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US Community-Based Organizations and Their Relationship to Solar Energy Development

PREPARED FOR THE CLEAN ENERGY STATES ALLIANCE

Clean Energy States Alliance

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ABOUT THIS REPORT

This report presents the findings from a national survey of Community-Based Organizations (CBOs) engaged or interested in solar development in low- and moderate-income communities. The survey was carried out by a team of researchers from MIT led by Professor Janelle Knox-Hayes. In addition to the findings in this report, additional ones are presented in a companion report by Warren Leon and Lizzy Diaz on *Understanding the Relationships and Solar Experiences of US Community-Based Organizations.*

This report was produced for the Solar with Justice project. Under this project, CESA and MIT are working with state and nonprofit partners to understand and improve how state energy agencies and community-based organizations collaborate on solar. Learn more at: https://www.cesa.org/projects/solar-with-justice.

ABOUT THE AUTHORS

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EXECUTIVE SUMMARY

Community-Based Organizations (CBOs) in the United States work at the local level to provide services and access to resources that improve the resiliency, health, and wellbeing of their community. CBOs play an essential role by supporting low- to moderate-income (LMI) communities to access the benefits of solar energy by bridging the gap between regulators, policymakers, and the needs of the community. Understanding the role CBOs play in solar development in LMI communities is critical for policymakers and clean energy advocates aiming to address energy burden and environmental justice. Research can help stakeholders understand how they can improve the design of solar focused grants, public education initiatives, and programming to support CBOs with building capacity and accessing state and federal funding opportunities.

In order to understand the impact of CBOs regarding solar in their communities, the Clean Energy State Alliance (CESA), Massachusetts Institute of Technology (MIT), and other partners applied for and won a research project award from the U.S. Department of Energy (DOE) in 2021 on the topic, "Effective Knowledge Dissemination for LMI Solar: The Roles of CBOs and State Governments." A CESA 2019 report, *Solar with Justice: Strategies for Powering Up Under-Resourced Communities and Growing an Inclusive Solar Market* [1], and a published 2023 article by Professor Janelle Knox-Hayes and other MIT researchers, "The geographies, typologies, and trends of community-based organizations for solar energy in the United States" [2]—inspired this current study.

The article, "The geographies, typologies, and trends of community-based organizations for solar energy in the United States," identified key characteristics influencing solar-related CBOs that suggested a correlation with organization tenure, staff capacity, population served, structure, and region. Two key types of CBOs emerged from the study: solar directed and solar adjacent, the former focusing on solar development. The paper also explored how larger CBOs (20+ employees) formed more coalitions, while regional dynamics and policy environments significantly impacted organizational activities. The research also revealed how challenges with utilities impacted advocacy efforts. Additionally, CBOs reflected on how the Inflation Reduction Act (IRA) and Infrastructure Investment and Jobs Act (IIJA) offered opportunities for federal and state support, which are essential due to the funding challenges faced by CBOs.

The Solar with Justice: Strategies for Powering Up Under-Resourced Communities and Growing an Inclusive Solar Market report identified that partnerships involving trusted community organizations are key to implementing equitable solar projects in LMI and disadvantaged communities. CBOs are uniquely positioned to understand how to engage and communicate with local residents. Through active engagement with CBOs, government and utility-run programs are more likely to understand the community needs and better able to overcome distrust residents might feel towards the solar industry, energy companies, and utilities. By engaging with CBOs, government programs are more likely to be responsive to community needs and able to overcome distrust.

This report identifies and fills in knowledge gaps in understanding the role that CBOs play in solar development and education in LMI communities. The research findings and recommendations will help stakeholders to build initiatives that support the work of CBOs that aim to address issues of energy equity and environmental justice in LMI communities.

The data collection method used for this report was built upon previous findings from semi-structured interviews with 41 CBOs regarding the challenges, opportunities, communication barriers and motivations for solar project implementation in LMI communities. A nationwide survey of CBOs conducted for this report was built around four key parameters identified in those interviews: *legal status, organization tenure, organization structure*, and *staff size*, with the goal of capturing the range of organizations focused on solar work in LMI communities and the types of challenges they face. The survey received 134 fully completed responses and 27 partial but usable responses.

Researchers used a mixed-methods approach, including statistical methods and Geographic Information Systems (GIS) mapping to analyze survey results. The statistical analysis included a factor analysis, which determined the following eight factor groups from variables that were determined by CBOs' knowledge base: *Energy Independence Awareness, Green Finance Awareness, Communication for Solar Awareness, Community Awareness Scale, Motivation: Energy Sovereignty, Degree of Community Involvement, Workforce Installation, and Depth of Solar Work.* Utilizing the variables that determined each of the factor groups, the researchers used GIS software to generate visualizations of the regional typologies of CBOs. This revealed regional differences among the CBOs that responded to the survey. Following the mapping of the index variables, a regression analysis was conducted using Stata to test the relationship of the index variables with a series of independent variables including region, scale of work, legal structure, organizational structure and level of perceived local and state solar support.

For national, state, and municipal policymakers, understanding the nuanced dynamics influencing CBOs in their engagement with solar energy and energy burden alleviation is critical for effective policy development. For CBOs, understanding how their own organization fits into the landscape of other CBOs in their region and across the country can help them plan their activities and increase their effectiveness.

Below is a summary of actionable insights that emerged from the survey analysis and related research.

KEY FINDINGS

1. **Regional Dynamics and Tailored Solar Focus**
    - CBOs in different regions prioritize solar activities differently. For example, many Western US CBOs focus on solar installation projects. Tailored support should align with regional priorities to maximize impact.
2. **Volunteer Engagement and Energy Burden Awareness**
    - Volunteer engagement plays a pivotal role in CBO efforts to address energy burden. Policymakers should consider prioritizing volunteer-based solutions and community-engagement strategies in energy initiatives.
3. **Workforce Training and Installation Scale**
    - Further research is needed to fully understand CBO involvement in workforce training and solar installation. Policymakers should consider supporting studies to uncover opportunities for workforce development within CBOs.

4. **Diversity and Community Empowerment**
    - Initiatives promoting diversity in CBO staffing could drive community-centric energy projects. For example, Indigenous staff presence correlates with a stronger focus on community empowerment and environmental justice within CBOs.
5. **Communication and Trust Building**
    - Fiscally-sponsored nonprofits, which have a larger organization collecting and administering funds on their behalf, demonstrate higher trust and communication capabilities. Policymakers should consider prioritizing support for CBOs, especially those fostering effective communication in solar awareness campaigns.
6. **Green Finance Awareness and Energy Burden Alleviation**
    - Organizations familiar with green finance show a heightened awareness of energy burden. Organizations that reside in the communities they serve show less awareness of both. Resources should be directed towards CBOs that reside in the communities they support to help build their capacity to address their awareness of green finance and ability to address issues of energy burden.

BEST PRACTICES

- **Tailored Support Programs:** Develop tailored support programs based on regional CBO priorities to enhance solar adoption and energy burden alleviation efforts.
- **Promotion of Volunteerism:** Encourage policies that promote volunteer engagement in CBO-led energy initiatives to address local energy challenges effectively.
- **Investment in Workforce Development:** Support further research to understand and promote workforce development opportunities within CBOs engaged in solar installation.
- **Diversity and Inclusion Initiatives:** Foster diversity and inclusion initiatives within CBOs to strengthen community empowerment and environmental justice efforts.
- **Communication Strategy Support:** Prioritize funding and resources for CBOs with strong communication and awareness-building capabilities to maximize the impact of solar awareness campaigns.
- **Green Finance Allocation:** Direct resources to build green finance organizations that address issues of energy burden through innovative financial mechanisms.

CONCLUSION

The report provides actionable insights for state and municipal policymakers to better support and collaborate with CBOs in advancing solar energy adoption and alleviating energy burdens in communities. By aligning policies and initiatives with the unique characteristics and needs of CBOs identified in this research, policymakers can foster inclusive and sustainable energy transitions that benefit all community members. Ongoing research, targeted investments, and strategic partnerships will be essential to realizing these objectives and driving equitable energy solutions.

1 INTRODUCTION

Community-Based Organizations (CBOs) are organizations that work at the local level to provide resources and services to support the health and well-being of a community. To capture the diversity and breadth of solar work conducted by CBOs in low- to moderate-income (LMI) communities and the types of challenges involved, the MIT team prepared, disseminated, and analyzed a nationwide survey of CBOs. Its questions were based on the learnings from 41 interviews previously conducted with CBOs across the United States, as well as from a national workshop and focus-group discussions with CBOs and state energy agency representatives.

The Clean Energy States Alliance (CESA), a national nonprofit organization working to expand equitable clean energy, compiled a national database of CBOs that work on solar and renewable energy on their website in 2023, and most CBOs in the database were sent a survey to gain information for this analysis (some CBOs have since been added to the database). The survey was sent to 563 participants with a received rate of 134 fully completed responses, and 27 partial but usable responses. The survey was structured to explore the following:

- Solar Work
- Opportunities and Challenges
- Context and Motivations for Solar-Related Work
- Solar Knowledge
- General Organizational Focus
- Demographics

From the survey, robust findings were captured. The following analysis is an overview of these findings.

2 BACKGROUND

In 2019, CESA published *Solar with Justice: Strategies for Powering Up Under-Resourced Communities and Growing an Inclusive Solar Market.* This report is an extensive review and analysis of how under-resourced and disserved communities across the United States could benefit from participation in the solar economy as well as a roadmap for how to accelerate that process. [1]

Although other reports have been published on the topic of solar for LMI households and communities, CESA's report had four key distinguishing features:

1. CESA put together a diverse research team that reflected not just a depth of experience across different arenas, but also the faces of the communities that were involved with providing their perspectives.
2. The report used interviews and workshops to gather the viewpoints of many experts from across the country, going beyond desktop research.
3. The views of leaders of community organizations were given special attention.
4. The report provided clear recommendations that policymakers could consider.

The *Solar with Justice* report emphasized the important role that CBOs can and should play in implementing solar in LMI and disadvantaged communities. The first of the report's ten general findings and recommendations was that "partnerships involving trusted community organizations are essential." The report recognized that CBOs "are well placed to know how to most effectively engage and communicate with local residents." By engaging with CBOs, programs from governments and utilities are more likely to be responsive to community needs and be able to overcome the distrust that some residents feel towards utilities, energy companies, and the solar industry.

Although the *Solar with Justice* report provided insights into how to accomplish the transition to solar within LMI communities, it did not include detailed research into the landscape of CBOs across the country or a study of how CBOs have engaged to expand solar development and solar education. To enhance knowledge of these subjects, CESA, MIT, and other partners received a project award in 2021 from the U.S. Department of Energy (DOE) Solar Energy Technologies Office (SETO) on the topic of "Effective Knowledge Dissemination for LMI Solar: The Roles of CBOs and State Governments." The current study is a key product of this DOE-supported project, and it seeks to fill knowledge gaps regarding CBOs, such as the insufficient understanding of how solar information spreads in LMI communities, what knowledge gaps exist in those communities, and how to support information exchange between CBOs and State Energy Agencies. It comes at a time when the playing field for LMI solar has changed significantly since the *Solar with Justice* report was released in 2019. Enactment of the Infrastructure Investment and Jobs Act (IIJA) of 2021 and the Inflation Reduction Act (IRA) of 2022 have improved the prospects for solar development and for renewable energy as a whole. The IRA has especially placed a strong focus on strategies for addressing energy equity and environmental justice.

In early 2021, incoming President Joe Biden's Build Back Better plan emphasized green job creation and infrastructure investment, along with investments in the care economy, healthcare, and housing. Although Build Back Better was not passed in its entirety, Congress did pass components of the plan in three legislative packages: the American Rescue Plan Act of 2021, the IIJA of 2021, and the IRA in 2022. The latter two provided significant investments in clean energy technologies and industries. Most significantly for solar, the IRA renewed the clean energy tax credit and included a direct-pay option that made the credit accessible to nonprofit organizations. It also supported the creation of new federal funding such as the Environmental Protection Agency's $7 billion Solar for All program and the $6 billion Clean Communities Investment Accelerator, both of which are intended to support clean energy development in low-income and disadvantaged communities.

Despite this flurry of legislation, public money, and new programs, LMI communities will not necessarily automatically benefit. By completing research on CBOs that identifies their needs for support, solutions may be designed with them and for them so they can better access educational and financial resources. Researchers can also help policymakers understand how they can design their projects and grants to ensure that organizations that need the most help have the means to receive it. This need for information is what structured and started earlier research on the topic.

In particular, the interview-based study on "The geographies, typologies, and trends of community-based organizations for solar energy in the United States" informed this research heavily. That study identified key characteristics influencing how solar development related to CBOs, suggesting correlations with tenure, staff capacity, population served, structure, and region. Two main CBO groups emerged from the research: solar directed and solar adjacent. Larger CBOs (20+ employees) tend to be solar-adjacent and form more coalitions, while solar-directed organizations focus on installation. The research also revealed how challenges with utilities impact advocacy efforts. In that research, CBOs reflected on how the IRA and IIJA offer opportunities for federal and state support, which are crucial due to the funding limitations faced by CBOs. The findings underscored regional influences and provided insights for state support in advancing solar adoption, laying the groundwork for this report.

3 METHODOLOGY

3.1 PRIOR RESEARCH

This survey builds on the findings from semi-structured interviews of 41 CBOs. The main goal of the semi-structured interviews was to understand the views and experiences of stakeholders about challenges, opportunities, communication barriers, and motivations in the implementation of solar projects in LMI neighborhoods. The interview questions focused on CBOs' work on solar and their relationships with state and local governments. When developing the interview questions, we relied on two sources. First, we researched existing scholarship on solar CBOs, multidimensional barriers to solar energy adoption by LMI communities, solar energy equity, and strategies for engaging CBOs and LMI communities in solar. Second, we conducted focus groups with 35 CBOs from 15 states. Based on the initial review of journal articles, policy documents, and professional reports, we identified issue areas around the solar experiences of CBOs and LMI communities. This exercise allowed us to capture the baseline views on the opportunities and challenges for LMI communities and the role of CBOs in assisting and working with LMI communities to participate in equitable solar-energy development.

To help create a database of CBOs working in the solar space and to initiate engagement with them, we participated in a Solar with Justice National Workshop, hosted by CESA from July 12–14, 2021. The workshop was attended by 35 CBOs from 15 states. We conducted three focus groups to hear the participants on issues identified as challenges in LMI solar. The focus groups enabled us to recognize questions in communication, opportunities, challenges, relationships, and strategies for advancing solar development in LMI communities. During focus groups, we could learn about the broad range of experiences as different CBOs shared their knowledge and perspectives on specific issues. We could also get data on group dynamics by observing the conversations between CBOs and state energy agency representatives. The workshop and focus group results served as a basis for designing an interview instrument that was then used with 41 CBOs.

For the interviews, we built a qualitative database with data from a few initial interviews, online research on the interview participants, and organizational and media documents. Using the workshop database, we deployed a two-pronged purposive sampling strategy to choose information-rich CBOs that could provide us with sufficient heterogeneity in data on the legal status of organizations, their tenure, structure, and staff size. We also ensured the representativeness of the states in the selection of CBOs. We employed a two-track approach in the interview participant recruitment process: (1) we contacted CBOs already in the CBO list that CESA had pre-developed, and (2) we reached out to CBOs that participated in the Solar with Justice National Workshop. Of the 200 CBO directors, managers, and staff of CBOs we contacted, 41 CBO representatives participated in the interviews. We provided $50 gift cards for interviewees and drew extensively on CESA's connections with CBOs to increase the interview participation rate to approximately 20 percent. The interviews followed Internal Review Board protocol

and were conducted virtually using a video-conferencing tool for transcribing purposes. Each interview lasted approximately 60 minutes. In several cases, we reached out to the interviewees for clarification and to access relevant documents about the work of their organizations. The output of these interviews formed the input for our nationwide survey of the CBOs.

From the interviews, we discovered the attitudes of CBOs and the communities they work with on opportunities for solar development. We also learned about their need for resources and the barriers CBOs face in disseminating knowledge about solar or supporting solar project development. Furthermore, CBO interviews helped us learn about support flow between state and city agencies, CBOs, and communities and what could make solar dissemination more successful. CBO responses captured and identified the phenomena and narratives around the key challenges, opportunities, and relationships in LMI solar energy development. Our CBO interviews were based on four typological parameters: legal status, organization tenure, organization structure, and staff size, and they relied on DOE's Regional Specialist Regions. For Appalachia, we used the Appalachian Regional Commission's designation of Appalachia down to the county level.

3.2 DATA COLLECTION

Our nested survey design aims to capture the different types of organizations carrying out solar work in LMI communities and the range of challenges they face. We used Qualtrics to design and disseminate the survey using organizations' email addresses. To improve efficiency and accessibility, the survey automatically calibrates the ordering of questions and what questions to ask based on the initial answers given by the respondent. For example, if an organization does not work directly on solar, the survey leaves out the questions that focus on solar implementation and other technical aspects of solar work. The survey is composed of five sections as outlined below, in addition to extra questions at the end of the survey for those participants who volunteered to provide additional details about their responses. (See Appendix B for Survey Question Flow.)

- **Section 1:** Asks questions about the participating organizations including their demographics, context, motivations behind solar work, community improvement needs, capacity, and funding mechanisms.
- **Section 2:** Aims to understand the nature of solar work within organizations. Questions include identifying organizations' main area of focus, degree of involvement in solar related work, community engagement, and their familiarity with technical terms related to solar management.
- **Section 3:** Identifies the community focus of organizations. Questions are focused on the work of CBOs with local, state, and federal governments and the extent of their engagement with Indigenous peoples.
- **Section 4:** Focuses on assessing stakeholder engagement.
- **Section 5:** Aims to identify the challenges faced by CBOs such as funding needs and technical capacity.

4 LITERATURE REVIEW

Low-to-moderate-income (LMI) households experience a high energy burden, with a large portion of household income being allocated to pay for energy bills. The communities in which they live often face many obstacles to solar adoption such as utility opposition, financial limitations, and policy barriers. [1] Investigating how best to support LMI households is important for the equitable distribution and implementation of solar energy, an important component of energy justice. A 2021 analysis of energy justice programs across the United States by Carley, Engle and Konisky, shows that nonprofit organizations led energy justice programs more often than government agencies did. [3] Government agencies have been more active since 2021, but this finding is still valid. Nonprofit organizations develop programs with shared mission statements but unique approaches to reaching their goals. The CBOs' ability to serve LMI households is determined by a number of factors, including their regional typology, relationships with utility companies, funding, and capacity.

Community-Based Organizations that do work related to solar within the United States have different organizational compositions depending on their geographical location. In order to understand the variance among CBOs, the paper "The geographies, typologies, and trends of community-based organizations for solar energy in the United States" asked questions to help understand the regional typology of CBOs and how this played a factor in how to best support their work. The typology of CBOs yielded different types of challenges. The paper found that CBOs in the Northwest were more concerned with gaining community trust on solar compared to other regions, while the CBOs in the Southwest were more concerned with addressing poverty and energy burden. In contrast, CBOs in the Midwest expressed more concern about political challenges. [2] The paper also found that each region exhibited unique challenges, and a common challenge for all CBOs was utility companies, as utilities often hindered CBOs' ability to engage in advocacy work such as community-driven or community-led solar development. [2] An earlier paper from 2015, "Solar Energy, Utilities, and Fairness," identified that utilities and their investors lobbied for changes to net-metering programs and rate designs to slow the growth of distributed solar energy, and leaned on fairness arguments to advocate for weakening incentives for rooftop solar energy. [4]

Another challenge faced by CBOs is accessing funding and capacity building. Lessons around challenges with funding and capacity can be learned from the American Recovery and Reinvestment Act of 2009, otherwise known as the Recovery Act. [5] The Department of Energy administered programs utilizing funds from the Recovery Act to spur investment in clean energy. However, the success of these programs varied significantly. The rate at which states spent ARRA funds was affected by their jurisdictional capacity and federal guidance, which altered the implementation process. Funds were only allowed to be utilized between 2009–2011, with a few exceptions through 2012 and 2013 for some programs. According to a study conducted by the American Society for Public Administration where they interviewed 46 state agency representatives responsible for spending ARRA energy funds, they

found that administrative capacity was a key factor for success. However, when capacity was limited in jurisdictions with less human capital, managerial expertise, and previous energy policy work, federal guidance was an important substitute for capacity building. [6] Federal guidance includes the government providing a clear outline of how to utilize the funding available. Clear guidance is particularly important when organizational capacity is limited, and organizations don't have the bandwidth to figure out unclear guidance. These lessons can be applied to how CBOs apply for federal funds and build capacity around spending those funds and implementing programs, particularly around expanding administrative capacity. The research findings and recommendations in this report will enable policymakers to build initiatives to help CBOs overcome the challenges they face in their efforts to address issues of energy inequity in LMI communities.

