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# **Journey Mapping Distributed Wind Deployment: Installer Perspectives**

September 2024

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## Summary

This work uses journey maps to assess the deployment of distributed wind technologies through the perspective of installers. Journey mapping is a human-centered design method that chronologically traces processes from the perspective of those who participate in them. The journey maps will be leveraged to identify deployment pain points (i.e., manifestations of generic deployment barriers) that the Strategize, Engage, Network and Deploy (SEND) Distributed Wind project team will seek to address in future work. Work to date and next steps include:

- Six distributed wind installers agreed to participate in this study, each completing a pre-interview survey and participating in a 30–60-minute semi-structured interview.
- The project team used a combination of inductive and deductive coding to categorize pain points and quantify the frequency at which installers discussed each pain point.
- Permitting issues, lack of public knowledge, and an underdeveloped market were the most frequent pain points discussed.
- Two personas, the “seeker” and “responder”, were developed to communicate the characteristics of installers who participated in the study.
- The “seeker” tends to spend significant time advertising and reaching out to customers who they believe have a good wind resource. Installers fitting this persona work to create meaningful customer relationships by building trust and crafting a compelling case for why customers should choose to install distributed wind.
- The “responder” places less (and sometimes no) emphasis on advertising. They instead receive direct inquiries from potential customers, which are likely the result of word-of-mouth recommendations. The responder then forges a relationship with a customer, typically through education and first order assessments of energy production and financial return. This relationship can be short-lived if installers discourage deployment in areas without favorable wind resources.
- The resulting journey map for installers, informed by the personas, shows two divergent sets of pain points during the customer outreach and acquisition stage. The journeys for the two personas converge during the siting and installation phase, with installers largely sharing similar experiences throughout the rest of the deployment process.
- In future work, the journey mapping methods applied to distributed wind installers will actively be applied to distributed wind customers. Once complete, the installer and customer journey maps will be merged to identify overlaps and reduce subjectivity that can be introduced through a single stakeholder perspective.

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## 1.0 Introduction

Uncertain policy environments, complex interconnection processes, non-uniform siting and permitting procedures, and a lack of technology awareness have long been cited as barriers to distributed wind deployment (Ahlgimm et al. 2010). Improved turbine technologies and state-of-the-art designs, backed by over a decade of research and certification, are ready for installation (National Renewable Energy Laboratory 2024). A recent uptick in federal funding and initiatives is attempting to address challenges to distributed wind deployment. With technical improvements in distributed wind technologies unlocking new deployment opportunities, efforts focused on the human dimension will be required to capitalize on current momentum. This necessitates innovative approaches to understand how remaining and emerging deployment barriers manifest at the ground level for the stakeholders directly involved in the development process.

This work uses journey mapping to assess the deployment of distributed wind technologies through the perspective of installers. Journey mapping is a human-centered design tool that visualizes processes to identify where and how pain points arise (Endmann and Keßner 2016). Originally employed to depict users rather than stakeholders, journey mapping has recently expanded into the energy field with at least one study linking journey maps of homeowners and installers of solar photovoltaics (Sinitskaya et al. 2020).

While barriers to distributed wind deployment are generally considered at a relatively abstract level, pain points can be thought of as the lived manifestation of those barriers. Journey maps offer a chronological depiction of key steps in a process from a specific stakeholder perspective. In doing so, journey maps leverage real and lived experiences, allowing researchers to better empathize with stakeholders by viewing the deployment process from their perspectives. By documenting all stages of a journey, it becomes clear where existing support mechanisms are insufficient and where new efforts are needed to address pain points. Journey maps also uncover pain points that emerge from seemingly discreet deployment stages but are the result of more complex interactions that span stages and different stakeholder groups. The pain points identified through the journey maps will be used to inform future efforts under the Strategize, Engage, Network, and Deploy (SEND) Distributed Wind project. The understanding gained from these maps can be more broadly applied to support the development of policies and support mechanisms (e.g., technical assistance and resource development) that can aid distributed wind deployment in reaching its market potential.

## 2.0 Methods

This section explains the methodology applied in the study, and the section that follows provides the outcomes for each step. There are five key steps in the methodology:

### 2.1 Recruit study participants

To recruit study participants, the project team issued emails to known distributed wind installers as documented in the U.S. Department of Energy's annual Distributed Wind Market Report (Sheridan et al. 2024). For installers who replied to the email indicating interest in participating, a pre-interview survey was issued, and a virtual meeting was set up to conduct the semi-structured interviews.

