver that has repeatedly been mentioned by all types of developers is the link to social acceptance, as this statement illustrates:

> "How do you involve the communities, the residents there? And how do you get more acceptance for follow-up projects? And that's actually the main reason of why we've been offering citizen participation in the last two years, in terms of frequency, amount and conditions." (Interview 14)

Interviewees seem to have a common understanding that citizens eligible for investment should preferably live near the turbines. Sometimes developers specify a radius of a few kilometers within which citizen investors must live, while in other cases citizens in surrounding zip codes of a planned wind farm site are eligible for investment. As several interviewees mentioned, the aim of increasing social acceptance relates to current projects. However, it also aims at enabling future projects. Whether or not citizen co-investment is linked to social acceptance depends on when, to whom and how project developers offer financial participation. This is going to be further discussed in the next subsections.

### 4.2. When do project developers offer citizen co-investment?

When introducing the project development cycle shown in Fig. 1 above, we pointed out that two stages can be identified where local stakeholders can either make or break a wind project: securing land rights and permitting. Our interviews show that experienced project developers are mindful of the time dimension of social acceptance and try to take this into account as they design citizen co-investment offers tailored to critical milestones.

> "It is all about timing, at what point of time do you launch such a project?" (Interview 1)

When it comes to securing land rights, our interviewees stated that the municipality is often asking for financial participation as a prerequisite for a land lease.

> "But it also always depends on who you are talking to. Is it the municipality that is now saying we would like to have public participation? Is it the municipality that is even the grantor? And that makes this a prerequisite, so to speak, for signing an agreement in the first place: A binding promise of some kind of public participation. This means that a developer is, quote unquote, 'forced' to hold out the prospect of such an offer." (Interview 7)

Interviewee 8 shared the experience that offering the prospect of financial participation improves the chances of securing a site:

> "This is a very, very competitive market. And first and foremost, it is important to secure sites. In other words, it is important to stake your claims. And depending on the project, the issue of direct or indirect participation can play a role [in securing a site]."

The other stage where financial participation can be crucial is further downstream in the project development process, when it comes to the time before officially applying for the permit. According to the interviewees, local authorities will take public opinion into account when making such decisions, and a larger number of beneficiaries may lead to more favorable sentiment in the community than if it was only a few landowners who financially participate. While unlike in other countries (e.g., Switzerland), it is the exception rather than the rule to have a popular vote about a project, local politicians will take their voters' opinion into account as they take decisions related to the project. This can also be leveraged by opponents. One interviewee pointed out how vocal opposition had an influence on the permitting process:

> "The council wanted to decide that the land use plan would be changed accordingly, as we had previously discussed for many years. And one week before this council meeting, a citizens' initiative against wind energy appeared (…) who did good a good job with public relations and has worked with fear. This unsettled the council so much that it said, no, let's not do this right now." (Interview 1)

Given that offering citizens the opportunity to co-invest could have positive effects on social acceptance at both an early stage (around securing land rights) and a later stage (shortly before the permitting phase), but that this offer can only be made once, the question arises what the perfect timing of such offers is. This turns out to be a non-trivial trade-off that many interviewees mentioned. One respondent summed it up as follows:

> "It is very, very difficult to catch the right moment. Because when you think about it, you first have to talk to the landowners to see if you can do something with the land. Conclude lease agreements with them. (…). That is, the moment you talk to people, things start to get public. Because they tell their neighbors or someone else. And then those say: 'What? Someone wants to build a wind turbine! What can you do and I've never heard anything about it.' And that's a point in time when you can't really say anything for sure. Because first of all, you don't know if the person will sign. Then you have maybe five or six owners, of whom you also don't know whether they will sign. And then rumors start. And you have to try to communicate as much as possible. And yet uncertainties arise, because you can't say at all what the project will look like. And that is a very, very sensitive point. To say when I can really start communicating. When can I reaching out to the population? And it's often the case that the mayors, the landowners or, in some cases, the people who are out and about, they underestimate this. And when rumors start flying around, it's difficult to get them back." (Interview 6)