5 RESULTS AND ANALYSIS

5.1 THE COMPOSITION OF COMMUNITY-BASED ORGANIZATIONS IN THE UNITED STATES

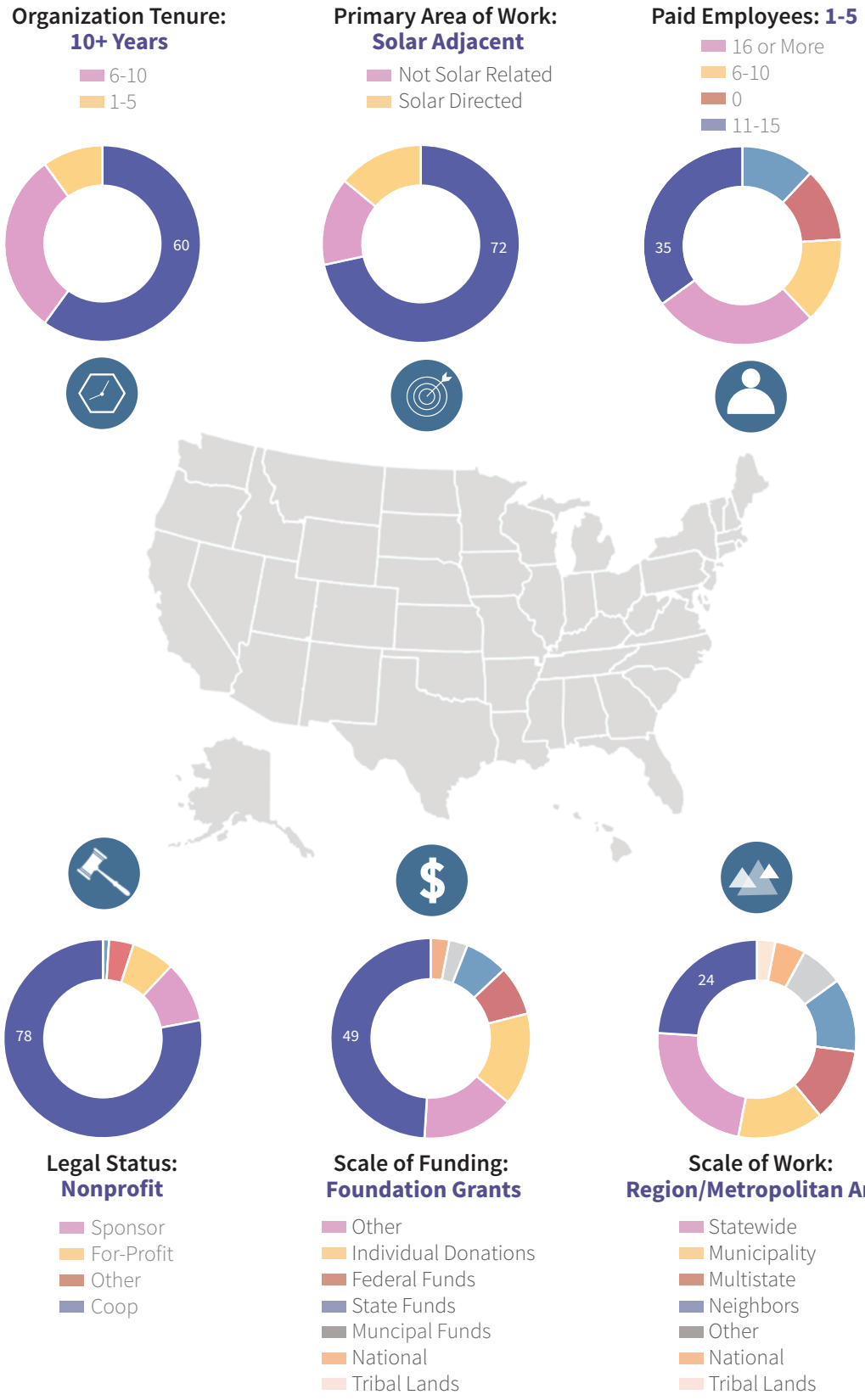
Understanding the baseline operational set-up of CBOs provides essential context when considering CBOs' opportunities and challenges, motivations for solar-related work, and knowledge of the solar industry within the United States. In total, 161 CBOs responded to the survey.

In order to understand the structure and characteristics of CBOs within the United States, the survey captured the following characteristics: *Organization Tenure, Scale of Organization Work, Organization Legal Status, Organization Size based on Number of Employees, Organization Source of Funding, Organization Solar Classification.* The table below shows the most common responses from CBOs addressing each of the main characteristics.

Most Common Responses for Composition of Community-Based Organizations in the Study	
Organization Tenure	10+ years
Scale of Organization Work	Regional/Metropolitan Area and Statewide
Organization Legal Status	Nonprofit
Organization Size based on Number of Employees	1–5 employees and 16+ employees
Organization Source of Funding	Foundation Grants
Organization Solar Classification	Solar-Adjacent

Figure 1, page 17 provides an overview of the most common organization type across the nation for tenure (10+ years), primary area of work (solar adjacent), number of paid employees (1–5), legal status (nonprofit), scale of funding (foundation grants) and scale of work (regional/metropolitan area).

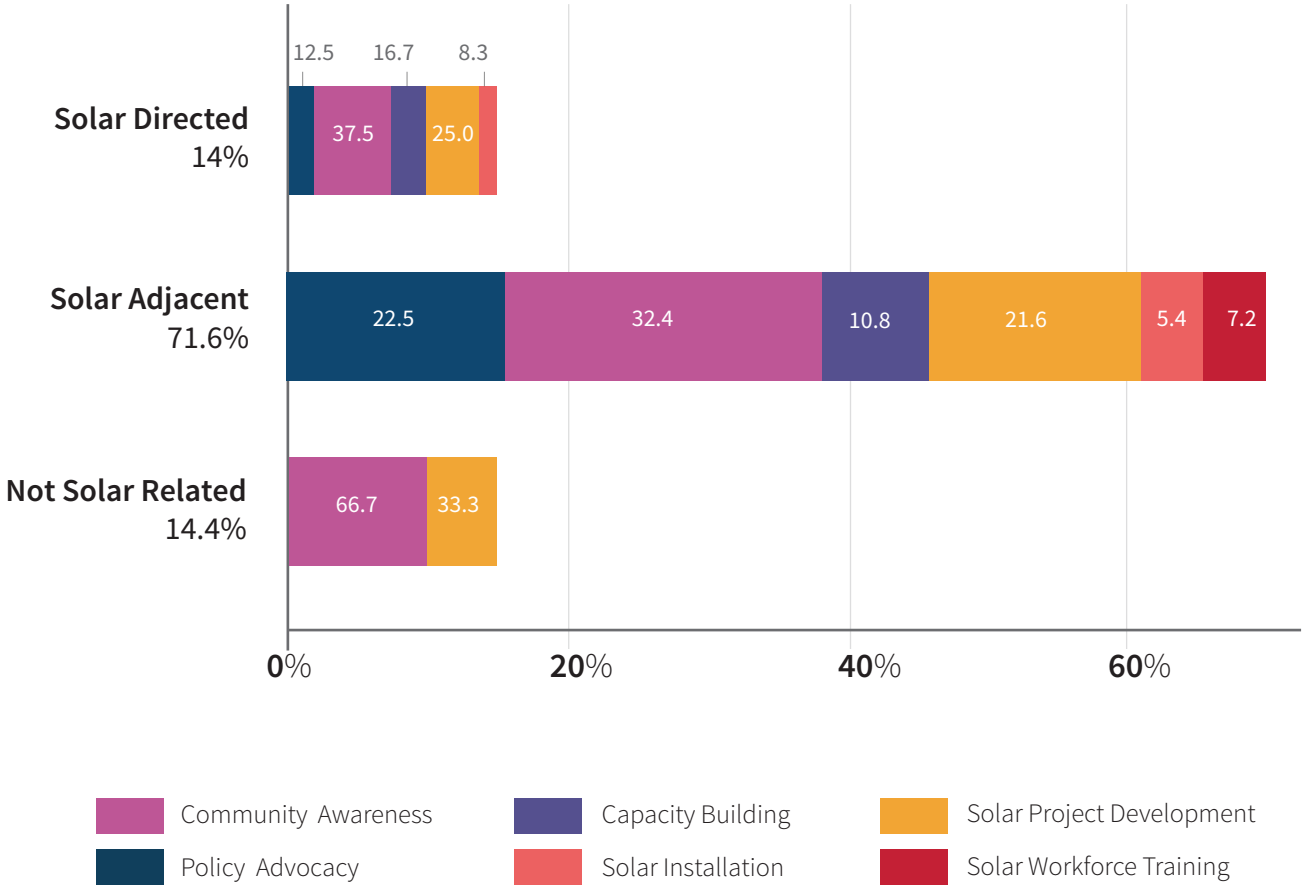
Figure 1: Overview of CBOs Across Regions



5.1.1 Organization Solar Classification

Within organizations across all three organizational focus classifications (*Solar Adjacent, Solar Directed, and Not Solar Related*), Community Awareness was the most common primary area of solar work for CBOs (see Figure 2). Based on the survey results, nearly 72 percent of organizations said they were Solar Adjacent, which means that their main organizational focus is not solar energy, but that they do engage on solar issues or solar work provides benefits to other core missions such as addressing community food security, education, or housing equity. Within those CBOs that are classified as Solar Adjacent, there was a greater focus on *Policy Advocacy* and *Workforce Training* than for CBOs classified as either *Solar Directed* or *Not Solar Related* (see Figure 2). Organizations that identify as *Not Solar Related* do not view solar development as part of their mission but may undertake activities that involve solar to advance their mission (e.g., install solar on their own building to reduce operating costs or share information about solar with community members for economic development reasons).

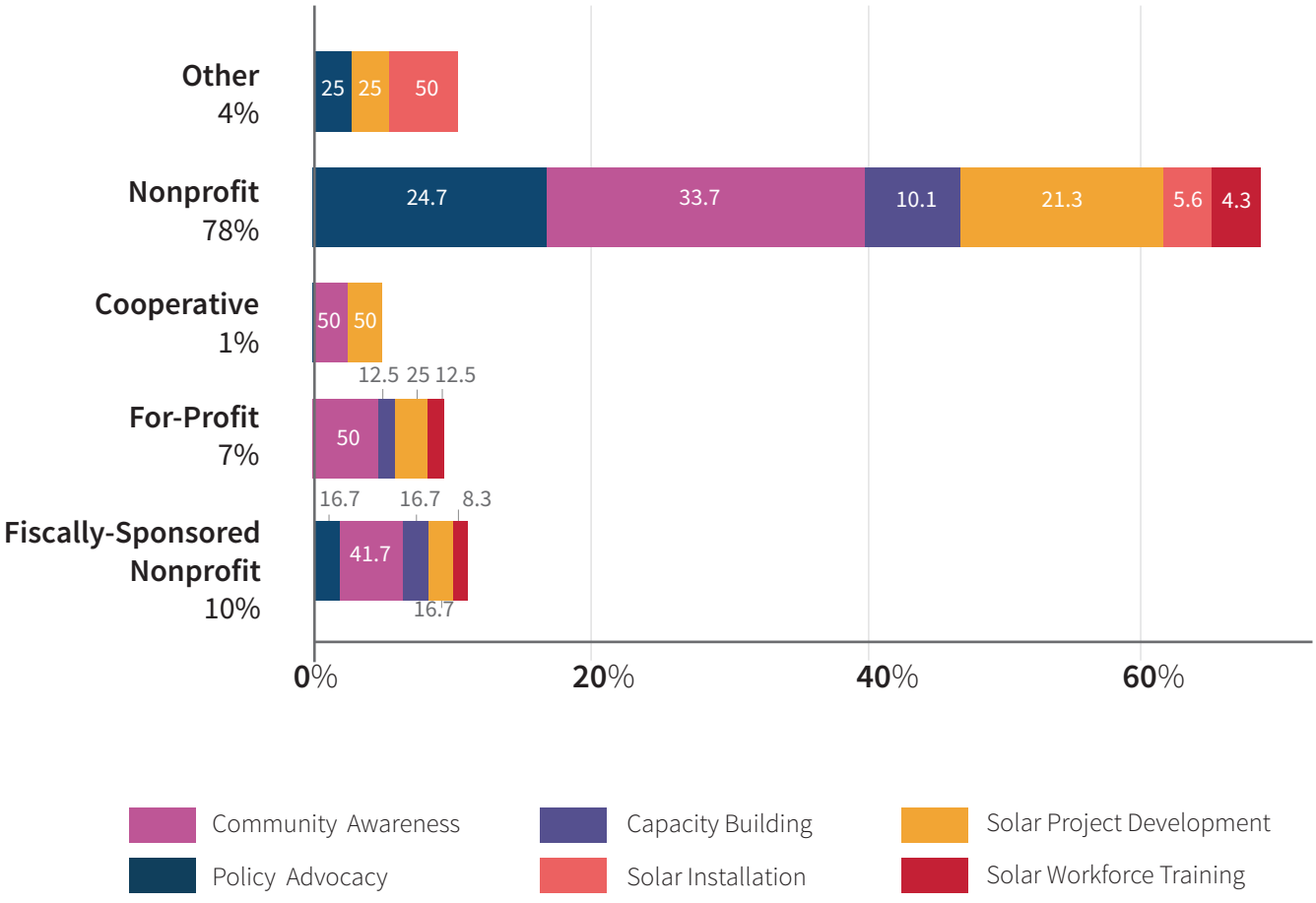
Figure 2: Primary Area of Solar Work by Organization Focus



5.1.2 Organization Legal Status

Based on the 139 responses to the question of legal status, 78 percent of organizations indicated that they had a nonprofit legal status, with the remainder structured as co-ops, for-profit organizations, or other. Among nonprofit CBOs, we find that they focus most frequently on communication awareness, policy advocacy, and solar project development (Figure 3).

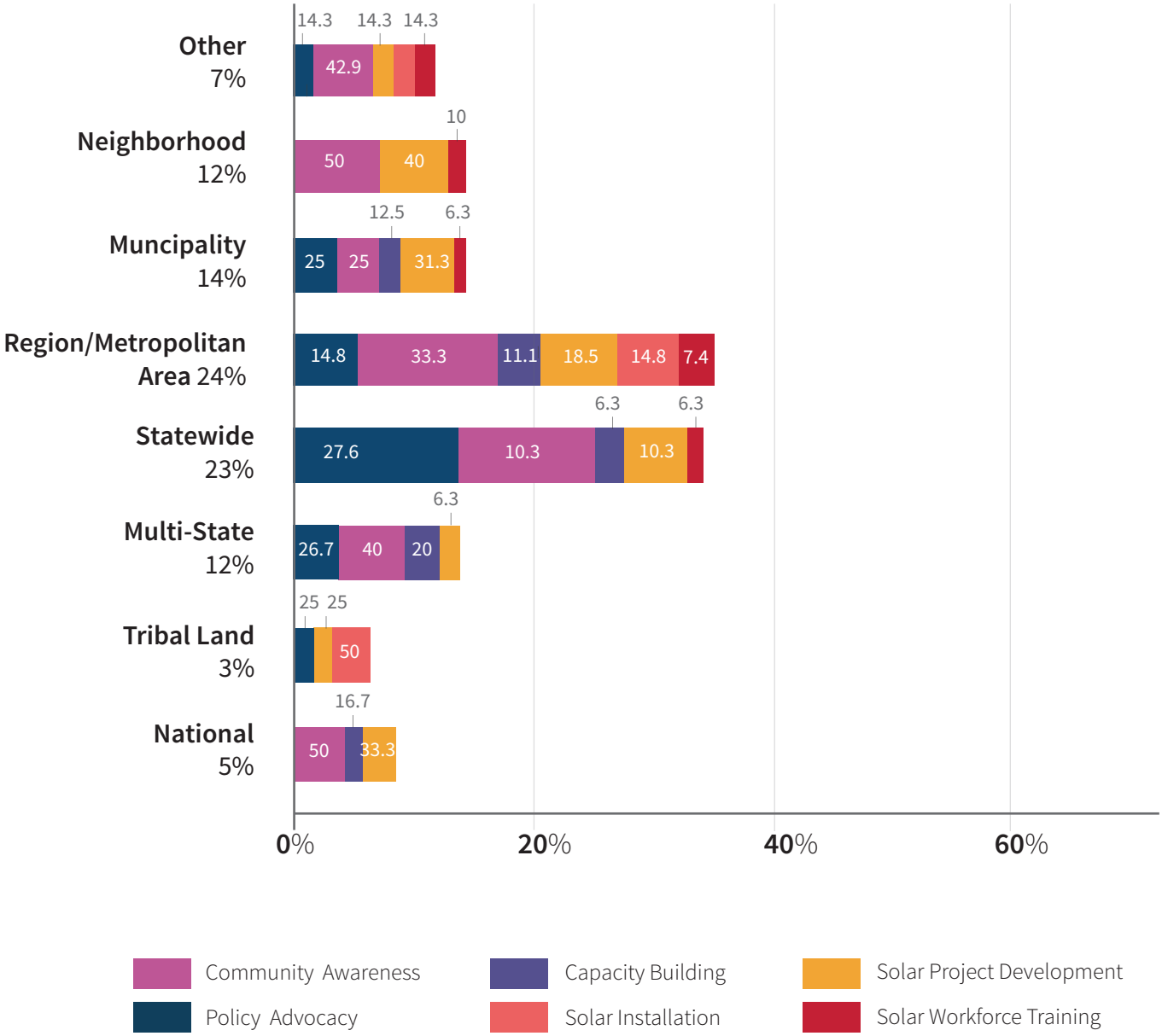
Figure 3: Primary Area of Solar Work by Legal Status



5.1.3 Scale of Organization Work

Organizations were split in terms of scale, with *Regional/Metropolitan Area* and *Statewide* CBOs jointly encompassing nearly 50 percent of responses, followed in frequency by CBOs that operate at the *Municipal, Multi-State,* and *Neighborhood* scale. Figure 4 breaks down the primary area of work and scale of work; it was apparent in our sample that solar installation work was most prevalent among organizations working on tribal land.