### 2.2 Conduct semi-structured interviews

In semi-structured interviews, the researcher has a pre-defined set of questions but can skip some questions or ask follow-ups that are not outlined beforehand. This approach helps create flexibility for the interviewer to capitalize on opportunities that arise in discussion while creating consistency in the interviews across participants. To gather background information to guide the interviews, a pre-interview survey (Appendix A) was issued to participants. The survey asked each participant to rank how frequently challenges arise in five categorical stages of the distributed wind deployment process: customer outreach and acquisition, siting, permitting, installation, and operations and maintenance. Rather than being prescriptive as to what activities are included in each stage, the categories serve as a structural mechanism with flexibility to accommodate different lived experiences. The questions prepared in advance of the interviews were structured around the same five categories. Interviews were scheduled for 30-60 minutes depending on the participant's interest and experiences.

### 2.3 Code interviews

The project team coded the interview transcripts and notes using a best-fit framework that combines inductive and deductive coding methods (Daniels 2018) to identify the stages in which pain points occur and how they manifest. Coding the transcripts in this way allowed the research team to 1) assess the study participants' experiences using both well-known deployment barriers (i.e., deductive) and barriers that were uncovered through the interviews and coding process (i.e., inductive) and 2) account for the project team's prior efforts and knowledge without limiting the study based on preconceived ideas.

### 2.4 Create personas

Once the interviews had been coded, personas were created based on the interviewed installers. In human-centered design, personas are fictional characters created to represent types of common experiences that exist among the examined populations. Personas are defined by their behaviors, needs, and goals and are based on the collected background information, coding results, and pre-interview survey responses. Personas are leveraged to unveil potential commonalities (e.g., location) that led to similar experiences, motives, and, ultimately, pain points in each stakeholder group.

## 2.5 Create journey map

The project team will create a journey map of the distributed wind deployment process from the perspective of an installer. The five deployment stages serve as the structure for each journey map with the identified behaviors, needs, and goals of each persona defining the types of actions and pain points along the journey timeline.



### 3.0 Results

#### 3.1 Recruit study participants

The project team contacted eighteen installers who responded to the 2024 Distributed Wind Market Report data request. The project team received responses from six installers who were interested in participating in a semi-structured interview. Given the detail obtained through the interviews and the small industry size, this sample size for installers allowed the project team to create a journey map that reflects shared experiences of the study participants. It is not intended to be representative of all installer experiences across the country. Participating installers are located in a range of locations, from California to New York, and have developed projects with small wind turbines less than 1 kW up to 2.5 MW machines. Installers had a range of experience in distributed wind spanning 8 to 42 years.

#### 3.2 Conduct semi-structured interviews

Six installer interviews were completed. Each installer also filled out the pre-interview survey. Table 1 shows the aggregated output from that survey. Collectively, the sample of installers rank siting and permitting as the stages of deployment where challenges arise most frequently. The process of actually installing the turbine was most often the stage where fewest challenges arise.

Table 1. Pre-interview survey results from installers. Installers were asked to rank each deployment stage on a scale from one to five based on the frequency at which challenges arise, where five is the highest frequency and one is the lowest.

Deployment Stage	Installer 1	Installer 2	Installer 3	Installer 4	Installer 5	Installer 6	Average
Customer Outreach & Acquisition	2	5	3	5	1	5	3.5
Siting	5	4	4	5	1	5	4
Permitting	1	4	5	4	5	5	4
Installation	2	5	3	3	1	2	2.67
Operations & Maintenance	5	4	3	2	2	3	3.17

### 3.3 Code interviews

The project team coded the installer interviews by accounting for the occurrence of each category of pain points (Table 2). Based on informal interviews and conversations the project team had with distributed wind energy stakeholders the previous year, nine deductive coding categories representing various deployment challenges and barriers were chosen: permitting issues, lack of public knowledge, underdeveloped market, lack of financing options/costly, varying local ordinances, utility interconnection issues, equipment failure/maintenance issues, negative public perception, and perception that solar is cheaper/better. The project team identified three inductive coding categories: hostile/uninformed local government, wind workforce gap, and ballooning project timelines. The most common pain points are those surrounding issues with the permitting process, poor public knowledge, and an underdeveloped market.