On one hand, to avoid rumors and negative word-of-mouth, it would be desirable to offer financial participation as early as possible. But on the other hand, as Interviewee 6 pointed out, there is a trade-off between communicating (and ultimately co-investing) at an early stage and being able to offer reliable information and a secure investment. This is confirmed by another interviewee, reporting on the experience with one of their projects:

> "[In the early stages of the project] of course the risk is insane, at what point do I go in? I have a project now. It's almost finished. We're probably going to somehow apply for a permit, and hopefully get one. And maybe build next year. But we needed to pre-finance

much earlier, so we wrote an incorporation agreement, founded a company. And at that time, all the citizens, all the neighbors had to sign how much money they would put into it. And I went in very conservatively, because I was aware of how high the risk was that this project would not be implemented at all. So I'm almost surprised that so many people have actually put a large sum of money into it. (…). Now they are lucky that it actually works out." (Interview 1)

Apart from hoping for the best and "being lucky", one factor that can mitigate this trade-off between launching a citizen co-investment opportunity early vs. later in the process, some developers address the issue with a staged communication approach. By making a general announcement about their intention to offer financial participation early in the process, they set the expectation that the locals will be able to co-invest. By making the actual specific investment offer at a later stage, they take advantage of the fact that some of the initial uncertainties will be resolved before citizens will actually have to put their money on the table. This is how one project developer describes this time lag:

"As a project developer, we also offer citizen participation with the aim to get the local people on board. And that's why it should actually be done very, very early in the project development. On the other hand, you can't. Because if you want to offer a really secure [financial] product, you actually need all the specific values, such as the remuneration you will get under the EEG [Renewable Energy Act]. (…). There is a gap of three to five years between when we actually want to offer it, namely at the moment when we are on site, when we talk to the community. Where we say, okay, we are actually prepared to offer citizen participation. And the moment when you can actually put everything on the table that an investor, a private investor, would like to see." (Interview 7)

The time lag in the development process can be used as a way to balance both objectives, but there may be limits to this approach. The interviewees stated that waiting for too long with making a specific offer could have a negative impact on the momentum in the local community and hamper the credibility of the developer.

We summarize the main interview findings with regard to when project developers offer citizen co-investment opportunities with the following propositions.

**Proposition 3**. *Announcing citizen co-investment as early as possible increases its impact on social acceptance.*

**Proposition 4**. *Making a specific citizen co-investment offering and collecting money too early increases risk that the project developer cannot keep the promise or that investors lose their money.*

**Proposition 5**. *Successful project developers use a staged communication approach, where they make a general announcement early in the process, followed by a more specific offering at a later stage.*

### 4.3. To whom do project developers offer citizen co-investment?

Apart from the timing of the offering, another interesting trade-off surfaces when reflecting about to whom the co-investment opportunity should be offered. From the point of view of maximizing the impact on social acceptance, it seems desirable to take as many people as possible on board as co-investors, and that appears to be the strategy of some project developers:

"We had capped the participation at 5′000 [Euros per person]. In terms of volume, it would have been possible to raise considerably more money if we had allowed larger amounts per capita. Because that would certainly have been appealing to some people. But that wasn't the goal in the first place: to raise as much money as possible. It was to reach as many people as possible." (Interview 11)

Such an inclusive strategy, however, has two drawbacks, as a large number of interviewees stated. First, as mentioned above, especially in the early stages of developing a project, the risk is quite high, and perhaps too high for the average retail investor. Second, every new investor that is taken on board tends to increase transaction cost. Making decisions with a small number of investors is a lot easier than doing the same if a project has hundreds of citizen co-owners. This becomes particularly relevant when the developer wants to add new shareholders or exit the investment at the end of the project cycle, as this statement illustrates:

"Let's put it this way, an [institutional] investor naturally has no great interest in having any micropartners in such a financial structure." (Interview 8)

Some developers, especially those who categorize themselves as citizen energy organizations, said that they do not want to exit and therefore hundreds of citizen co-owners are not an issue for this reason. However, they pointed out some challenges, such as that it is almost impossible to add new citizen investors later.