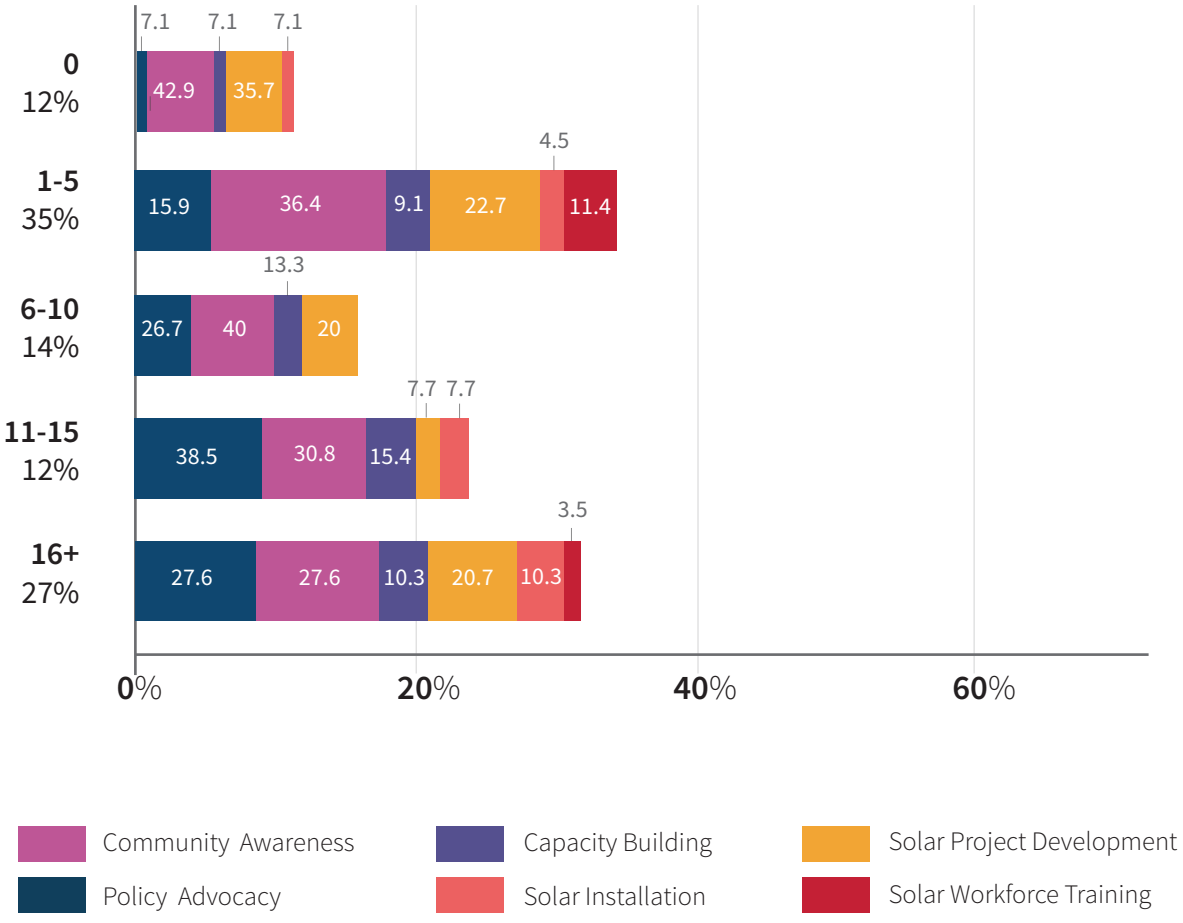
Figure 4: Primary Area of Solar Work by Scale of Work



5.1.4 Number of Employees

In response to questions regarding organization size and number of employees, slightly more than one-third of CBOs (35%) indicated having one to five employees. Slightly more than a quarter (27%) reported having 16 or more employees. The remaining CBOs have 11–15 employees (12%), 6–10 employees (14%) or no employees (12%). See Figure 5.

Figure 5: Primary Area of Solar Work by Organization Size

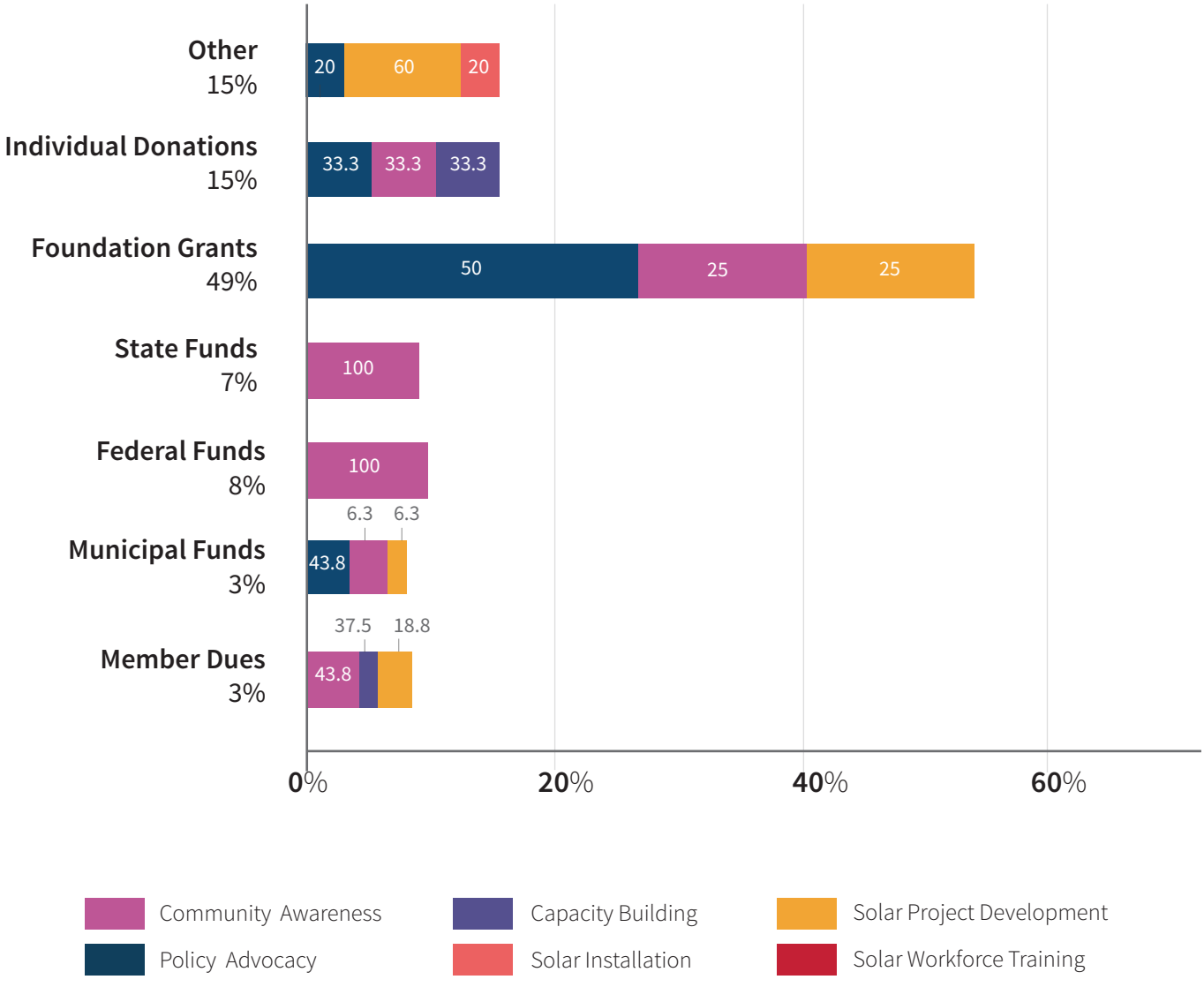


5.1.5 Primary area of solar work by primary source of funding

Figure 6 shows that the largest share of organizations (49%) relies on foundation grants as their main source of funding. Other organizations rely on individual donations (15%) or other (15%), followed by grants from the federal government (8%), state government (7%), municipal government (3%) and member dues (3%).

A notable insight is that organizations that rely on foundation grants are much more likely to focus on policy advocacy than other CBOs. Strikingly, all the organizations that rely primarily on state and federal funding focus on community awareness. Organizations whose primary area of work is solar installation receive funding from other sources.

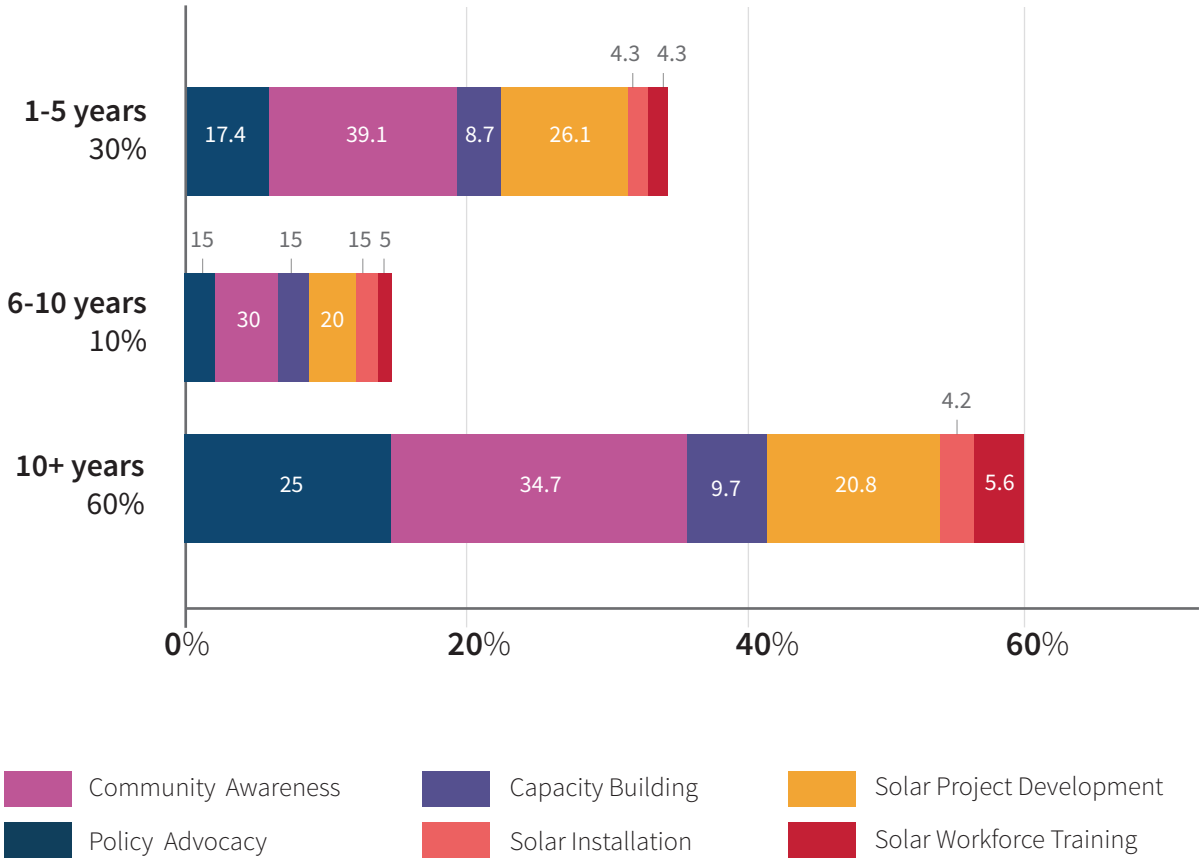
Figure 6: Primary Area of Solar Work by Source of Funding



5.1.6 Organization Tenure

A majority of CBOs (60%) have an organization tenure of over 10 years. Ten percent have 6–10 years and 30 percent have 1–5 years of tenure. Organization tenure does not make a dramatic difference in the primary areas of solar work. See Figure 7.

Figure 7: Primary Area of Solar Work by Organization Tenure



5.2 REGIONAL ANALYSIS OF COMMUNITY-BASED ORGANIZATIONS

To understand the regional breakdown of CBOs, we analyzed the distribution across five regions: Midwest, Northeast, Southeast, Southwest, and West. Figure 8 defines these regions and the scale of community solar awareness therein, with 5 being the highest level of solar awareness.

Figure 8: Overview Map

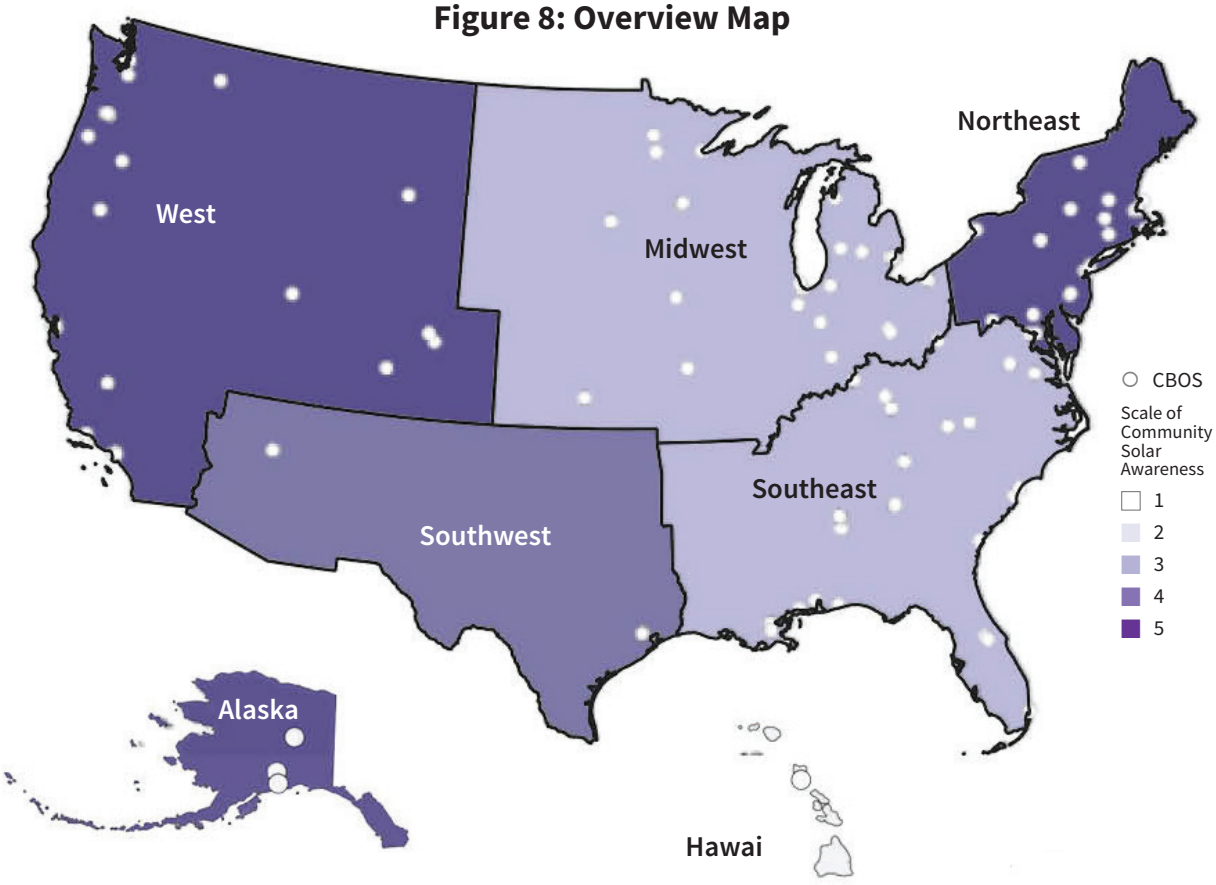
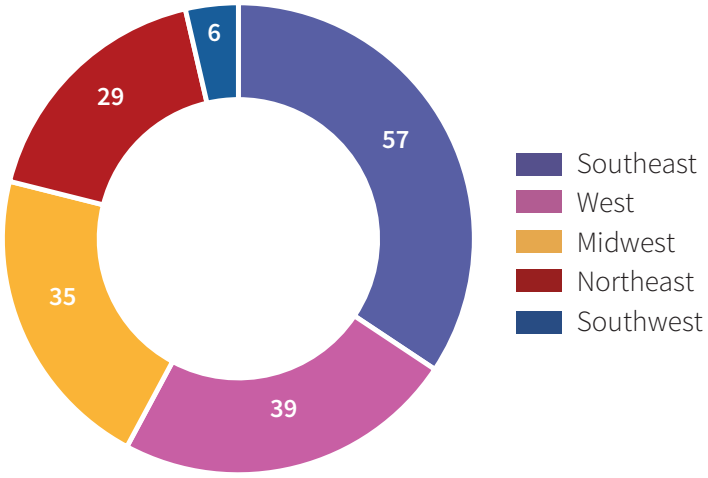


Figure 9: Regional Distribution of Responses



As Figure 9 shows, the Southeast region had the most respondents (57). The Southwest had the fewest respondents (6), which limits the significance of the findings for that region.

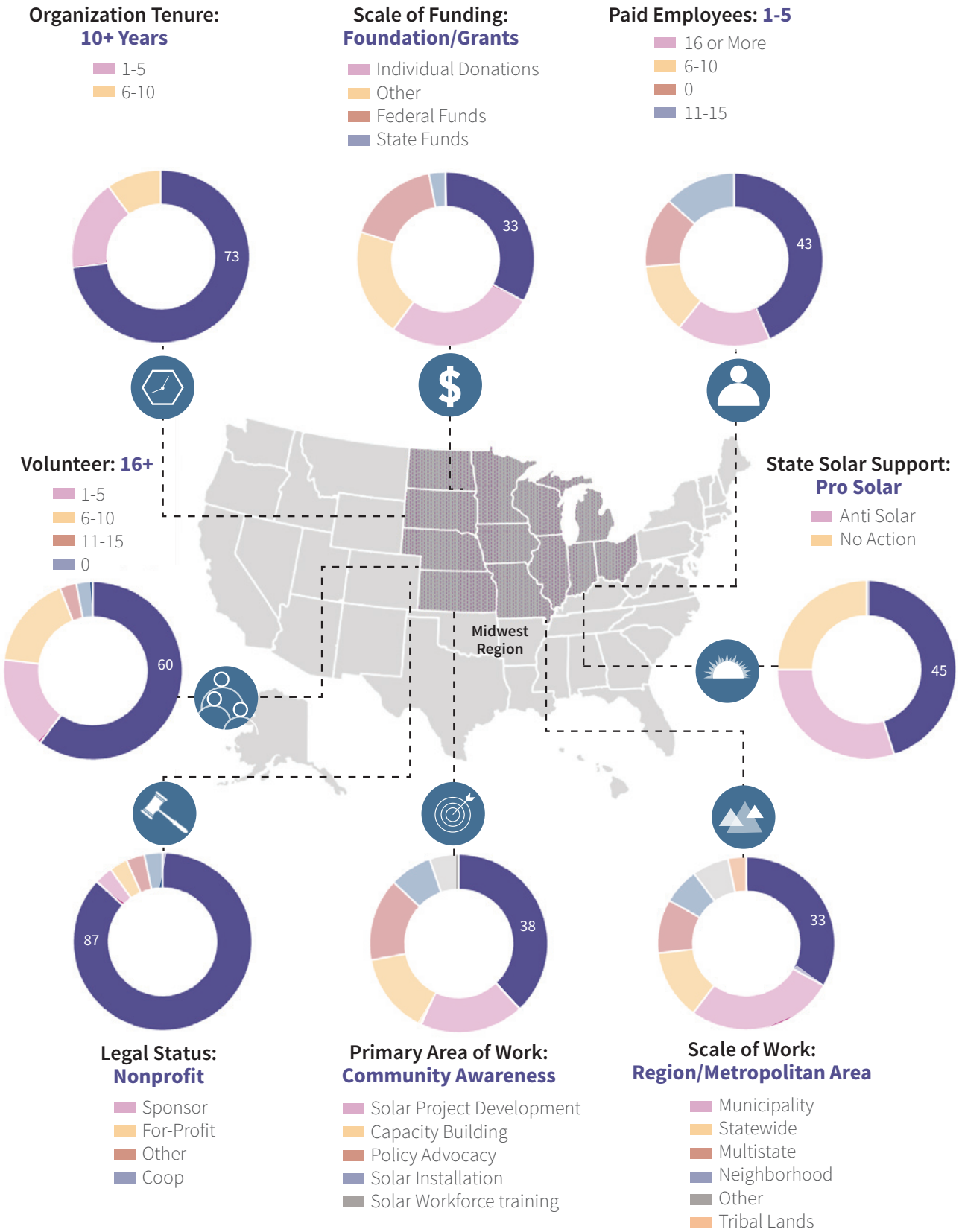
The survey responses were analyzed by region for eight key factors: Organization Tenure, Scale of Work, Primary Area of Work, Legal Status, Paid Employees, Scale of Funding, Volunteers, and Perceived Level of State Solar Support.

5.2.1 Midwest

From the 35 Midwest respondents, survey results indicate that 72 percent of organizations had a tenure greater than 10 years, and 87 percent of organizations had a nonprofit legal status. While the scale of work was centered largely at the municipal and regional scale, the primary area of work was building community awareness, with a fairly even distribution of solar project development, policy advocacy, and capacity building. Most also reported having a supportive state government. The following table includes the most common responses from CBOs in this region. Figure 10, page 26, provides an overview of analysis of the Midwest.