**Table 2. Interview coding of pain point frequencies for installers using inductive and deductive categories.**

<b>Pain Point</b>	<b>Inductive or Deductive Category</b>	<b>Total Occurrences</b>
<b>Permitting issues</b>	Deductive	25
<b>Lack of Public Knowledge</b>	Deductive	17
<b>Underdeveloped Market</b>	Deductive	15
<b>Lack of financing options / costly</b>	Deductive	13
<b>Varying Local Ordinances</b>	Deductive	13
<b>Utility interconnection issues</b>	Deductive	11
<b>Hostile / Uninformed Local Government</b>	Inductive	11
<b>Equipment Failure / Maintenance issues</b>	Deductive	9
<b>Negative Public Perception</b>	Deductive	7
<b>Solar is cheaper / better</b>	Deductive	6
<b>Wind workforce gap</b>	Inductive	6
<b>Ballooning project timeline</b>	Inductive	4

Most pain points arose in the permitting stage with the fewest in the construction and installation stage (Table 3), which aligns with the pre-interview survey results.

Table 3. Number of times pain points arose in each deployment stage across all installer interviews.

Deployment Stage	Total Pain Point Occurrences in Deployment Stage
1. Customer Outreach	23
2. Siting	28
3. Permitting and Interconnection	51
4. Construction and Installation	14
5. Operation and Maintenance	21

### 3.4 Create personas

After the interview process, the team analyzed the differences and similarities in responses between installers. They reviewed the answers to interview questions and grouped them based on similarities. Two personas were defined based on installer experiences in the customer acquisition phase of the deployment process: the “seeker” and the “responder.” The seeker tends to spend time advertising their business to acquire customers, often identifying and reaching out to potential customers they recognize as having a favorable wind resource. This persona positions the installer as the initiator for deployment through active advertising and outreach. Installers fitting this persona work to create meaningful customer relationships by building trust and crafting a compelling case for why customers should elect to install distributed wind.

In contrast, the responder places less (and sometimes no) emphasis on advertising. They instead receive direct inquiries from potential customers, likely from word-of-mouth recommendations or their already-established website. The responder then forges a relationship with a customer, typically through education and first order assessments for projected energy production and financial return. This relationship can sometimes be short-lived if installers must discourage deployment in areas where there are not favorable wind resources.

### 3.5 Create journey map

The project team created a journey map for installers using information from the six semi-structured interviews, the experiences tracked through the seeker and responder personas, and the pain points identified in the coding process. The installer journey map (Figure 1) is structured around the five deployment stages addressed in each interview. The green boxes show categorical steps throughout each stage with the specific actions or activities that occur in each stage shown in pink boxes. The journey map includes symbols for 1) actions and activities informed by the seeker persona, 2) actions and activities informed by the responder persona, 3) pain points, and 4) potential connections with customers.

The journey map suggests that installers have different journeys based on whether they are “seeking” or “responding” to customers, but the differences in these journeys only last until the siting phase. At that point, all installers experience similar processes and pain points for the rest

of the deployment journey. This appears to be the result of the actors at these steps. In the early stage of acquiring customers, the process is largely limited to the installer and the potential customers. However, once siting begins, new actors start to emerge in those steps (e.g., local zoning jurisdictions). Those actors have a different level of agency relative to customers and installers, which could be influencing the pain points that occur at that stage.

The permitting process is where the most pain points arise (Table 3) and is the stage that installers find to be the most challenging (Table 1). Several installers reported that local governments have unique permitting processes, sometimes requiring tailored approaches for each site. While the deployment process is, in theory, linear, the webbed nature of the journey maps shows that the process is not straightforward with many factors that can influence the success of a project.