The following two propositions summarize our main findings with regard to how project developers decide to whom they offer an opportunity to co-invest:

**Proposition 6**. *Offering co-investment opportunities to as many local citizens as possible increases its impact on social acceptance.*

**Proposition 7**. *Citizen co-investment has to be traded off against the desire to have a clean capital structure at the time the project developer wants to exit.*

### 4.4. Which type of citizen co-investment do project developers offer?

Picking up on the somewhat inconclusive findings of Vuichard et al. (2019) about citizen preferences for various forms of financial participation, how do project developers decide which of the financing instruments sketched out in section 2.3 to apply? Which form of financial participation do they prefer, and what do they think best fits their dual objectives of finding social acceptance for a project and earning a decent return? Based on our interview findings and what we have laid out in the previous sections, we propose that a key to resolving the apparent incoherence in prior literature is to take the dynamic nature of the project development process into account. There is no one size-fits-all approach to determine an ideal co-investment model, but the offering can be tailored to where a specific project is located, both in the development cycle and geographically.

Before thinking about which instrument to choose, it is important to take into account the preferences of both parties, the developer and the prospective citizen investors, in terms of who should hold the decision-making authority. One developer describes his considerations as follows:

"I think a lot of it comes down to the amount of funding you want to raise. But also, to what extent you want to involve investors in decision-making. Or how little you want to involve them. (…). That's the most important question you should ask yourself at the beginning when choosing a form of investment." (Interview 11)

While some of the social acceptance literature seems to suggest that giving more decision power to the locals is always better, our interviewees had some doubts whether this is actually what all citizen investors want:

"I don't know if people really want to have a say. You know, if I participate as a shareholder, maybe I don't want to participate in the company at all. I just want to invest money." (Interview 3)

Comparing the possibility to invest via equity or debt, our interviewees seemed to agree that in general, there is a larger number of investors who are interested in the lower-risk profile that is typically associated with debt, while the higher risk profile of investing in equity is (and should be) offered to a more restricted set of investors:

> "So it depends on what your target audience is. If, of course, you only want to work with, let's say, semi-professionals, professionals, [issuing equity] is an option. But if the goal is to get local residents on board, there is no point inviting people to participate as shareholders." (Interview 3)

In the German context, subordinated loans appear to have become the preferred instrument for citizen co-investment in wind energy by many developers. According to them, as a form of debt, subordinated loans offer a relatively low risk profile (compared to equity), although some of our interviewees pointed out that the lender still faces the risk of a total loss. One thing that makes citizen co-investment via debt more attractive to both parties involved is the lower complexity of the transaction, or, as one interviewee put it:

> "You also have to be able to understand it as a non-financial person, as an ordinary human being." (Interview 3)

However, as some interviewees pointed out, the preference for financial participation models may be different for experienced citizen investors, e.g., farmers, who are more used to taking entrepreneurial risk and making professional investment decisions. Therefore, as our interviewees pointed out, farmers have been frequent investors in wind energy projects in some parts of Germany, especially in the North and West where the sector has the longest history:

> "The North has grown up with it. Every farmer has put up a wind turbine. 10 or 20 farmers have joined forces, they know it, they have made money [with wind energy] in the last 20 years." (Interview 7)

> "Even as a small farmer, you get used to those sums. Already with the small turbines, the cost was around 300′000 Euros. And they knew that if everything goes wrong, a [farmer's] company can go bust." (Interview 5)

Given their long-standing experience with wind investments and their embeddedness in rural communities, farmers can also be very effective ambassadors to convince other co-investors:

> "Nothing compares to when some veteran farmer, who already started with wind power 20, 30 years ago, stands up [in a meeting] and says for two and a half minutes: 'You know what guys, I've done this before, that's gonna work.'" (Interview 1)

While meeting the preferences of their target audience, the challenge of keeping transaction cost low is another factor that according to the interviewees determines how broadly a project developer invites citizen co-investment.