Most Common Responses from Midwest Community-Based Organizations	
Organization Tenure	10+ years
Scale of Work	Municipal and Regional
Primary Area of Work	Community awareness, with a fairly even distribution of solar project development, policy advocacy, and capacity building
Legal Status	Nonprofit
Paid Employees	1–5 employees, with an even distribution of 6-10, 11-15 and 16+ employees
Scale of Funding	Rely on foundation grants and individual donations
Volunteers	16+ volunteers
Perceived level of State Solar Support	Pro-solar

Figure 10: Regional Analysis—Midwest

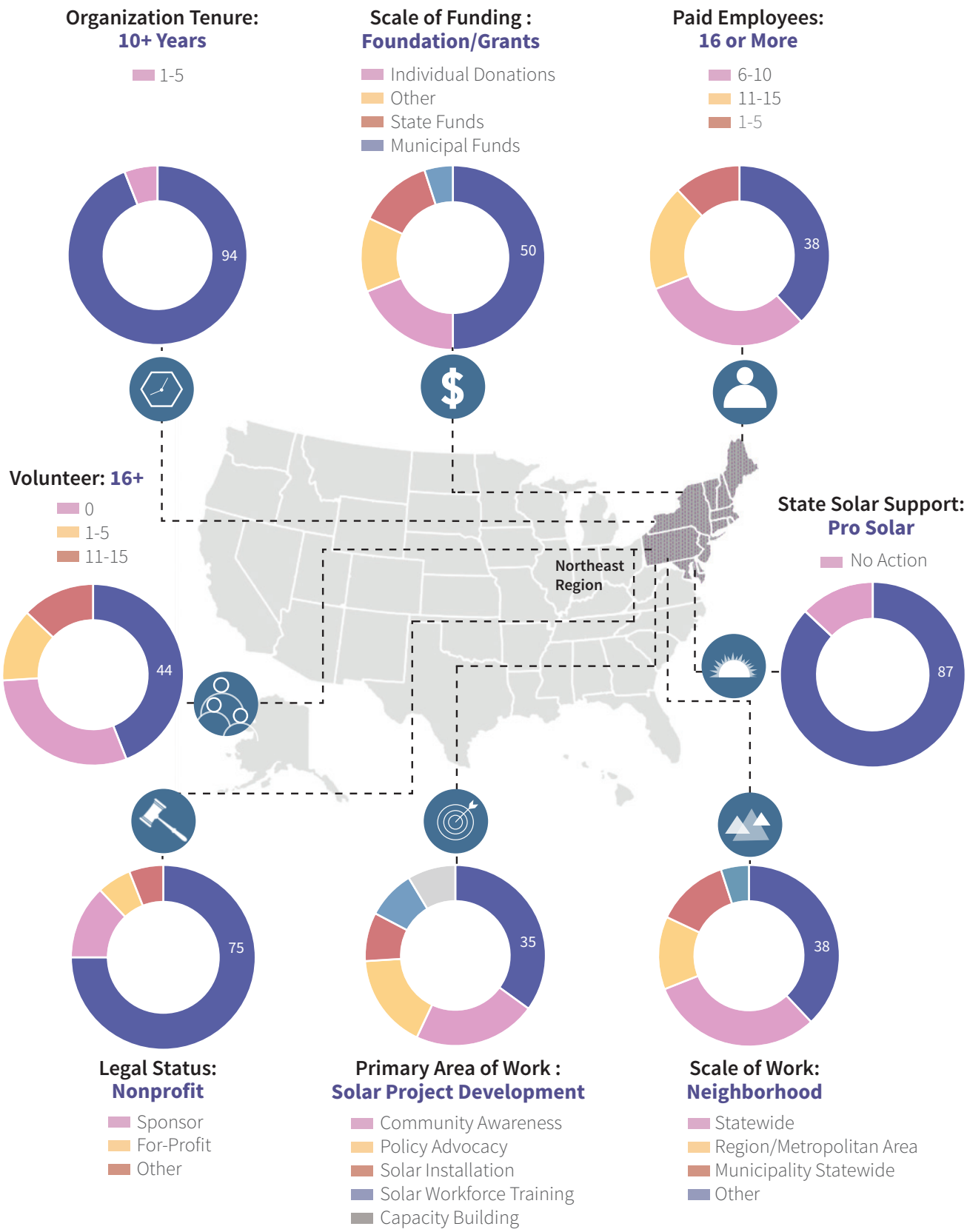


5.2.2 Northeast

The survey collected 29 responses from CBOs in the Northeast. Survey results show 94 percent of these CBOs have a tenure of more than 10 years. The scale of work is focused on the neighborhood or metropolitan level. The primary area of work was solar project development and building community awareness. CBOs reported that state governments in this region were mostly supportive of solar. The following table includes the most common responses from CBOs in this region. Figure 11, page 28 provides an overview of the analysis of the Northeast.

Most Common Responses of Northeast Community-Based Organizations	
Organization Tenure	10+ years
Scale of Work	Neighborhood and Statewide
Primary Area of Work	Solar project development, with a good distribution across community awareness and policy advocacy. The region is also involved in solar workforce training.
Legal Status	Nonprofit
Paid Employees	The largest number of organizations is medium or large sized, with more than 16 paid employees
Scale of Funding	Rely on foundation grants and individual donations
Volunteers	16+ volunteers
Perceived level of State Solar Support	Pro-solar

Figure 11: Regional Analysis—Northeast

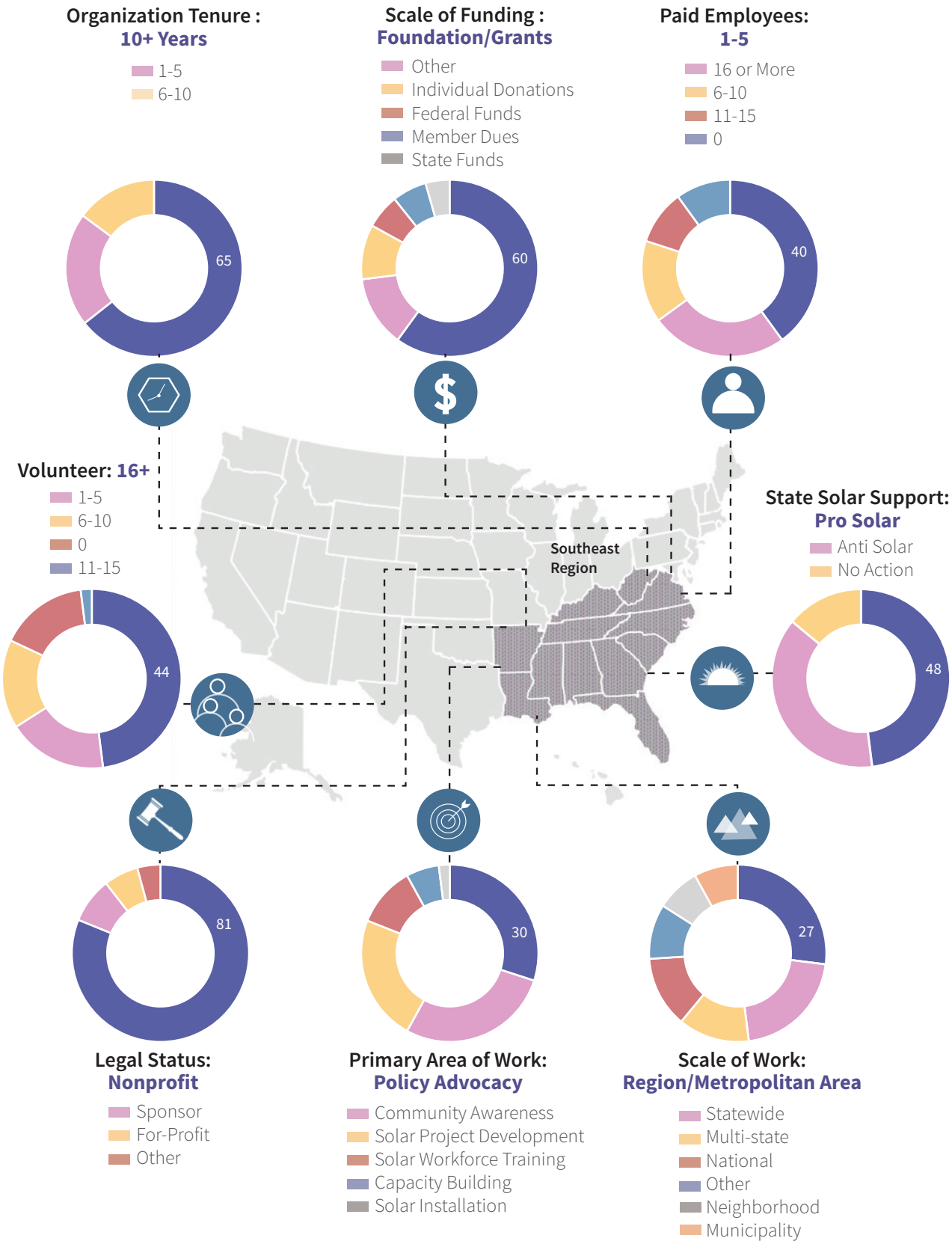


5.2.3 Southeast

The survey collected responses from 57 CBOs in the Southeast. Results show 65 percent of CBOs have a tenure of more than 10 years, and 21 percent have 1–5 years of experience. The scale of work in this region is primarily focused on the state or regional level. The primary area of work was mixed and included community awareness, policy advocacy, and solar project development. CBOs in this region reported mixed feelings on perceived level of state support: 48 percent reported feeling supported, 38 percent reported not feeling supported, and 15 percent felt that their state had simply not taken any action. The following table includes the most common responses from CBOs in this region. Figure 12 on page 30 provides an overview of analysis of the Southeast.

Most Common Responses from Southeast Community-Based Organizations	
Organization Tenure	10+ years
Scale of Work	Regional and Statewide with even distribution of work at the neighborhood, Municipal, Multi-State and National scale
Primary Area of Work	Community awareness, policy advocacy and solar project development. The region is involved in solar workforce training.
Legal Status	Nonprofit
Paid Employees	1–5 employees majority, with an even distribution of 6–10, 11–15 and 16+ employees
Scale of Funding	Rely primarily on foundation grants
Volunteers	16+ volunteers
Perceived level of State Solar Support	Even split between anti- and pro-solar states in the region

Figure 12: Regional Analysis—Southeast

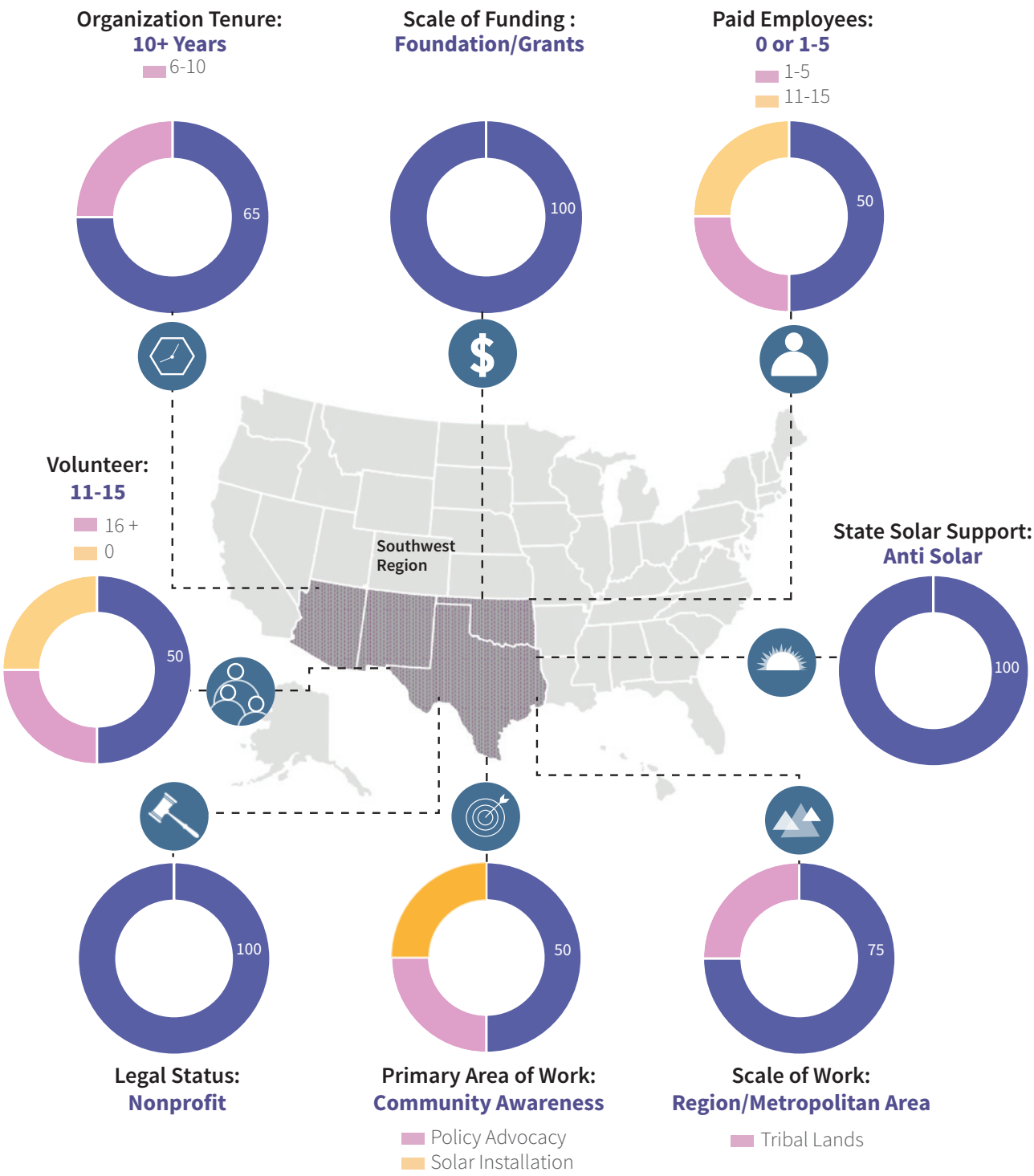


5.2.4 Southwest

The survey collected responses from six CBOs in the Southwest, the fewest of any region. In this region, of the six respondent organizations, two work at the tribal level, while four work at the state-wide level. Most CBOs focused on community awareness, with a fairly even distribution among solar project development, policy advocacy, and solar installation. All CBOs in this region felt that their state government was unsupportive of solar. The following table includes the most common responses from CBOs surveyed in this region. Figure 13, page 32, provides an overview of analysis of the Southwest region.

Most Common Responses of Southwest Community-Based Organizations	
Organization Tenure	10+ years
Scale of Work	Regional and Tribal Land
Primary Area of Work	Community awareness, with a fairly even distribution among solar project development, policy advocacy, and solar installation
Legal Status	Nonprofit
Paid Employees	0 employees or 1-5 employees
Scale of Funding	Rely on foundation grants
Volunteers	11–15 volunteers
Perceived level of State Solar Support	Anti-solar

Figure 13: Regional Analysis—Southwest

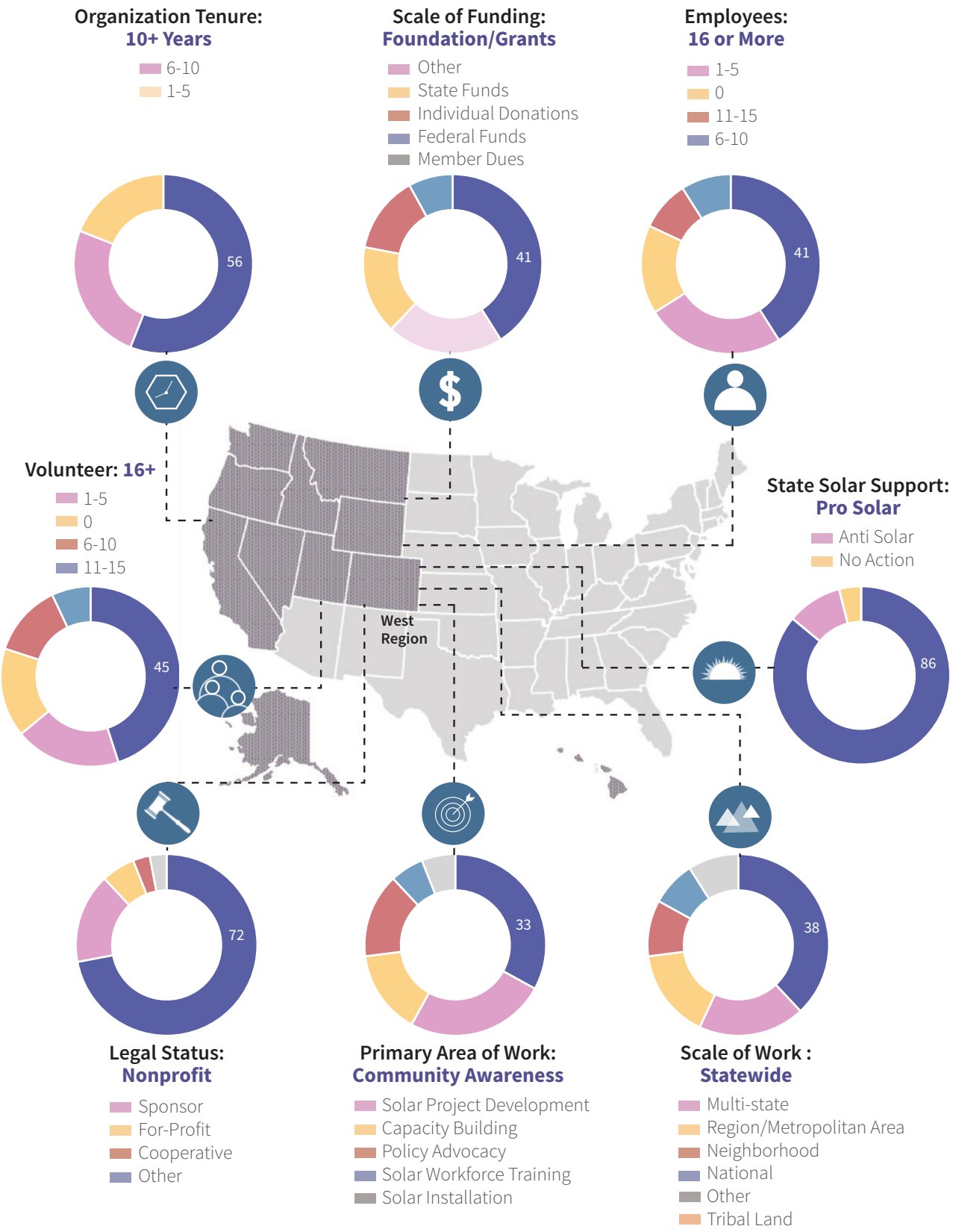


5.2.5 West

The survey collected responses from 39 CBOs in the West. A majority of CBOs had more than 10 years of experience, but a sizable minority (25%) had a tenure of 6–10 years. Most CBOs focused on communication, solar project development, and capacity building. Most CBOs in this region reported support from their state government on solar projects. The following table includes the most common responses from CBOs in this region. Figure 14, page 34, provides an overview of analysis of this region.

Most Common Responses of West Community-Based Organizations	
Organization Tenure	10+ years
Scale of Work	Statewide and Regional
Primary Area of Work	The primary area of work is community awareness, followed by solar project development, capacity building, and policy advocacy.
Legal Status	Nonprofit
Paid Employees	1–5 employees or 16+ employees
Scale of Funding	Rely on foundation grants
Volunteers	16+ volunteers
Perceived level of State Solar Support	Pro-solar

Figure 14: Regional Analysis—West



5.3 FACTOR ANALYSIS

Principal component analysis (PCA) uses linear combinations to create a variance-covariance structure among the set of variables to determine factor groups. Factor Analysis measures a latent variable through a series of underlying Y variables. We utilized a combined approach in Stata with "factor, pcf," which runs factor analysis but rescales the factors such that they conform to a PCA. [19]

For example, the Energy Independence Awareness Scale shows the degree to which an organization is familiar with and focused on energy burden. The scale is comprised of six variables of a CBO respondent's knowledge base including: 1) familiarity with Low Income Residential Solar (LIRS) programs, 2) lack of access to a resilience hub, 3) familiarity with solar tax credits, 4) familiarity with low-income programs, 5) familiarity with energy independence, and 6) familiarity with energy burden. The positive sign indicates a positive correlation (as the variable increases, the scale increases) with the other variables in the scale. The negative sign indicates a negative correlation (as the variable increases, the scale decreases). The variables were loaded and rotated in Stata's combined PCA and Factor Analysis as a single factor with an Eigenvalue of 3.1. The Eigenvalue is a measure of the strength of the variance of factors in a factor analysis. Using the Kaiser criterion, only factors with eigenvalues greater than 1 are retained as each factor extracts at least as much variance as at least one original variable. [20]

The Cronbach's alpha "tests to see if multiple-question Likert scale [for example, strongly agree to strongly disagree ranked from 1-5] surveys are reliable. These questions measure latent variables—hidden or unobservable variables such as a person's conscientiousness, neurosis or openness. These are very difficult to measure in real life. Cronbach's alpha reveals how closely related a set of test items are as a group." [8] A factored variable is generally considered a stronger measure than original variables if the alpha is equal to or greater than 0.70. The six variables in the Energy Independence Awareness Scale tested with an Eigenvalue of 3.1. They were standardized and scaled into the index with a reliability test Cronbach's alpha of 0.84 and an average interim covariance of 0.45.