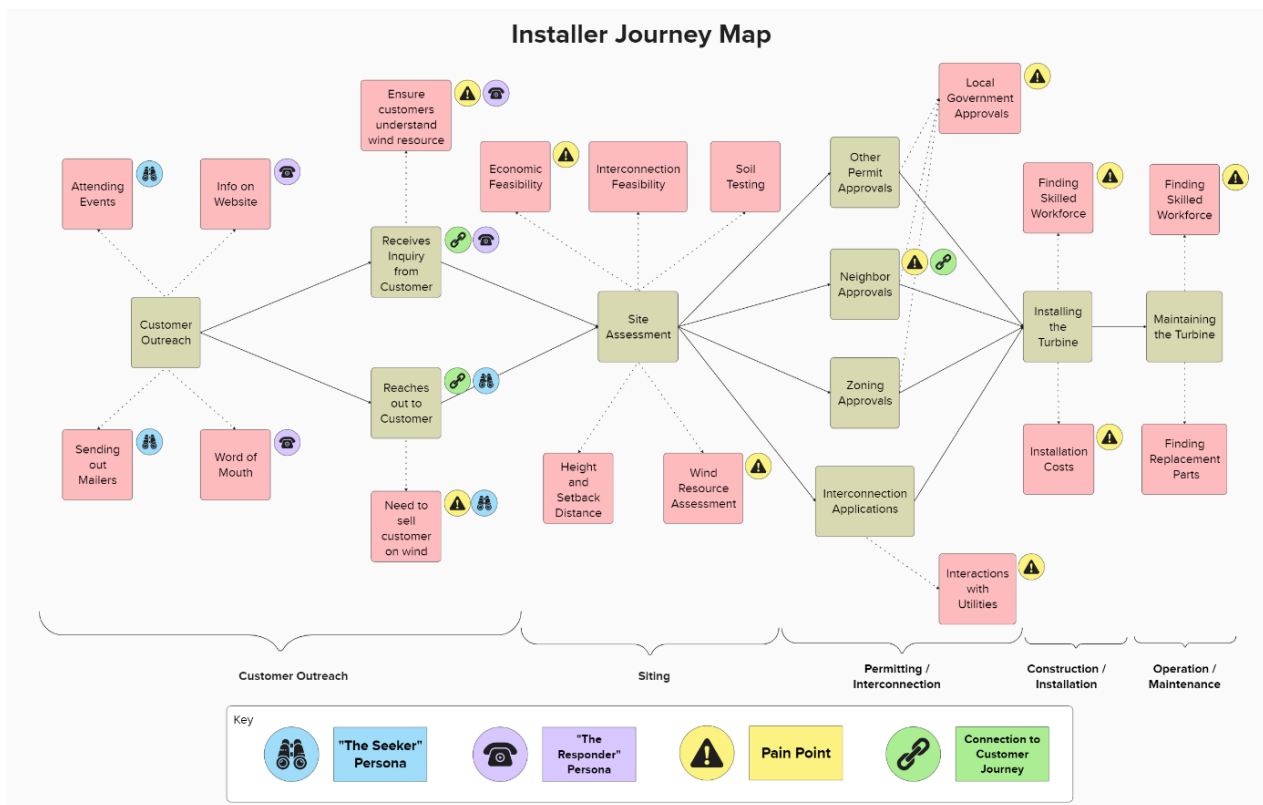


Figure 1. Installer Journey Map

## 4.0 Conclusion and Future Work

Through interviews with six installers of distributed wind technologies, deployment barriers were identified, and a journey map was created detailing the deployment experience for installers from the lens of “the seeker” and “the responder” personas. We found that installers experience pain points most frequently in the permitting stage. The most common pain points were related to the permitting process, poor public knowledge, and an underdeveloped market. This work is currently limited by the analysis of the deployment process and its barriers through a single stakeholder perspective. The subjectivity of the analysis could be decreased by introducing another stakeholder perspective. Future work will include developing a journey map of the customer deployment experience with a similar methodology that was used for the installer journey map.

Once the customer journey map has been drafted to the same level of completeness as the installer journey map (Figure 1), the two will be chronologically merged to identify shared pain points between stakeholder groups. This will help uncover prevalent pain points in distributed wind deployment and also decrease the subjectivity that can be introduced by relying on a single stakeholder perspective. The journey maps will be elevated with advanced graphics at this stage of the work and used as a tool when communicating about challenges around distributed wind deployment. The pain points will inform future research questions, targeted support, and technical assistance opportunities.

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## Appendix A – Installers Pre-Interview Survey

### Distributed Wind Deployment Barriers Survey

The following survey is designed to help develop an understanding of how often challenges and barriers arise throughout the various stages of the distributed wind deployment process. The five stages in the deployment process that we have outlined are customer outreach and acquisition, siting, permitting, installation, and operations and maintenance.

\* Required

1. What is your name? \*

2. Do challenges frequently arise in the customer outreach and acquisition phase? (1 being challenges rarely/never arise, 5 being that challenges are constantly arising) \*

3. If you would like to elaborate on some of these challenges in the customer outreach and acquisition phase, please do so here

4. Do challenges frequently arise in the siting phase? (1 being challenges rarely/never arise, 5 being that challenges are constantly arising) \*

5. If you would like to elaborate on some of these challenges in the siting phase, please do so here

6. Do challenges frequently arise in the permitting phase? (1 being challenges rarely/never arise, 5 being that challenges are constantly arising) \*

7. If you would like to elaborate on some of these challenges in the permitting phase, please do so here

8. Do challenges frequently arise in the installation phase? (1 being challenges rarely/never arise, 5 being that challenges are constantly arising) \*