Issuing equity, on the other hand, tends to be subject to stricter regulation by financial market authorities as many interviewees stated, which basically results in the developer (and their lawyers) having to prepare a detailed prospectus, which can cost up to 100′000 Euros according to one interviewee. Complexity also increases because managing a larger number of equity investors comes with additional effort on the side of the developer, as this interviewee vividly points out:

> "The disadvantage is really an enormous administrative effort if you have 300 limited partners per wind farm. (…). And then they also always bring different concerns and thoughts and worries. And not everybody always reads their letters the way they should, I'd say. So when you have to deal with a lot of people, then the probability increases that there are a few, well, annoying things in there from time to time." (Interview 13)

Contrary, there seems to be consensus among the interviewees that debt-based models have lower transaction cost compared to equity-based models. On the one hand, regulations are less strict, e.g., no prospectus is needed. On the other hand, debt-based models allow a higher degree of standardization of financial participation, e.g., through IT.

> "In other words, these difficult financial market regulations, prospectus requirements and so on, already set the bar enormously high, so to speak, for people to be able to participate. And we are looking for ways and means to actually do that." (Interview 2)

> "And that's why we have also developed these products in order to standardize them. Because it's a huge effort for us internally to look at each location and see whether they' d rather have a savings bond with the regional bank or whether they'd rather have this or that." (Interview 8)

Finally, we summarize that the choice of instrument depends on the timing of the offer. Equity-based models seem to work well in early stages, while including citizens at a later project stage seems easier with debt-based models. To conclude, as for the preferred type of financial instrument, we find that:

**Proposition 8**. *Citizen co-investment* via *equity is more suitable to offer in the early stages of a project, while debt tends to be more suitable in the later stages.*

**Proposition 9**. *The higher risk implied by equity investments resonates more with (semi-) professional investors, whereas a majority of citizen investors prefer the lower risk profile of debt.*

**Proposition 10**. *Keeping transaction cost and complexity low is a key consideration when developers choose the most suitable financial instrument for citizen co-investment.*

## 5. Conclusion and policy implications

### 5.1. Summary of main findings

Fig. 3 summarizes the key findings from the interviews and allows us to answer the research questions based on a more nuanced view of the project development process and the relationship between citizen-co-investment and community acceptance. All findings are based on information provided by respondents and should be treated as such. We selected only those outcomes that were mentioned repeatedly by different interviewees.

Project developers considering offering citizens to co-invest in a wind energy project are faced with a trade-off: Making such an offer in the early stages of the project maximizes the opportunity for citizens to shape the project outcome and may thus be preferrable in terms of procedural justice. At the same time, the early stages of project development are characterized by high levels of risk, and the ability to offer a secure form of co-investment improves in later stages. We find that project developers address this trade-off in two ways: First, they distinguish between early-stage investment, offered to a smaller number of experienced and risk-taking investors, and later-stage investment, directed towards a broader, more risk-averse audience. Second, experienced project developers try to make productive use of the time lag between announcement and closing. They tend to announce their intentions to offer citizen co-investment opportunities early on, often in the context of securing land rights, and then wait with further specification until the project has gone through further de-risking. Ideally, this will also allow them to address citizens with a specific offering around the time of reaching crucial milestones like getting ready for the permitting process. We illustrate the developer's approach in Fig. 3 by triangles (orange for equity and blue for debt). The blank triangle illustrates the approximate timing of the announcement (often without mentioning details). The light triangles represent the time when developers start to make specific offers, and the dark triangles show the time when the offers are closed, and citizens can no longer invest. As the bars at the bottom of the figure show, there is some flexibility here. In the very early stages, when risk is high (or "insane" as Interviewee 1 put it), equity may be the only option. In the later stages, both equity and debt are used for broader citizen investment, often with a preference for