The factor analysis, with the Eigenvalue and Cronbach's alpha used to verify significance, revealed factors that were compiled into scaled variables (scores from combining the weights of each of the factored variables). Below are the correlated factors tables from Section 4 and from Sections 1, 2, 3 of the survey with descriptions.

Table 1: Factor Analysis

Factor	Variables Used (Interim Co-Variance)	Definition	EigenValue	Alpha
Energy Independence Awareness	+ Access to Resilience Hub (0.60) + Familiarity with Solar Tax Credits (0.44) + Familiarity with Low-Income Programs (0.44) + Familiarity with Energy Independence (0.44) + Familiarity with Energy Burden (0.41)	Shows the degree to which an organization is familiar with and focused on energy independence.	3.1	0.84
Green Finance Awareness	+ Familiarity with Resilience Hub + Familiarity with Electric Grid (0.82) + Familiarity with PPA (0.77) + Familiarity with Green Banks (0.79)	Shows the degree to which organizations are familiar with aspects of green finance.	2.3	0.84
Degree of CBO Involvement in Communities Served	+ Degree Organization Learns From Communities Served (0.73) + Degree Organization Communicates to Communities Served (0.76) + Degree Organization Builds Trust in Communities Served (0.74)	Shows the degree to which the organization is involved in the community.	2.36	0.86
Degree of Community Solar Awareness	+ Degree Community Understands Benefits of Solar (0.44) + Degree Community is Excited About Solar (0.40) + Degree Community Have Seen Solar (0.49) + Degree Community is Aware of Solar Programs (0.49)	Shows the degree to which the communities served are aware of and understand solar benefits	2.38	0.77
Communication for Solar Awareness	+ Organization has spent time building trust w/ served community (0.34) + Organization has established ways of communication educational materials (0.31) + Funding opportunities align with mission of CBO (0.46) + Organization frequently canvasses community (0.44) + Communities aware of residential solar programs (0.52) + Organization frequently uses paid advertisements (0.47)	Shows the degree to which the organization focuses on building trust, communication strategies, and capacity to raise awareness for residential solar programs.	1.83	0.48

Factor	Variables Used (Interim Co-Variance)	Definition	EigenValue	Alpha
Motivation: Community Energy Sovereignty	+ Motivation: Community Empowerment (0.35) + Motivation: Economic Opportunity (0.43) + Motivation: Energy and Environmental Justice(0.44)	Shows the degree to which an organization is motivated by community empowerment, economic opportunity and environmental justice	1.86	0.69
Workforce Installation Scale	+ Level of Solar Workforce Training (0.74) + Primary Work Training and Installation (0.75) + Level of Solar Project Development (0.74) + Level of Solar Installation (0.73)	Shows the degree to which an organization is focused on workforce training and solar installation in their communities.	2.45	0.79
Solar Work Depth	+ Length of Solar Related Work (0.38) + Rooftop Solar Installations Completed, non-residential (0.28) + Rooftop Solar Installations Completed, residential (0.27) + Solar Work Aspirations (0.36) + Depth of Solar Project Development Work (0.31) + Extent of Solar Work (0.26)	Shows the degree to which an organization is focused on solar installation projects specifically.	2.6	0.73

5.4 REGIONAL TRENDS (MAPPING)

Using the variables we generated from our factor analysis, we generated big-picture-level visualizations of the regional typologies of CBOs using QGIS geographic information system software. These visualizations reveal key regional differences across CBOs surveyed.

To map out index variables, researchers gathered the spreadsheet data from the survey results and geocoded the results to a map of the United States and its territories. We are able to pin CBOs on the map based on either an address they provided in our survey or an address from a website. With that map created, we were able to use QGIS's "join attributes by location" tool to create regional median and mean values for each of our index variables that grade a region based on a value scale from one to five (one is the lowest score for a region, five is the highest). Our regional map is based on the following US DOE Regional Work regions: Alaska, South, Appalachia, Midwest, Intermountain West, Southeast, Southwest, West Coast, Mid-Atlantic, Northeast, Hawaii, Puerto Rico, United States Virgin Islands, American Samoa, Guam, and the Commonwealth of Northern Mariana Islands.

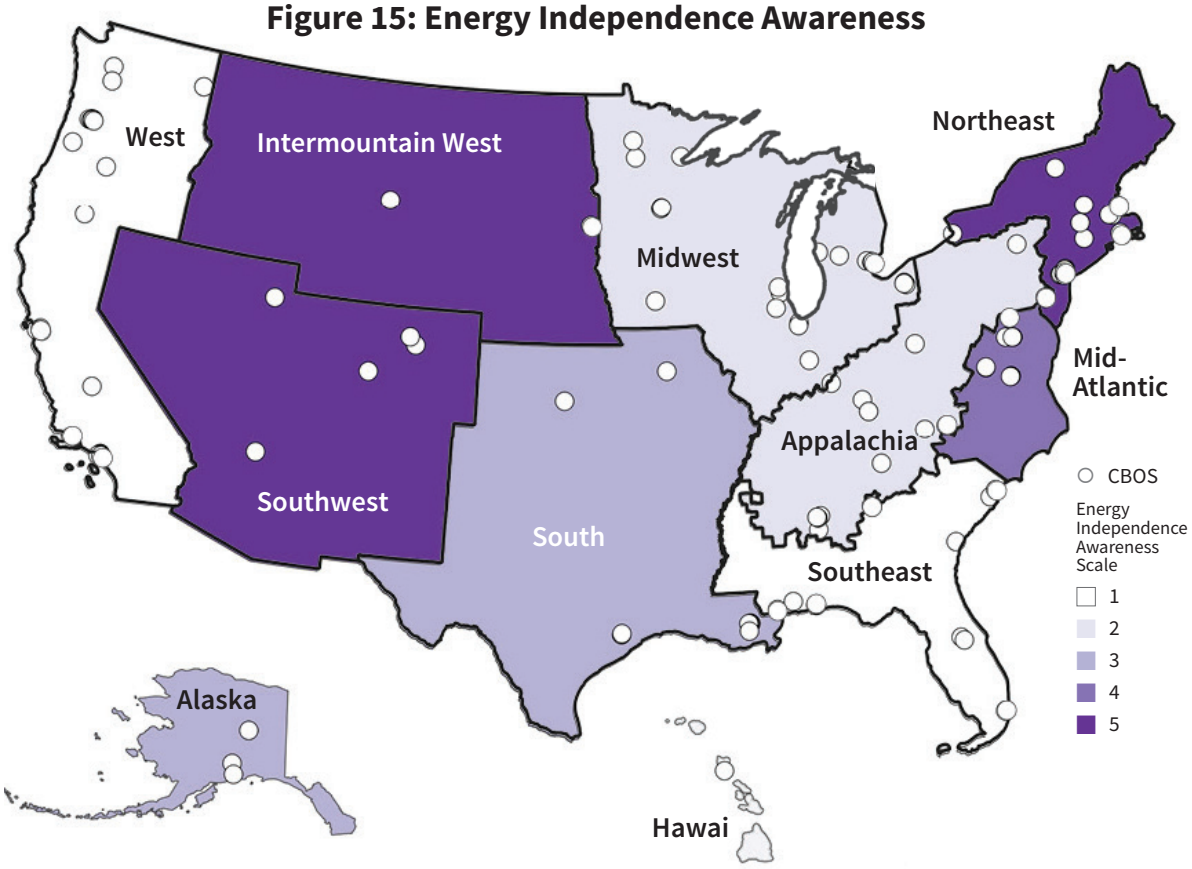
This map follows state and territorial boundaries fairly neatly aside from the distinction of an Appalachian region that stretches from the north of Georgia, Alabama, and Mississippi to the southwest of New York. The distinction of this area by geographic features versus administrative boundaries is based on existing culture regarding the unique regional typology of the Appalachians when it comes to solar power and energy development at large.

The following pages show the map results for eight factors identified above in section 5.3 on Factor Analysis.

5.4.1 Energy Independence Awareness

Energy Independence is a variable the research team created that brings together CBO familiarity with solar tax credits, low-income assistance programs, energy burden, and familiarity with energy independence, along with access to resilience hubs. Together, these factors suggest a CBO awareness of and focus on energy independence as an issue. In our map of this variable, we find that the Intermountain West, Southwest and Northeast all have a focus on energy independence (with an Energy Independence Scale of 5 on the map, see Figure 15), while the adjacent South, Mid-Atlantic Regions, and Alaska the next highest scores, denoting a similar focus. The Midwest, Appalachia, and Hawaii have the second to lowest scores. The Southeast and West have the lowest level of focus on energy independence as an issue.

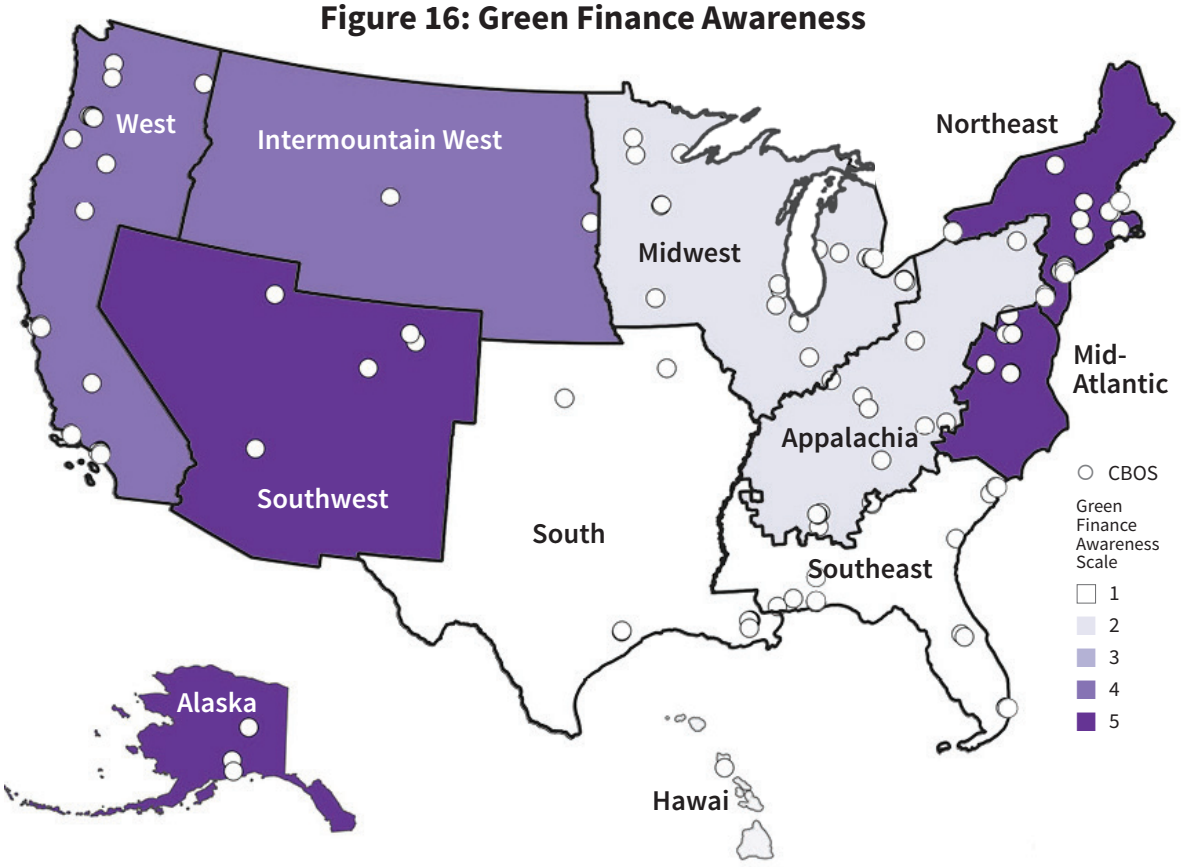
Figure 15: Energy Independence Awareness



5.4.2 Green Finance Awareness

Green Finance Awareness measures the degree to which CBOs are familiar with aspects of green finance and focus on it in their work. Variables that influence it include familiarity with resilience hubs, the electric grid, power purchase agreements, and green banks. The Northeast, Southwest, Mid-Atlantic, and Alaska have the highest scores, with a Green Finance Awareness Scale of 5 on the map, see Figure 16. The West Coast and Intermountain West have the second highest scores. The Midwest, Appalachia, and Hawaii have the second lowest scores. Finally, the South and Southeast have the lowest scores. While the number of data points is limited, the map points to a potential lack of awareness of green finance among CBOs in these two regions, although there may simply be a difference in focus, as the South and Southeast both have high scores for Community Energy Sovereignty as a motivation.

Figure 16: Green Finance Awareness

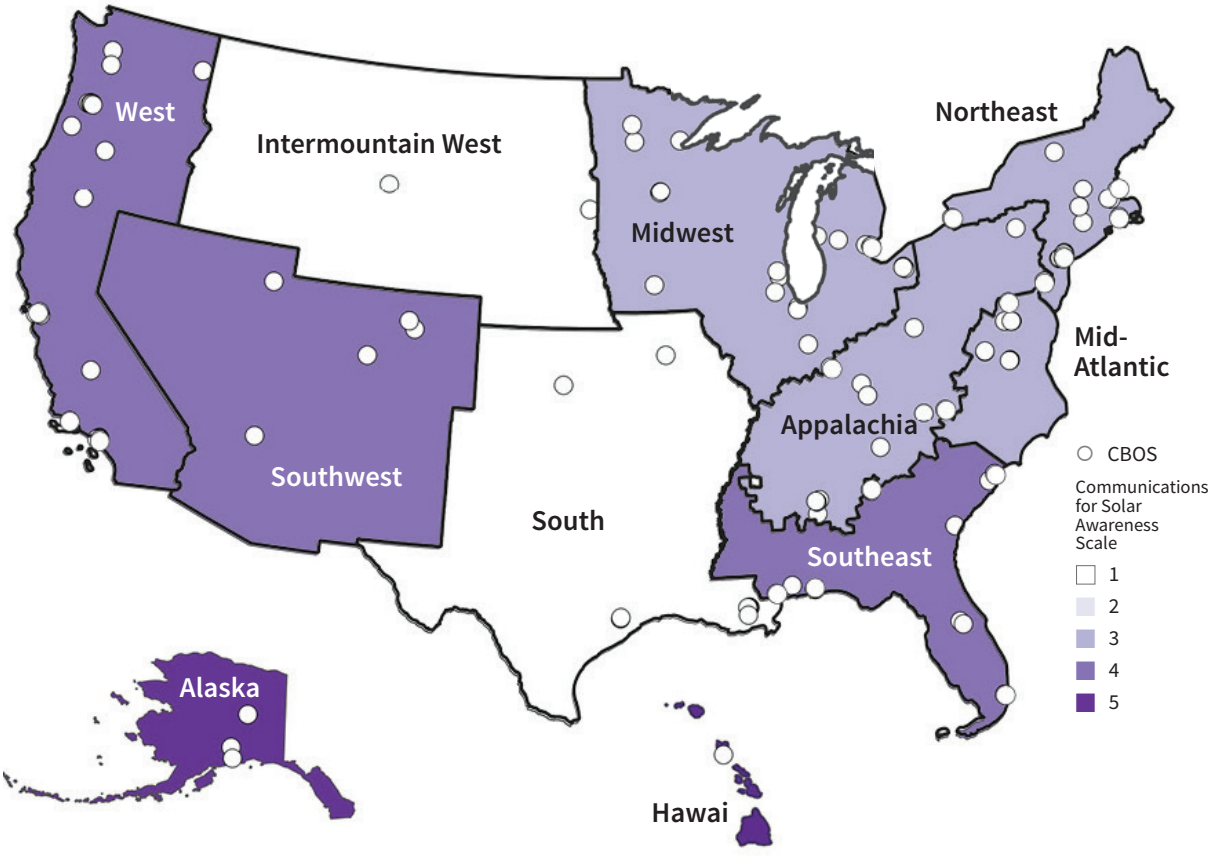


5.4.3. Communication for Solar Awareness

Communication for Solar Awareness shows the degree to which the organization perceives it has built trust, communication strategies, and capacity to raise awareness for residential solar programs. Variables that influence this factor include time spent building trust with the community served, methods of communication of educational materials, and funding opportunities that align with the mission of the CBO.

In mapping Communication for Solar Awareness to the DOE Regional Specialist Regions, Alaska and Hawaii have the highest score (Awareness Level 5 on the map, see Figure 17). The West Coast, Southwest, and Southeast have the second highest score. The Northeast, Mid-Atlantic, Appalachia, and Midwest have the second lowest scores, while the Intermountain West and South have the lowest scores. Higher scores on Communication for Solar Awareness may be correlated with the communication of educational materials and organizing that do not require frequent canvassing, as well as the ability to promote community awareness of residential solar programs without the frequent need for paid advertisements.

Figure 17: Communications for Solar Awareness

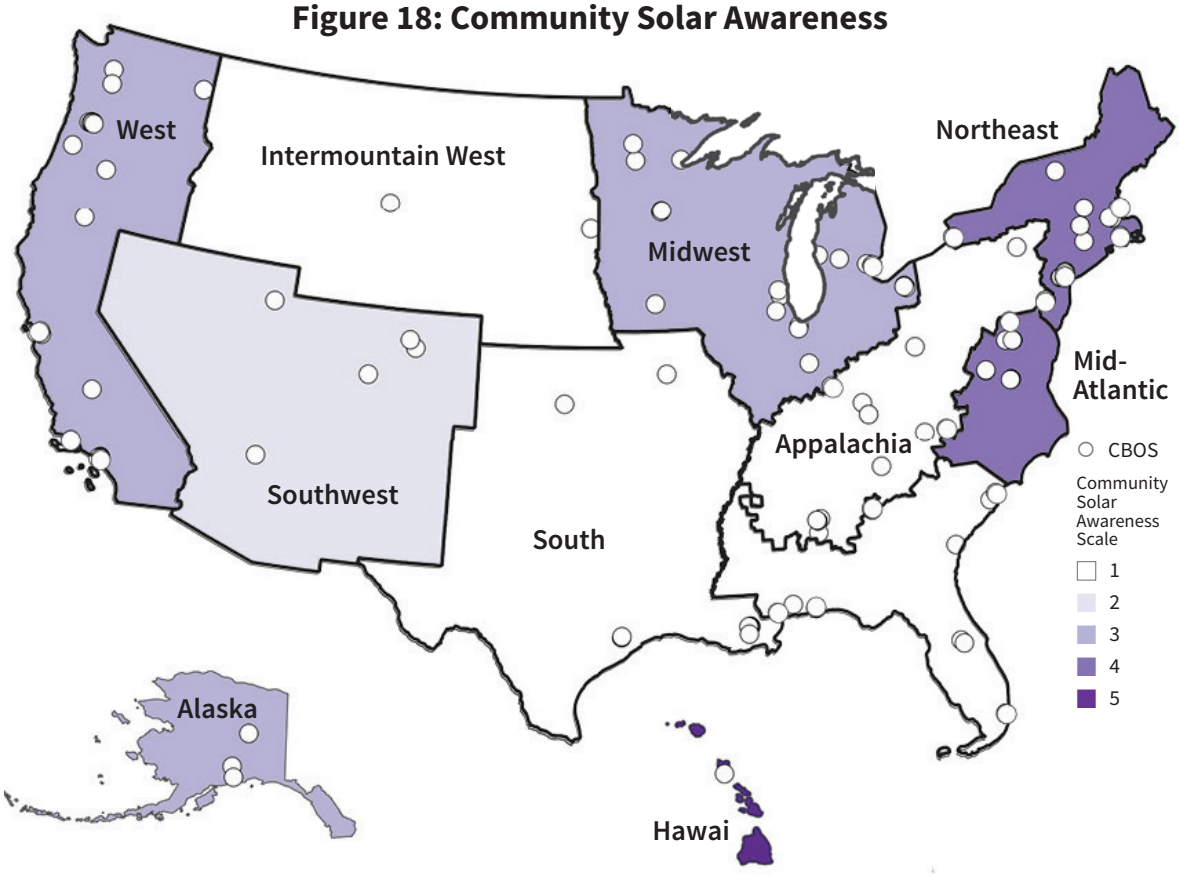


5.4.4 Community Solar Awareness Scale

Community Solar Awareness Scale shows the degree to which the CBOs perceive that the communities they serve understand, are excited for, and have experienced solar projects in their area. Variables that influence this factor include the degree the community understands benefits of solar, the degree the community is excited about solar, the degree to which the community has seen solar, and the degree of community awareness of solar programs.