9. If you would like to elaborate on some of these challenges in the installation phase, please do so here

10. Do challenges frequently arise in the operations and maintenance phase? (1 being challenges rarely/never arise, 5 being that challenges are constantly arising) \*

11. If you would like to elaborate on some of these challenges in the operations and maintenance phase, please do so here



## Appendix B – Installer Interview Questions

### Distributed Wind Journey Mapping Interview Questions – Installer

*The interviewer should progress and pivot through questions based on responses. Priority questions are in bold text.*

#### Installer

*Group Definition: Companies that install, inspect, maintain, operate, and repair wind turbines*

#### **Background**

*These questions establish a foundation of the respondents' characteristics. They shape the respondents' perspectives and nuance their shared experiences. These questions were asked over email prior to the interview.*

- 1. What size turbine(s) do you install?**
- 2. Who manufactures the turbines?**
- 3. What is your service territory?**
4. How long has your company been in the distributed wind industry?
5. When was your last distributed wind installation?

*Additional responses on company location and past projects are accessible from online research.*

#### **Initial Outreach and Customer Acquisition**

*These questions inform the customer contact and business development stages of the deployment journey. Much of these responses will be about individual experiences, and we should look for similarities across respondent groups to draw general conclusions.*

- 6. How do you advertise your business?**
  - What advertisement types have customers been most responsive to? Least responsive to?
  - What is the intake process for new customers? What information do you gather?
- 7. What challenges do you have during the initial outreach and customer acquisition phase?**

- Have any of these challenges stopped you from advancing to the next deployment stage?
  - Can you give an example of a time when you were able to overcome those challenges?
8. What type of customers do you have (e.g., farmers, schools, local communities)?
- Does your advertising and recruitment process change based on the customer type?
9. Do you need to clarify any common misconceptions about wind turbines when acquiring customers? If yes, what are the most common ones, and how do you resolve the misconception?

### **Siting**

*These questions assess the screening process to determine a project's technical and economic viability. This is part of pre-project development. It will shed light on individual experiences and thus inform the past and present journey. We should look for similarities across all respondent groups to draw general conclusions about the overall journey.*

10. How do you transition from initial contact with a customer to conducting a site assessment?
- 11. How do you conduct a site assessment for a customer? What are the primary considerations?**
- What tools, if any, do you use to conduct the assessment?
- 12. What challenges have you experienced conducting studies at the site (wind resource assessment, environmental review, economic and technical feasibility, etc.)?**
13. What is the outcome of your site assessment? What information do you provide the customer, and how do you share it?
- What typically goes well during site assessment?
  - Can you give an example of how you resolved those challenges?
  - Do these challenges prevent you from construction and installation?

### **Permitting and Interconnection**

*These questions assess the pre-project development phase, which researches and acquires the necessary permits for construction and paperwork for interconnection. Responses will reflect past and present individual experiences, and the project team will look for similarities across all respondents to draw general conclusions. These questions also investigate specific challenge*

*examples related to our assumed barriers: Local ordinances vary between regions where siting may occur, and difficulties often arise in the permitting process and during utility interconnection.*

**14. What approvals are needed for permitting and interconnection to advance to construction and installation?**

- How do you meet those requirements?

**15. Which of the permitting and interconnection requirements is most likely to prohibit a project from advancing?**

- What typically goes well during permitting?
- What challenges have you experienced during permitting and interconnection? (Give an example)

***Construction and Installation***

*These questions assess the development phase, which refines siting, design, and generation modeling and engineers the project. In this phase, permits are acquired, equipment is procured, and the turbine is installed. Responses will mostly reflect past and present individual experiences, and the project team will look for similarities across all respondents to draw general conclusions.*

**16. What steps are included in the installation process?**

- Which steps are you responsible for?

**17. Which steps create challenges and why?**

- What typically goes well during construction and installation?
- What resources do you have to address these challenges?

***Operation and Maintenance***

*These questions assess the operations phase, which involves commissioning, optimization, and maintenance. Responses will primarily reflect past and present individual experiences, and the project team will look for similarities across all respondents to draw general conclusions. These questions also investigate the challenge related to our assumed barriers: frequency and cost of equipment failures and maintenance issues.*

**18. Do you provide maintenance support for your customers? If yes, how often?**

- How do customers access your support? Are contracts established?
- Do you provide safety training and guidance to your customers?
- Are remote monitoring systems or predictive maintenance technologies included in installation?

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