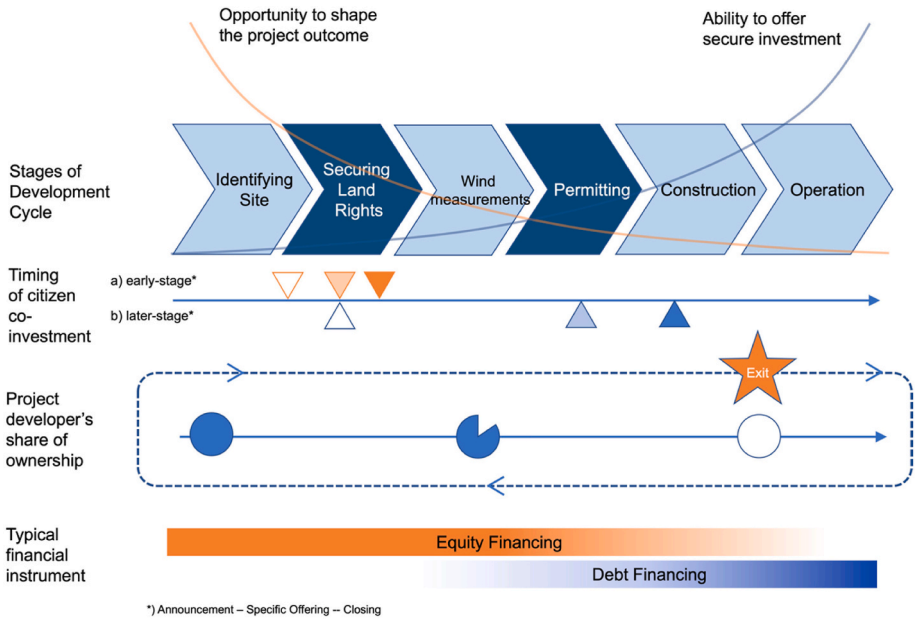


**Fig. 3.** Advanced conceptual framework of citizen Co-investment in the project development process.

debt (or specifically subordinated loans) due to the higher security offered to small investors and lower transaction cost.

Many project developers' business models are specialized in the early stages of the process, ranging from site identification to construction, while they tend not to own operating assets. In these cases, any decisions they take about co-investors will be taken with their exit in mind. This can, for example, further increase the preference for debt over equity, as a clean capital structure makes it easier to find an acquirer in the transaction. Considerations about preparing for a successful exit, as well as about keeping capital cost low, are also driving the decision of many project developers to keep the share of equity ownership offered to citizens within certain limits (often up to 10 or 20%).

### 5.2. Policy implications

Our research findings suggest that incentivizing co-investment is done most effectively with a nuanced understanding of where and when along the project development cycle which type of citizen co-investment is most likely to be helpful. When it comes to the early stages, where risks are high, project developers tend to target a smaller set of risk-taking co-investors who are willing to provide equity with the understanding that there is a considerable probability of losses. These early-stage co-investments are on one hand desirable for anchoring a project in the local community early on, but they may also backfire if financial losses materialize.[4] They can be supported with tax incentives, but due to the trade-off between broad participation and the risk of financial losses, policymakers should apply caution when considering to promote early-stage co-investments to wider circles of citizens. Policy support that is particularly valuable to these kinds of investments would be anything that reduces the risk of further delays in the planning and permitting stages, and the availability of sufficient land for new wind project development. As an example, the recent proposals by the German government and the EU Commission to further streamline permitting procedures are a step in the right direction.

Later-stage investments may be useful for supporting broader community acceptance by allowing a large number of citizens to financially participate in the project. The regulatory framework at this stage should reduce complexity and transaction cost. Given that projects have largely been de-risked at this late stage of the development process, there is less need to impose complicated measures and lengthy documentation aimed at protecting retail investors from the risks that are inherent in the early stages of new projects. As such, the trend towards ever tighter regulation of some segments of the financial market, which was perceived as increasing bureaucratic burden by some of our respondents, may be counterproductive. Tax incentives may have relatively less of an effect here, because the citizens involved tend to invest smaller amounts, but they may still be valuable as a signal that this is a credible investment category that offers reasonable risk-adjusted returns and contributes to an important societal goal, accelerating the low-carbon energy transition. What is also valuable for de-risking those later-stage investments is the prospect of not being fully exposed to electricity price volatility, so offering feed-in tariffs, contracts-for-differences, power purchase agreements or other forms of (partly) fixed compensation that hedges price risk can be a valuable indirect form of supporting citizen co-investment in renewables.