In mapping the Community Solar Awareness Scale to the DOE Regional Specialist Regions, the Northeast, Mid-Atlantic and Hawaii have the strongest rating, while the Midwest, West and Alaska have the second highest ranking. The Southwest has the second lowest rating. The Intermountain West, South, Southeast, and Appalachia have the lowest. Higher scores on the Community Solar Awareness Scale indicate that the CBOs perceive their regions to be more aware of and excited about solar projects and benefits. For the Northeast and Hawaii these results are also reflected in the Solar Installation and Depth of Solar work scales. The Solar Awareness Scale has notable differences with the Communication for Solar Awareness scale. CBOs acknowledge that the results of their communications have not had the same impact as their perceived focus on communicating for solar awareness, particularly in the Southeast and Appalachia. See Figure 18.

Figure 18: Community Solar Awareness

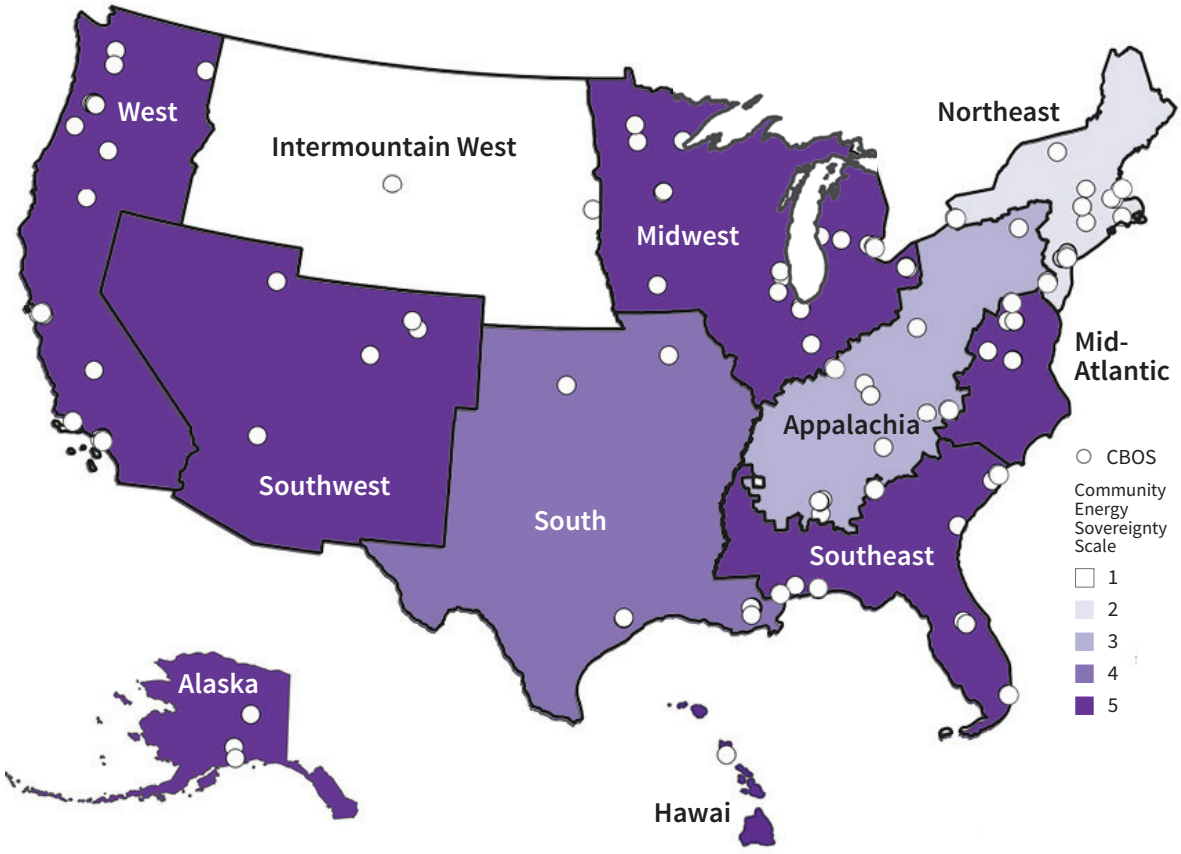


5.4.5 Motivation: Community Energy Sovereignty

Community Energy Sovereignty shows the degree to which an organization is motivated by community empowerment, economic opportunity, and environmental justice. It is a variable created from questions asking CBOs to rate how much community economic empowerment, economic opportunity, and environmental justice motivate their work.

Mapping on Figure 19 shows that this is a significant motivation for organizations in several regions. The West, Southwest, Midwest, Southeast, Mid-Atlantic, Hawaii, and Alaska all have the highest scores for Community Energy Sovereignty as a CBO motivation, shown as Level 5 on the map. The South has the second highest score, followed by Appalachia. The Northeast has the second lowest score. Finally, the Intermountain West has the lowest score, which is interesting given that it has high scores for Energy Independence Awareness, Green Finance Awareness, and Depth of Solar Work. Given the results in the Northeast and Intermountain West, it is possible that CBOs that focus more on solar installation and workforce development are less motivated by community energy sovereignty.

Figure 19: Motivation—Community Energy Sovereignty

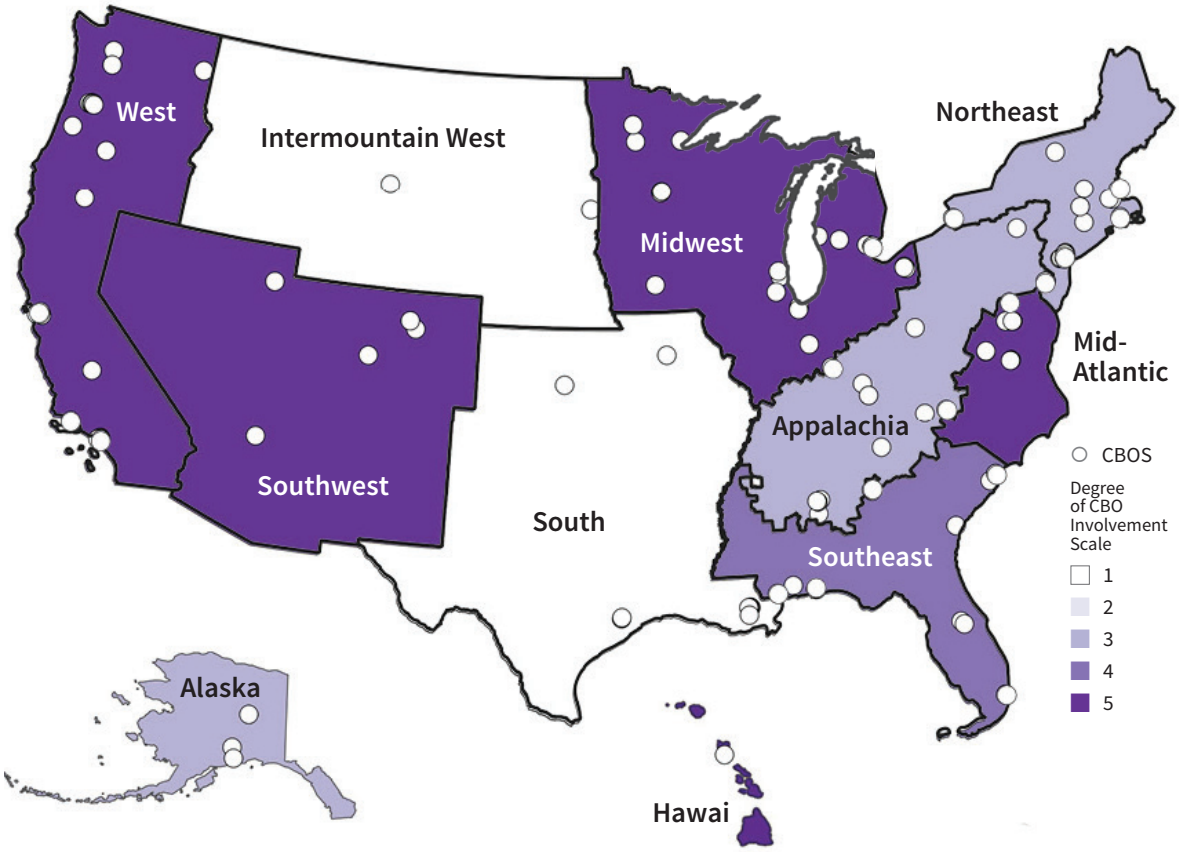


5.4.6 Degree of CBO Involvement in Communities Served

Degree of CBO Involvement in Communities Served attempts to value the degree to which a CBO is located in or near the communities they serve. This factor positively increases depending on the degree to which a CBO learns from the communities served, the type of communication delivered to the communities served, and the degree to which CBO respondents reside in the community they work in.

The Midwest, Southwest, West and Mid-Atlantic have the highest ratings while the Southeast has the second highest rating. The South and Intermountain West have lower ratings. See Figure 20. These are areas with more rural populations. These results could be a result of larger administrative boundaries that group people together across wide distances. These results accord with previous study results that show that many western CBOs are focused on community engagement and work at the state or regional level. Southwestern states had a similar profile but worked at the Tribal level more.

Figure 20: Degree of CBO Involvement in Communities Served

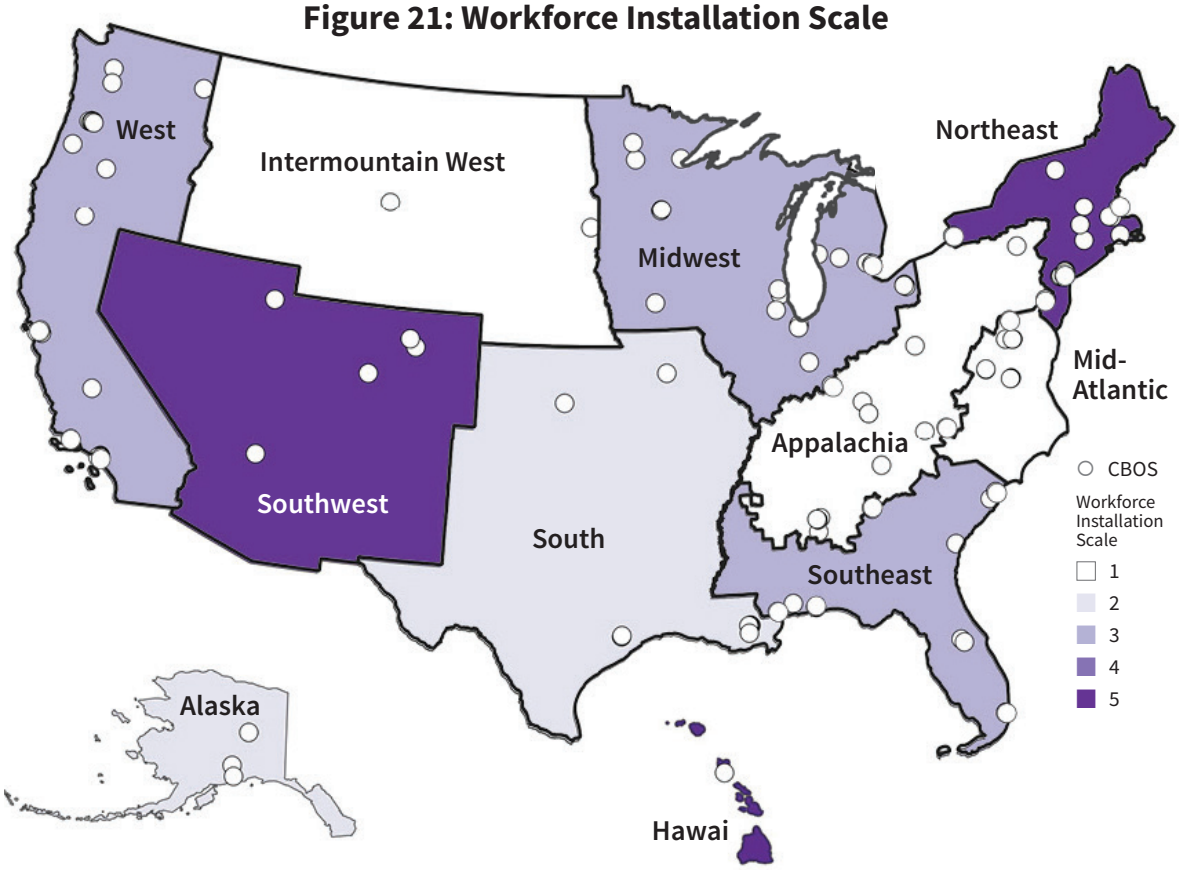


5.4.7 Workforce Installation Scale

Workforce Installation Scale shows the degree to which an organization is focused on workforce training and solar installation in their communities.

The Northeast, Southwest, and Hawaii have the highest ratings on the Workforce Installation Scale, indicated as Level 5 on the map, see Figure 21. These regions have favorable state polices, as well as a greater focus on solar installation. The West, Midwest and Southeast have the second highest ratings on the Workforce Installation Scale. The South and Alaska have the second lowest scores. Finally, the Appalachian and Intermountain West, and Mid-Atlantic region have the lowest scores for workforce training and solar installation. It is important to note that the inclusion of workforce training in this variable makes it distinct from Depth of Solar Work (page 45). Some of the regions like the Northeast and Southwest have a focus on both workforce training and solar installation, but others such as the Intermountain West have Depth of Solar Work but less focus on workforce training.

Figure 21: Workforce Installation Scale

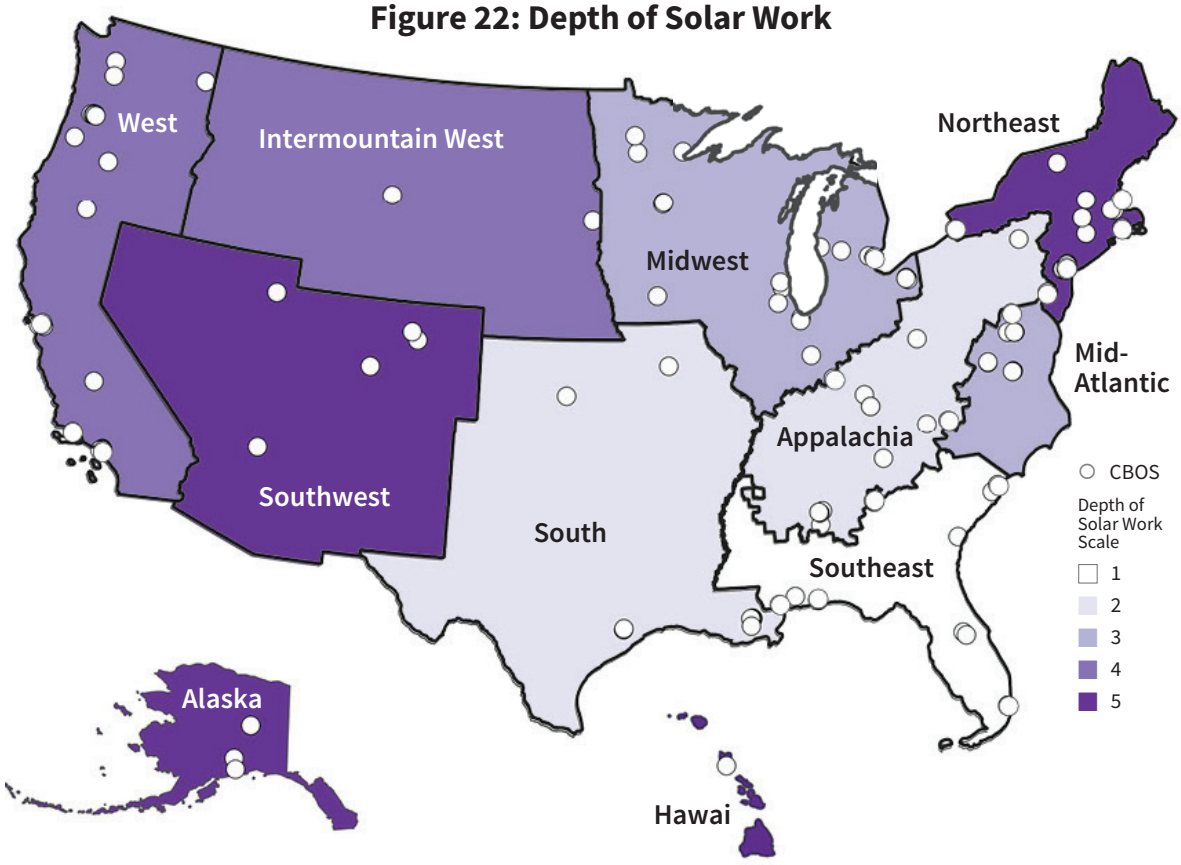


5.4.8 Depth of Solar Work

Depth of Solar Work shows the degree to which an organization is focused on solar installation projects. This scaled variable is comprised of several variables, including the length of solar-related work, rooftop solar installations completed (residential and non-residential), solar work aspirations, and depth of solar project development work, and extent of solar work.

The Southwest and Northeast have the highest scores for Depth of Solar Work, indicated as Level 5 on the map, see Figure 22. The West and Intermountain West are second, followed by the Mid-Atlantic and Midwest. The South and Appalachian regions have lower scores, and the Southeast the lowest. This reflects a larger trend we identified in previous conversations with CBOs: many work on solar energy, but do not focus on solar installation. The Southwest and Northeast have the greatest focus on solar installation projects.

Figure 22: Depth of Solar Work



6 STATISTICAL METHODOLOGY

6.1 REGRESSION ANALYSIS

After completing mapping, we tested if there was any statistical significance between variables in our dataset. We used Stata to carry out a series of regression analyses to test the existence and strength of relationships between various regional and organizational structure variables and the index variables created from the factors described above in section 5.3. Ordinal and categorical variables are regressed as categorical variables, and each category is compared with the baseline. Due to the small sample size we could not analyze the 12 regions and four states and protectorates mapped above, so have compiled these regions into 5 major regions: West, Midwest, Northeast, Southwest and Southeast. To balance the Southwest region so that we could conduct the statistical analysis, we combined the data from South and Southwest regions as described in the mapped sections above. This will generate some differences between the above mapped factor variables, and the regressions results in Table 2.