Policy measures aimed at increasing actor diversity may also be useful to promote citizen co-investment, in order to avoid crowding out local initiatives in, for example, competitive bidding processes. Lastly, an improved understanding of the dynamic nature of the project development process among local authorities and financial institutions, through training programmes and best practice case studies, would help to make developers more comfortable incurring the additional complexities of getting citizens involved in co-investing.

### 5.3. Limitations and further research

As any piece of research, our work is subject to some limitations that can be the starting point of further research. First, our research is based on a set of qualitative interviews with experienced project developers. While their longstanding experience was helpful in offering deep insights into their strategies and practices, we cannot exclude the possibility that some of their views are not representative of the whole population of project developers. Future research could complement our analysis by talking to less experienced or unsuccessful developers, or those that have considered citizen co-investment but actively chosen not to pursue it. A larger, quantitative survey of project developers might also be insightful, provided that a large enough high-quality sample of professionals can be convinced to share their insights in such a format.

Second, for the sake of having a coherent sample, we chose to focus

[4] cf. the high-profile failure of Prokon Wind mentioned above in Section 2.2.

on one country, Germany, which has a long-standing history of wind energy development and citizen involvement in the energy transition. Future research could replicate our study in other wind energy markets, including those at different stages of development (e.g., the less mature Swiss market) or with different attitudes towards citizen involvement (e.g., US or China). While we believe that the general dynamics of the project development process should be quite constant across geographical regions, differences in the institutional framework may lead to different conclusions as to how best to incentivize citizen co-investment. These institutional influences may well extend beyond energy-specific issues and include taxation regimes and financial market regulation and preferred financial instruments. As early results from the implementation of community energy concepts across the European Union show, it is challenging to find one-size-fits-all approaches for citizen involvement that effectively work across different cultural settings.

Third, we focused our analysis on a particular form of financial participation, namely citizen co-investment. Some of our developers mentioned that they also have experience with community benefit schemes, where local communities or local citizens can financially benefit without having to put their own money at risk. Future research could systematically compare these two forms of financial participation, thereby also informing policymakers in countries (including, most recently, Germany) which have opted for legislation that regulates community benefit schemes. This would also allow finding out to what extent the two forms of participation are complementary, or whether one is crowding out the other.

Fourth, this paper reflects the perspective of project developers. Their perspective is important, but not the only one in the field, and successful policies will always have to strike a balance between the interests of a variety of stakeholders. This limitation concerns among others the policy recommendations, which would benefit from triangulation with other stakeholders, such as citizen investors. While we believe that high-risk co-investments should not be offered to inexperienced citizen investors, we do think that citizen involvement at an early stage is desirable and should be encouraged. We recognize a need for research on how to manage the trade-off, possibly digging deeper into the contractual relationships used by successful project developers to govern the time lag between funding commitment and drawdown.

## CRediT authorship contribution statement

**Jakob Knauf:** Conceptualization, Methodology, Formal analysis, Investigation, Resources, Writing – original draft, Writing – review & editing, Visualization. **Rolf Wüstenhagen:** Validation, Investigation, Writing – original draft, Writing – review & editing, Visualization, Supervision, Funding acquisition.

## Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: One of the authors of this paper has also been a member of the guest editorial team of the Energy Policy Virtual Special Issue “Dynamics of Social Acceptance”, but declares that he has neither been involved in the review process of this paper nor the editorial decision.

## Data availability

The authors do not have permission to share data.

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## Appendix A. Supplementary data

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