Table 2. Multiple multivariate regression of energy independence awareness, green finance awareness, communication for solar awareness, and community solar awareness scale variables

Variables	Energy Independence Awareness		Green Finance Awareness		Communication for Solar Awareness		Community Awareness	
	B	*Standard Error*	*B*	*S.E.*	*B*	*S.E.*	*B*	*S.E*
Region — Midwest (Baseline)								
Northeast	-0.24	0.41	0.17	0.49	-0.16	0.30	-0.60	0.48
Southeast	-0.01	0.29	0.19	0.34	-0.10	0.21	-0.78**	0.34
Southwest	-0.10	0.39	0.07	0.47	-0.26	0.29	-0.42	0.46
West	-0.49	0.33	-0.31	0.39	-0.37	0.24	-0.63	0.39
Scale of Work — Other (Baseline)								
Neighborhood	-0.33	0.40	-0.12	0.48	0.34	0.30	0.47	0.47
Municipality	-0.69	0.43	-0.27	0.52	0.49	0.32	0.17	0.51
Region/Metro. Area	-0.35	0.38	0.31	0.46	0.13	0.28	0.53	0.45
Statewide	-0.19	0.35	0.36	0.42	0.32	0.26	0.52	0.41
Multi-state	-0.19	0.41	0.24	0.49	0.47	0.31	0.71	0.49
Tribal land	-0.37	0.59	-0.50	0.71	0.51	0.44	-0.53	0.70
National	-0.25	0.51	0.31	0.61	0.44	0.38	0.59	0.61

Variables	Energy Independence Awareness		Green Finance Awareness		Communication for Solar Awareness		Community Awareness	
	B	*Standard Error*	*B*	*S.E.*	*B*	*S.E.*	*B*	*S.E*
Legal Structure — Other (Baseline)								
Nonprofit	-0.25	0.46	-0.14	0.55	0.55	0.35	-0.88	0.55
Cooperative	0.19	0.99	0.25	1.18	0.60	0.74	-0.04	1.17
For-Profit	0.10	0.62	0.05	0.74	0.70	0.46	-0.62	0.74
Fiscally-spnr. nonprofit	-0.23	0.56	0.11	0.66	**0.91****	**0.41**	-0.32	0.66
Organization Staff								
Resides in Community	**-0.69*****	**0.23**	**-0.67****	**0.27**	**-0.39****	**0.17**	-0.36	0.27
Has Indigenous Staff	0.16	0.26	0.22	0.31	-0.03	0.19	0.20	0.31
Paid Employees — 0 (Baseline)								
1-5	0.001	0.30	0.03	0.36	-0.01	0.22	-0.24	0.35
6-10	0.20	0.40	0.25	0.47	-0.14	0.30	-0.04	0.47
11-15	-0.04	0.38	-0.24	0.46	-0.04	0.28	-0.37	0.45
16 or more	0.07	0.37	0.08	0.44	-0.17	0.27	-0.34	0.44
Volunteers — 0 (Baseline)								
1-5	-0.11	0.32	0.00	0.38	-0.31	0.24	-0.33	0.38
6-10	0.18	0.33	0.15	0.39	-0.04	0.24	-0.48	0.39
11-15	0.53	0.49	0.58	0.58	0.59	0.36	-0.11	0.58
16 or more	0.10	0.29	0.16	0.35	0.01	0.22	-0.35	0.35
Organization Tenure — 1-5 years (Baseline)								
6-10 years	0.39	0.30	0.41	0.36	0.04	0.22	**0.81****	**0.35**
More than 10 years	0.12	0.26	-0.04	0.32	0.05	0.20	0.37	0.31
Solar Support								
Perceives local support	0.15	0.22	0.04	0.26	-0.15	0.16	-0.16	0.21
Perceives state support	-0.12	0.22	0.22	0.27	0.10	0.17	**0.50***	**0.26**
Constant	1.10	0.75	0.22	0.90	-0.24	0.56	1.18	0.89
R^2	0.28		0.27		0.40		0.38	
N =	81		81		81		81	

* p < 0.1 **; p < 0.05; *** p < 0.01

6.1.1 Energy Independence Awareness

In our multivariate test for the variable Energy Independence Awareness, there was a statistically significant relationship found with a 99 percent confidence interval related to whether or not the respondent representing the CBO resides in the community. The negative sign on the coefficient indicates an inverse relationship such that CBOs with respondents who live in the community are less likely to be aware of various aspects of energy independence and less likely to have access to a resilience hub. For policymakers, this is a signal that organizations that reside in communities and operate at more local scales may be less familiar with various aspects of energy independence.

6.1.2 Green Finance Awareness

For the variable Green Finance Awareness, we found statistically a significant relationship, at the 95 percent confidence interval, between the independent variable Resides in Community and Green Finance Awareness, a factor created by researchers and discussed earlier. The regression test showed a 99 percent confidence interval in the statistical significance of these two variables. The negative sign on the coefficient indicates an inverse relationship CBOs with respondents who live in the community being less likely to be aware of green finance opportunities. For policymakers, this signals that more education and outreach might be needed to help locally oriented CBOs access and build awareness of green finance opportunities.

6.1.3 Communication for Solar Awareness

The multivariate test for Communication for Solar Awareness established multiple statistically significant relationships between Communication for Solar Awareness, and the independent variables "Legal Structure: Fiscally-sponsored Nonprofit," and "Resides in Community" at the 95 percent confidence interval. For context, a fiscally-sponsored nonprofit is an entity that has a larger organization collecting and administering funds on its behalf. This can happen for a few reasons—most often it is a strategy used by relatively new CBOs to collect funding while they figure out their own formal nonprofit status.

Nonprofit organizations that are fiscally-sponsored and which do not reside in the community feel they have developed better strategies and capacity for communicating solar awareness in the communities they serve. Whereas organizations that reside in the community feel less confident about their capacity for communicating solar awareness. The inverse relationship for "Resides in Community" may signal an issue of capacity as other data indicate that the organizations that reside in community tend to be smaller organizations, which may have less capacity to staff a variety of different activities. Policymakers could further investigate the strategies that fiscally-sponsored nonprofits use, and bolster support for these strategies with organizations which have other legal structures including nonprofits and cooperatives.

6.1.4 Community Solar Awareness

In our multivariate test for the dependent variable Community Solar Awareness Scale, there were three statistically significant relationships. The independent variables, "Region: Southeast" and "Organization Tenure: 6–10 years" show a significant correlation with the dependent variable, Community Solar Awareness Scale at the 95 percent confidence interval. The negative sign on the coefficient of the variable "Region: Southeast," means that CBOs based in the Southeast tend to have less awareness of community solar. The positive sign on the "Organization Tenure: 6–10 years" indicates a positive correlation between organizations of this age and the Community Awareness Scale. The other variables with a statistically significant relationships to Community Solar Awareness Scale is "Solar Support:

Perceives State Support." The positive coefficient, which is significant at the 90 percent confidence interval indicates a positive relationship between organizations perceiving state support for solar and serving in communities with a higher community awareness of solar score. See Table 3.

Table 3. Multiple multivariate regression of solar motivation, involvement, workforce training, and depth of solar work variables

Variables	Motivation: Energy Sovereignty		Degree of Community Involvement		Workforce Installation		Depth of Solar Work	
	B	*Standard Error*	*B*	*S.E.*	*B*	*S.E.*	*B*	*S.E*
Region — Midwest (Baseline)								
Northeast	-0.55	0.47	**-0.91****	**0.41**	-0.27	0.44	-0.09	0.38
Southeast	-0.11	0.33	-0.27	0.29	-0.44	0.31	**-0.46***	**0.27**
Southwest	**-0.93****	**0.45**	-0.25	0.39	-0.38	0.43	-0.30	0.37
West	**-0.82****	**0.38**	**-0.94*****	**0.33**	-0.28	0.35	0.08	0.30
Scale of Work — Other (Baseline)								
Neighbourhood	-0.02	0.46	**1.08****	**0.40**	-0.68	0.43	-0.54	0.37
Municipality	**-1.16****	**0.50**	0.29	0.44	**-1.24****	**0.47**	-0.45	0.40
Region/Metro. Area	-0.41	0.44	0.24	0.38	-0.17	0.42	-0.12	0.36
Statewide	-0.42	0.40	**0.72****	**0.35**	**-0.75***	**0.38**	-0.01	0.32
Multi-state	-0.63	0.48	0.56	0.41	-0.76*	0.45	0.20	0.38
Tribal land	-0.49	0.68	0.22	0.59	-0.14	0.64	-0.45	0.55
National	0.03	0.59	0.33	0.51	-0.19	0.56	0.69	0.48
Legal Structure — Other (Baseline)								
Nonprofit	0.11	0.54	**1.12****	**0.47**	**-1.10****	**0.51**	**-0.81***	**0.43**
Cooperative	0.35	1.15	0.75	0.99	**-1.89***	**1.08**	**-1.92****	**0.92**
For-Profit	-0.15	0.72	0.78	0.62	-0.81	0.68	**-1.07***	**0.58**
Fiscally-spnr. nonprofit	-0.23	0.64	**1.47****	**0.56**	-0.86	0.60	**-1.00***	**0.52**
Organization Staff								
Resides in Community	-0.42	0.26	**-0.50****	**0.23**	-0.39	0.25	**-0.39***	**0.21**
Has Indigenous Staff	**0.87*****	**0.30**	**0.80*****	**0.26**	-0.08	0.28	-0.12	0.24
Paid Employees — 0 (Baseline)								
1-5	0.50	0.35	0.17	0.30	0.29	0.32	0.04	0.28
6-10	0.32	0.46	-0.13	0.40	0.33	0.43	-0.42	0.37
11-15	0.02	0.44	-0.32	0.38	-0.25	0.42	-0.49	0.36
16 or more	0.48	0.43	-0.21	0.37	0.35	0.40	-0.11	0.34

Variables	Motivation: Energy Sovereignty		Degree of Community Involvement		Workforce Installation		Depth of Solar Work	
	B	*Standard Error*	*B*	*S.E.*	*B*	*S.E.*	*B*	*S.E*
Volunteers — 0 (Baseline)								
1-5	-0.38	0.37	**-0.88*** **	**0.32**	-0.18	0.35	-0.43	0.30
6-10	-0.54	0.38	-0.54	0.33	0.19	0.35	**-0.55***	**0.30**
11-15	-0.24	0.56	-0.31	0.49	**0.93***	**0.53**	0.02	0.45
16 or more	-0.24	0.34	**-0.59** **	**0.29**	-0.03	0.32	-0.37	0.27
Organization Tenure — 1-5 years (Baseline)								
6-10 years	-0.20	0.35	0.47	0.30	-0.04	0.32	0.36	0.28
More than 10 years	-0.36	0.31	0.39	0.26	-0.56	0.29	0.27	0.25
Solar Support								
Perceives local support	-0.24	0.26	0.01	0.10	-0.07	0.24	-0.16	0.21
Perceives state support	0.03	0.26	0.00	0.08	0.28	0.24	0.20	0.21
Constant	1.17	0.87	-0.46	0.75	**2.22*** **	**0.82**	**1.80** **	**0.70**
R^2	0.46		0.48		0.45		0.49	
N =	81		81		81		81	

* p < 0.1 **; p < 0.05; *** p < 0.01

6.1.5 Motivation: Community Energy Sovereignty

The multivariate test for "Motivation: Community Energy Sovereignty" showed statistically significant inverse relationships with a 95 percent confidence interval for "Region: Southwest," "Region: West" and, and "Scale of Work: Municipality."[1] Additionally, a statistically significant relationship was found with a confidence interval of 99 percent for the variable, "Organization Staff: Has Indigenous Staff." The independent variable for scale or work have a negative coefficient which means they have an inverse relationship with the dependent variable. Organizations in the West and Southwest have a relatively lower motivation as compared to organizations in the Midwest (baseline) on energy sovereignty. Organizations which have Indigenous staff are more likely to be motivated by issues of community energy sovereignty. Organizations which focus their work at the municipal scale are generally less motivated by energy sovereignty (as compared to their counterparts). These organizations may have other primary goals.

1 For the two regions Southwest and West, there is a difference with the mapping of the variable across 12 regions and four states and protectorates. Here West incorporates Intermountain West and Southwest incorporates South, so the scores are a combination of rankings across region. The way to interpret the result of the regression with a categorical intendent variable is that relative to the Midwest (Baseline) the Southwest and West have a statistically significant, and relatively lower motivation of energy sovereignty.

6.1.6 Degree of CBO Involvement in Communities Served

The multivariate test for Degree of CBO Involvement in Communities Served showed statistically significant inverse relationships with the variables, "Region: Northeast" (95 percent confidence interval) and "Region: West" (99 percent confidence interval). A positive correlation at the 95 percent confidence interval was found with the variables "Scale of Work: Neighborhood," "Scale of Work: Statewide," "Legal Structure: Nonprofit," "Legal Structure: Fiscally-sponsored Nonprofit," and "Organization Staff: Has Indigenous Staff." Organizations that work at the Neighborhood and Statewide scale, which are nonprofits or fiscally sponsored nonprofits, and which have Indigenous staff are more likely to have a higher degree of community involvement. A statistically significant relationship with a 95 percent confidence interval and an inverse relationship was found for variable, "Organization Structure: Resides in Community" indicating that organizations which reside in the community are likely to have a lower degree of community involvement. This may be an indication of staff capacity. Finally, statistically significant inverse relationships were found with the variables "Volunteers: 1–5" (99 percent confidence interval) and "Volunteers: 16 or more" (90 percent confidence interval). Organizations with few volunteers, as well as those with many volunteers are less likely to feel they are involved in the communities they serve.

6.1.7 Workforce Installation

The multivariate test for Workforce Installation showed statistically significant relationships with inverse relationships with the variables, "Scale of Work: Municipality," "Scale of Work: Statewide," "Scale of Work: Multi-state," "Legal Structure: Nonprofit," and "Legal Structure: Cooperative." Organizations that work at the municipal, statewide, or multi-state scale, and that are nonprofits or cooperatives, are less likely to have experience with workforce development and solar installation. Finally, A statistically significant relationship with a 90 percent confidence interval was found for the variable "Volunteers: 11–15" indicating organizations with a substantial volunteers are more likely to be involved in workforce development and solar installation.

6.1.8 Depth of Solar Work

The multivariate test for Depth of Solar Work showed statistically significant inverse relationships with the variables: "Region: Southeast," "Legal Structure: Nonprofit," "Legal Structure: Cooperative," "Legal Structure: For-Profit," "Legal Structure: Fiscally-sponsored For-Profit," "Organization Staff: Resides in Community," and "Volunteers: 6–10." Organizations that are from the Southeast, that reside in the community and that have a moderate-size volunteer staff are less likely to have greater depth of solar work. The negative inverse correlations for the legal structure variables as compared with the baseline variable "Legal Structure: Other" indicate that organizations with a non-typical organizational structure are more likely to have a greater depth of involvement in solar work. Policymakers should examine the nature of the legal structure, as well as the reasons that makes solar work more effective for these organizations.

7 DISCUSSION

The evaluation of various factors influencing CBOs reveals nuanced insights into their engagement with solar energy, energy independence awareness, workforce training, and community involvement.

- **Energy Independence Awareness** underscores the pivotal role of volunteer engagement in CBO efforts to address energy independence, suggesting a policy focus on volunteer-based solutions.
- **Green Finance Awareness** highlights the importance of CBO familiarity with green finance in addressing energy burden effectively, suggesting resource allocation to green finance-focused organizations for mitigating energy burden.
- **Communication for Solar Awareness** shows the degree to which the organization perceives it has built trust, communication strategies, and capacity to raise awareness for residential solar programs. The emphasis on communication is particularly significant for organizations operating at the municipal and multi-state scale, and for those that are fiscally-sponsored nonprofits.
- **Degree of Community Solar Awareness** shows that the desire to communicate effectively with communities has not translated to awareness of solar programs and benefits in all communities. This is an area that most regions could build, especially the Southeast. For-profit organizations are more likely to be serving communities with strong solar awareness.
- **Motivation of Energy Sovereignty** shows that organizations in the Midwest have the highest motivation for energy sovereignty. Additionally, organizations that focus at the municipal level, and organizations where respondents reside in the community are less likely to be motivated by energy sovereignty. These organizations are likely focused on other goals. Organizations with Indigenous staff are more likely to be motivated by energy sovereignty.
- **Degree of CBO Involvement in Communities Served** emphasizes the degree of community involvement across learning, trust building and communication with the communities served.
- **Workforce Installation Scale** shows that scale of work, legal structure, and volunteer capacity have an impact on the focus on workforce development and solar installation. Nonprofits and cooperatives are less likely to be engaged in Workforce Installation whereas organizations with more substantial volunteer staff are more likely to be engaged. These variables may signal a capacity issue. Additional organizations that work at larger scales are less likely to be involved, which signals the importance of local scale work.
- Finally, **Depth of Solar Work** regression highlights the lower levels of installation in the Southeast, whereas the maps indicate greater focus in the Southwest and Northeast. The statistically significant relationship between “other” legal structures and higher rates of solar installation points to the need to further investigate the types of organizations that are successful in building depth of solar work, as well as the kinds of legal and structural challenges that create obstacles. Organizations that reside in the community, and which have moderate size volunteer capacity are also less likely to have experience and emphasis on solar installation.

These findings collectively offer actionable insights for policymakers and stakeholders.

The tax credits and funding programs through the Inflation Reduction Act (IRA) provide additional resources intended to support growth in solar installations, and it will be important to assess how the rate of installations shifts among surveyed CBOs in the years to come. It will be particularly interesting to examine the extent to which a CBOs' legal structure or number of volunteers is correlated with accessing these tax credits and participating in EPA's Solar for All program.

The IRA provides additional tax incentives for projects located in low-income communities, on Tribal land, and in energy communities, as well as for qualified low-income, residential building projects and qualified low-income, economic-benefit projects. As such, depending on the location of the CBO and the community it serves, there will be additional incentives to locate and install solar that supports vulnerable communities. The EPA's $7 billion Solar for All and the $6 billion Clean Communities Investment Accelerator will also potentially move resources to the communities and CBOs that are the focus of this study. As this money flows out, we call on policymakers to join us in thinking more about how CBOs access funding and better understand how that funding can be spent efficiently and equitably.

8 CONCLUSION

Community-Based Organizations play an essential role in bridging the gap between regulators and policymakers and the needs of the community. This report sought to build on the research in the previous two reports from CESA and MIT, to help fill knowledge gaps about the role CBOs play in the dissemination of solar in LMI communities. Despite our study's limited sample size, it sheds light on the typology of CBOs in the United States, and steps policymakers and/or stakeholders could take to support CBOs with their unique goals.

The following is a high-level overview of two key components of our research especially relevant to policymakers, the regional analysis and factor/regression analysis.

REGIONAL ANALYSIS OF CBOS SUMMARIZED

For our regional CBO analysis, we used a five-region distribution: Midwest, Southeast, Southwest, Northeast, and West Coast. Despite the small sample size, this breakdown ensured accuracy. The survey covered eight key areas per region: Organization Tenure, Scale of Work, Primary Area of Work, Legal Status, Paid Employees, Scale of Funding, Volunteers, and Perceived State Solar Support.

Table 4: Summary of Regional Analysis

Region	Description
Midwest	• 72% of organizations have over 10 years' tenure • 87% are nonprofits • Mainly work at the regional/metropolitan or municipal levels • Primary area of work for 38% is community awareness followed by a relatively equal split among solar project development, policy advocacy, and capacity building • Wide split in where they get funding, with the largest group getting most funding from foundation grants (33%), with individual donations being the next most common answer • Most (60%) have more than 16 volunteers • 45% have 1–5 employees and another 14% have no employees • Nearly half of CBOs believe their state government is pro-solar with the remaining respondents split between saying the government is anti-solar and not voicing an opinion
Northeast	• 94% have over 10 years' tenure • 75% are nonprofits • The work of the vast majority of CBOs focuses on the neighborhood or municipality levels • Half get the most funding from foundation grants, with individual donations being the next most common answer • Solar project development is the primary area of work for 35%, followed by community awareness then policy advocacy. • 87% believe that their state government supports solar • Most have more than 11 volunteers, including 44% with more than 16 volunteers • Nearly 90% have at least 6 employees, including 38% with at least 16 employees

Region	Description
Southeast	• 65% have 10+ years' tenure, 21% have 1–5 years' tenure • 81% are nonprofits • There is a wide split in the scale of work among CBOs in the region, with 27% focusing on the region/metropolitan area and almost as many focused statewide • There is a wide range of work focuses, with 30% focused primarily on policy advocacy while almost as many are focused on community awareness and slightly fewer focused on solar project development • 60% get the largest share of their funding from foundation grants • More than half have fewer than 10 volunteers, although 44% have more than 16 volunteers • 30% have 1–5 employees and another 16% have no employees • There are mixed opinions about state government: 48% believe their state government is pro-solar, while most of the rest believe their state government is anti-solar
Southwest	• The scale of work for 25% is tribal and region/metropolitan area for 75% • All are nonprofits and all report that they rely primarily on foundation grants • For half, community awareness is the primary area of work, with the remainder split between solar installation and policy advocacy • Three-quarters had 10+ years of tenure, the rest had 6–10 years' tenure • All CBOs feel that their state government is unsupportive of solar.
West	• 56% have an organization tenure of more than 10 years, with most of the rest having 6–10 years • 72% are nonprofits • There is a wide split in the primary area of work, with 33% listing community awareness as the primary area and almost as many listing solar project development and slightly fewer listing capacity building. • 86% reported that their state governments support solar • Most have more than 11 volunteers, including 45% with at least 16 volunteers • About half have at least 11 employees, including 41% with at least 16 employees

INDEX VARIABLES & MULTIVARIATE REGRESSION SUMMARIZED

The factor analysis, verified for significance using Eigenvalue and Cronbach's alpha, produced factors compiled into scaled variables. Below are the correlated factors with a description of relevant relationships to each.

Table 5: Summary of Findings from Analysis of Eight Index Variables

Factor Variable	Variable Description	Summary of Findings
Energy Independence Awareness	Energy Independence Awareness reflects a community-based organization's awareness and emphasis on achieving energy independence. Variables that comprise this factor include access to a resilience hub, familiarity with solar tax credits (inverse), familiarity with low-income programs, familiarity with energy independence and familiarity with energy burden.	• Volunteer Impact: Energy independence awareness has a significant inverse correlation with whether CBO respondent resides within the community. Those residing in the community seem to be less familiar with aspects of energy independence. • Resource Focus: Policymakers should prioritize building energy independence awareness for local CBOs that reside in communities. These are often smaller scale organizations which could benefit from staff and additional resources. • Actionable Insight: This finding underscores the importance of the relationship between local CBOs and their capacity to build energy independence.
Green Finance Awareness	Green Finance Awareness measures the degree to which CBOs are familiar with aspects of green finance and focus on it in their work. The scaled variable is comprised of variables including familiarity with resilience hubs, familiarity with the electric grid, familiarity with power purchase agreements (PPAs), and familiarity with green banks.	• Significant Relationship: The regression test for Green Finance Awareness revealed a significant inverse negative correlation with whether the CBO respondent resides in the community. • Correlation Interpretation: Organizations that reside in the community tend to be less aware of issues of green finance. This suggests that local organizations need more support in building awareness around green finance practices and addressing energy burden through resilience hubs, power purchase agreements, and green banks. • Policy Implication: Policymakers should consider directing resources towards local CBOs to build their capacity to engage with green finance and to more effectively reduce energy burden.
Communication for Solar Awareness	Communication for Solar Awareness shows the degree to which the organization perceives that is has built trust, communication strategies, and capacity to raise awareness for residential solar programs. Variables that influence this factor include time spent building trust with the community served, methods of communication of educational materials, and funding opportunities that align with the mission of the CBO.	• Significant Relationships: The multivariate test identified significant relationships with the independent variables scale of work, legal structure and resides in community. CBOs that work at the municipal and multi-state scale feel they have better built trust, communication strategies and capacity to raise awareness for solar programs. Fiscally-sponsored nonprofits show higher trust and communication capabilities in solar awareness. Organizations that do not reside in the community also feel they have better strategies and capacity for communicating solar awareness. • Policy Implication: Policymakers should give special attention to cooperatives and to fiscally-sponsored nonprofits for developing programs to advance solar awareness, and lend additional support to smaller more localized CBOs to better build their capacity.

Factor Variable	Variable Description	Summary of Findings
Degree of Community Solar Awareness	Degree of community solar awareness shows the degree to which the communities served are aware of and understand the benefits of solar programs. Variables that are incorporated into this factor include the degree to which the community understands the benefits of solar, degree to which the community is excited about solar, the degree to which the community have seen solar, and the degree to which the community is aware of solar programs.	• Significant Relationships: The multivariate test identified significant relationships with the independent variables region, scale of work, legal structure and state solar support. CBOs from the Southeast serve communities that have a lower awareness of solar. CBOs that work at a multi-state level are more likely to serve communities that have higher solar awareness. Nonprofit CBOs are less likely to serve communities with high solar awareness. CBOs in states that are perceived to be supportive of solar are more likely to serve communities with higher solar awareness. • Policy Implication: There is a relationship between level of resources, capacity, and state support, and community solar awareness. Policymakers should build capacity for smaller nonprofit organizations, and focus on bolstering state programs and support for solar to build community awareness.
Motivation of Energy Sovereignty	Community Energy Sovereignty shows the degree to which an organization is motivated by community empowerment, economic opportunity, and environmental justice. The scaled variable is comprised from variables including the degree to which an organization's motivation is community empowerment, economic opportunity, and energy sovereignty and environmental justice.	• Significant Relationships: The multivariate test mostly showed statistically significant results and inverse correlations for independent variables including region, and scale of work. The variable had a positive correlation with the variable has Indigenous staff. Organizations that work at the municipal scale are less likely to be motivated by energy sovereignty. Organizations in the Midwest that have Indigenous staff are more likely to be motivated by energy sovereignty. • Need for Further Research: More investigation is necessary to draw definitive conclusions, but diversity in staff, particularly among Indigenous groups, seems to play a role. • Sampling Limitations: The study sampled both tribally affiliated and non-affiliated organizations, but the small sample size (less than 10) warrants caution in interpreting results.

Factor Variable	Variable Description	Summary of Findings
Degree of CBO Involvement in Communities Served	Degree of CBO Involvement in Communities Served shows the degree to which the organization is involved in the community. This factor is comprised of variables including the degree to which CBOs communicate and learn from the communities they serve, the degree the organization communicates to the communities served, and the degree to which CBO work to build trust in the communities served.	• Significant relationships: The regression tests for Degree of CBO Involvement in Communities Served showed significant relationships with independent variables region, scale of work, legal structure, and resides in community. There is a positive correlation with has Indigenous staff. CBOs from the Northeast, the West, and that reside in community; they are less likely to be involved in the communities served. Organizations that work at the neighborhood, statewide scale, that are nonprofits or fiscally-sponsored nonprofits, and that have Indigenous staff are more likely to be involved in the communities served. Organizations with either very small or very large volunteer capacity are less likely to be involved in the communities served. Having volunteers, but at a moderate level seems to be important in CBO community involvement. • Policy Implications: Nonprofit organizations have a significant role of being involved in the communities served. Policymakers should bolster support for these organizations and their community work and help build support for community involvement in regions such as the West. They should also focus resources on small local organizations. • Sampling Limitations: The study sampled both tribally affiliated and non-affiliated organizations, but the small sample size (less than ten) warrants caution in interpreting results.
Workforce Installation Scale	Workforce Installation Scale shows the degree to which an organization is focused on workforce training and solar installation in their communities. The scales variable is composed of the CBOs' level of solar workforce training, the primary work of the organization being focused on workforce training and solar installation, the level of solar project development the organization does, and the level of solar installation the organization does.	• Significant results: Regression analysis of the Workforce Installation scale showed statistically significant inverse correlations with independent variables including scale of work, legal structure, and number of volunteers. CBOs that work at the municipal and statewide scale, and that are nonprofits, fiscally-sponsored nonprofits, or cooperatives are less likely to be focused on workforce training and solar installation. Organizations with moderate to large numbers of volunteers are more likely to be involved in workforce development and solar installation. • Given that organizations with "other" legal structures are more focused on workforce installation, there may be relative resource constraints for nonprofits and cooperatives in building support for workforce training and installation. The number of volunteers seems to correspond with both level of community involvement and scale of work at the neighborhood, as well as statewide scale. Policymakers should dedicate resources to building workforce development capacities with local organizations, and organizations that work at the municipal and statewide scale. Helping to bolster the volunteer and other staff capacities of these organizations may help.

Factor Variable	Variable Description	Summary of Findings
Depth of Solar Work	Depth of Solar Work shows the degree to which an organization is focused on solar installation projects. Relevant variables that positively affect the Depth of Solar Work include the length of solar-related work, rooftop solar installations completed, solar work aspirations, and depth of solar project development work, and extent of solar work negatively impacts the factor.	• Significant results: Regression analysis of Depth of Solar Work shows significant inverse correlations with legal structure and resides in community. The organizations that have the most focus and experience doing solar projects do not have a typical CBO legal structure, but rather some other structure. These organizations also do not reside in the communities served. Finally, organizations with small to moderate volunteer capacity are less likely to have greater depth of solar work. • Policy implications and future research: policymakers should further study the legal barriers for conventional CBOs to install solar projects. Additionally, they should build capacity in local organizations. Solar capacity is a significant factor for CBO fundtion that policymakers should further investigate and bolster.

Policymakers should consider these findings when designing targeted funding programs, communicating about IRA solar incentives, and prioritizing CBOs in grant allocation. Data analysis on IRA funding and recipients' characteristics is vital for equitable resource distribution. Future research should focus on regional differences among CBOs and their experiences with accessing federal funds.

Due to the important role that CBOs play in bringing the benefits of solar to disadvantaged communities, they deserve additional future research. The role of volunteer capacity as well as legal structure should be further investigated. It will be especially important to examine in detail the experiences CBOs have with understanding and taking advantage of the Inflation Reduction Act, including to identify challenges they have in accessing funding.

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APPENDIX A
GLOSSARY OF TERMS

Area of work: includes *communication awareness, workforce training, policy advocacy, solar installation, capacity building,* and *solar project development*

Communication and awareness: shows the degree to which the organization perceives it has built trust, communication strategies, and capacity to raise awareness for residential solar programs; variables that influence this factor include time spent building trust with the served community, methods of communication of educational materials, and funding opportunities that align with the mission of the CBO

Community-based organizations: organizations that work at the local level to provide services to communities that improve their health and well-being

Community energy sovereignty: shows the degree to which an organization is motivated by community empowerment, economic opportunity, and environmental justice; a variable created from questions asking CBOs to rate how much community economic empowerment, economic opportunity, and environmental justice motivates their work

Cronbach's alpha: reveals how closely related a set of test items are as a group

Degree of community involvement: attempts to value the degree to which CBO is engaged in the community served; positively increases depending on the degree to which a CBO learns from the communities served, the type of communication delivered to the communities served, and the degree to which CBO builds trust in the organization served

Depth of solar work: shows the degree to which an organization is focused on solar installation projects; relevant variables that positively affect the factor include the length of solar-related work, rooftop solar installations completed, solar work aspirations, and depth of solar project development work, and extent of solar work negatively impacts the factor

Eigenvalue: a measure of the strength of the variance of factors in a factor analysis

Energy burden: the percentage of household income allocated to pay for energy bills

Energy burden awareness: a variable the research team created that brings together CBO familiarity with solar tax credits, low-income assistance programs, energy burden, and ideas on energy independence, along with access to resilience hubs

Energy justice: a theoretical approach that challenges injustice and inequality in the energy sector, with the aim of achieving equality in social, economic, and political participation in the energy system

Energy sovereignty: ability of individuals and communities to make their own decisions on energy generation, distribution and consumption

Factor Analysis: measures a latent variable through a series of underlying Y variables

Green bank: a financial institution, typically public or quasi-public, that employs innovative financing techniques and market development tools in collaboration with the private sector to expedite the deployment of clean energy technologies

Green finance: a loan or investment that promotes environmentally-positive activities

Green finance awareness: measures the degree to which CBOs are familiar with aspects of green finance and focus on it in their work; variables that influence it include familiarity with resilience hubs, the electric grid, power purchase agreements, and green banks

Low-to-moderate income: an income is less than 80 percent of the local area median income

Organization legal status: includes nonprofit, for-profit, co-op, and other

Organization size: based on the number of employees, from no employees, 1-5, 6-10, 11-15, or 16+

Organization solar classification: includes *solar adjacent, solar directed,* and *not solar related*

Organization tenure: based on how long the organization has existed, from 1-5 years, 6-10, or 10+

P-value: the probability of obtaining the observed results, assuming that the null hypothesis is true

Perceived level of state solar support: from anti-solar to pro-solar

Power purchase agreement (PPA): an arrangement in which a third-party developer installs, owns, and operates an energy system on a customer's property; the customer then purchases the system's electric output for a predetermined period

Principal component analysis (PCA): uses linear combinations to create a variance-covariance structure among the set of variables to determine factor groups

Resilience hub: community-serving facilities augmented to support residents, coordinate communication, distribute resources, and reduce carbon pollution while enhancing quality of life; provide an opportunity to effectively work at the nexus of community resilience, emergency management, climate change mitigation, and social equity while providing opportunities for communities to become more self-determining, socially connected, and successful before, during, and after disruptions

Scale of organization work: includes *regional/metropolitan area, statewide, municipal, multi-state, neighborhood, national, Tribal land,* and *other*

Solar tax credit: a tax credit that can be claimed on federal income taxes for a percentage of the cost of a solar PV system paid for by the taxpayer

Source of funding: includes *foundation grants, individual donations, federal grants, state grants, municipal grants, member dues,* and *other*

Workforce installation scale: shows the degree to which an organization is focused on workforce training and solar installation in their communities; positively correlated with a CBO's levels of solar workforce training, solar project development, and solar installation

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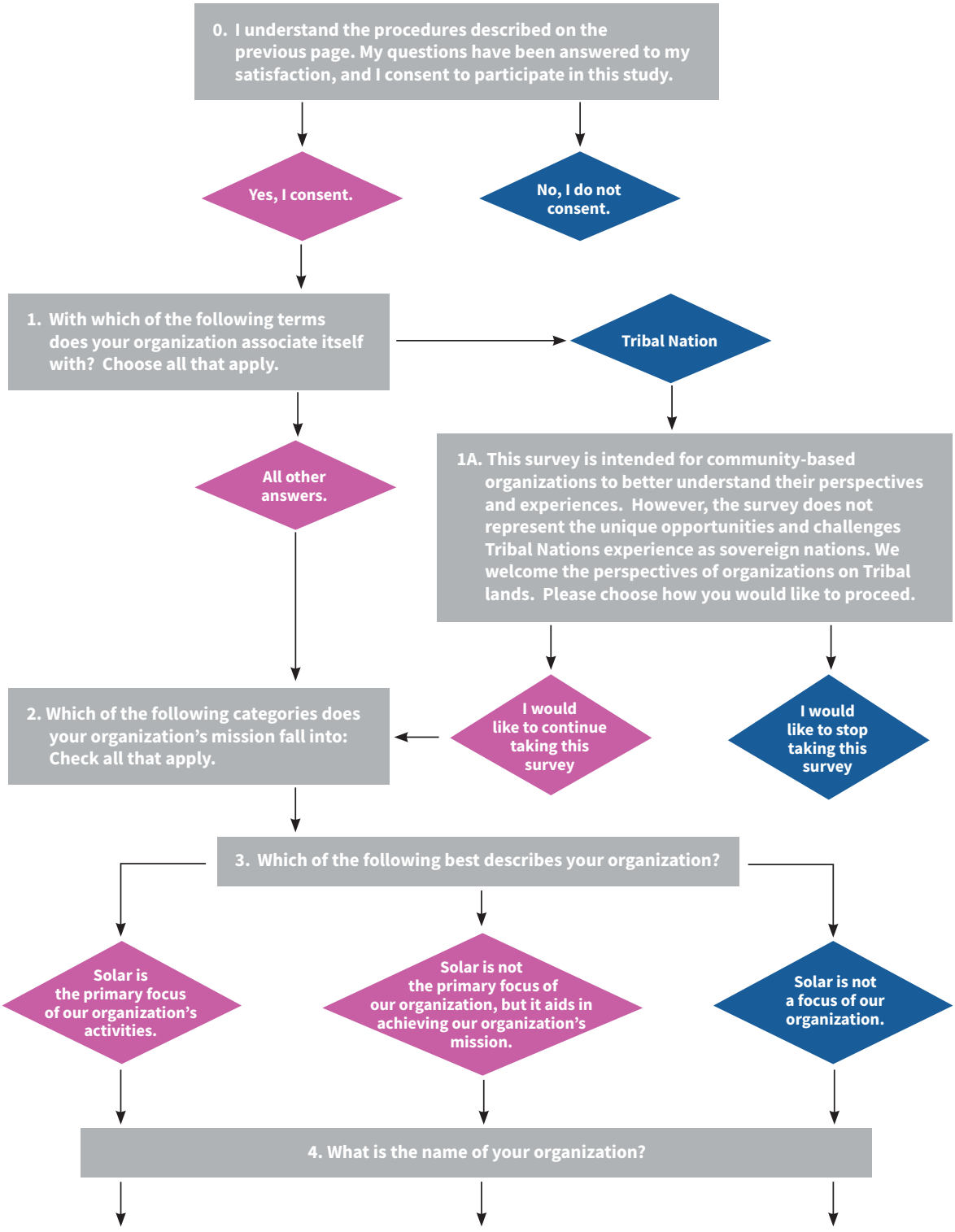
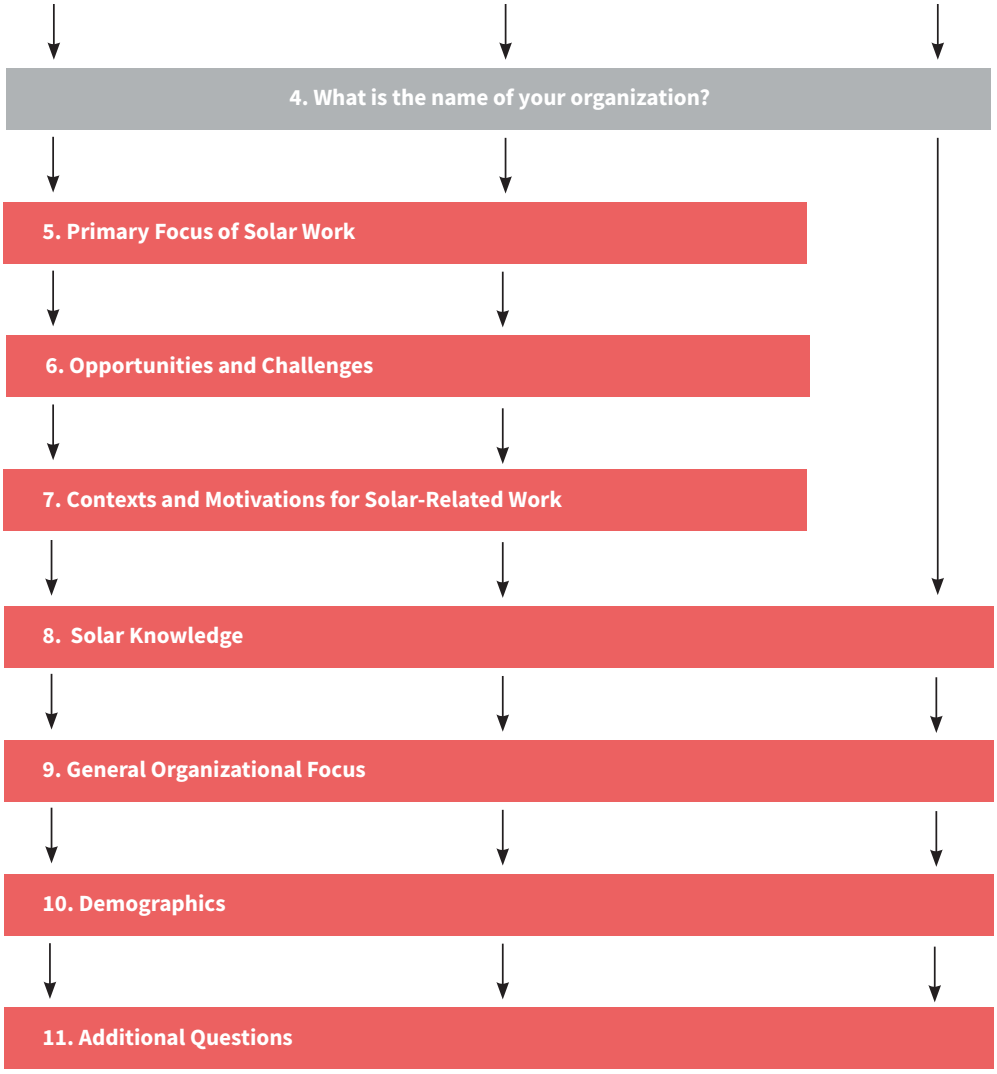
APPENDIX B
SURVEY FLOW CHART



APPENDIX B : SURVEY FLOW CHART (CONTINUED)



The Clean Energy States Alliance (CESA) is a national, nonprofit coalition of public agencies and organizations working together to advance clean energy. CESA members—mostly state agencies—include many of the most innovative, successful, and influential public funders of clean energy initiatives in the country.

CESA works with state leaders, federal agencies, and other stakeholders to develop and promote clean energy programs and markets, with an emphasis on renewable energy, energy equity, financing strategies, and economic development. CESA facilitates information sharing, provides technical assistance, coordinates multi-state collaborative projects, and communicates the views and achievements of its members.

Ørsted US Offshore Wind/Block Island Wind Farm

Clean Energy States Alliance

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Clockwise from upper left: Shutterstock/Soonthorn Wongsaita; Tom Piorkowski; Resonant Energy; Portland General Electric; RE-volv; Bigstockphoto.com/Davidm199