

ILLUME



PROJECT:

Illinois Solar for All
Program Evaluation

PROJECT SPONSOR:

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ANNUAL REPORT EVALUATION PLAN

ILLUME Advising, LLC (ILLUME), in partnership with Verdant Associates (Verdant), (hereafter, “the evaluation team”), have been contracted by the Illinois Power Agency (IPA) to evaluate the Illinois Solar for All (ILSFA) program, as directed by Section 1-56(b)(6) of the Illinois Power Agency Act. This document summarizes the approach for the evaluation of Program Year 2021 – 2022 (PY4) and the Program Year 2022 – 2023 (PY5).

Program Background and Current Status

In 2017, the ILSFA program was created through revisions to Section 1-56(b) of the IPA Act contained in the Future Energy Jobs Act (also known as FEJA or Public Act 99-0906) to *“include incentives for low-income distributed generation and community solar projects.”* The program objectives are to: *“bring photovoltaics to low-income communities in this State in a manner that maximizes the development of new photovoltaic generating facilities, to create a long-term, low-income solar marketplace throughout this State, to integrate, through interaction with stakeholders, with existing energy efficiency initiatives, and to minimize administrative costs.”*

To accomplish this, FEJA originally created four sub-programs, including:

- Low-Income Distributed Generation (LIDG), for on-site solar projects
- Low-Income Community Solar, for off-site solar projects
- Incentives for non-profits and public facilities to do on-site projects
- Low-Income Community Solar Pilot Projects, with distinct rules and incentives

In September 2021, the Climate and Equitable Jobs Act (also known as CEJA or Public Act 102-0662) took effect, increasing available funding, and prioritizing expanding participation to areas of Illinois previously underserved by the program, increasing development by small and emerging businesses, and encouraging development of projects promoting energy sovereignty. CEJA also updated the program to discontinue the Low-Income Community Solar Pilot Projects and split the Low-Income Distributed Generation sub-program into separate sub-programs for distributed generation projects serving small residential (single- to four-unit residences) and large residential (five units or more) buildings. Under CEJA, ILSFA includes the following sub-programs:

- Low-Income Single-Family and Small Multifamily Solar (1-4 units)
- Low-Income Community Solar
- Incentives for non-profits and public facilities
- Low-income large multifamily solar (5+ units)

Program Year Four (PY4), which ran from June 1, 2021, through May 31, 2022, featured two separate initial project submission windows, one for the Low-Income Distributed Generation and Non-Profit/Public Facilities sub-programs and one for the Low-Income Community Solar sub-program. Both initial project submission windows remained open for two weeks. In the LIDG sub-program, submissions during the initial project submission window did not exceed the available budget so the Program Administrator opened a rolling submission window for the remainder of the program year. The incentive values for these projects never reached the budgeted amount of funds available for this sub-program so the remaining funds were rolled over to the Program Year Five (PY5) LIDG sub-program budget. After the passage of CEJA, additional funding was made available to open a second submission window in PY4 for both the Non-Profit/Public Facilities and Low-Income Community solar sub-programs, allowing ILSFA to approve additional projects for funding.

Table 1 below shows a breakdown of the overall budget for the ILSFA PY4 sub-programs, as well as the total number of approved projects, their system capacity, and their total incentive value.

Table 1. ILSFA PY 4 Budget and Approved Projects by Sub-Program

SUBPROGRAM	BUDGET	TOTAL APPROVED PROJECTS	TOTAL SYSTEM CAPACITY (MW)	TOTAL INCENTIVE VALUE
Low-Income Distributed Generation	\$36,674,305	162	1.321	\$3,276,420
Low-Income Community Solar	\$26,309,991	6	7.405	\$21,338,128
Incentives for non-profits and public facilities	\$15,076,529	41	5.869	\$13,604,870
Total Year 4	\$39,340,387	209	14.323	\$38,203,848

Evaluation Objectives and Overview of Approach

This document summarizes the approach for the PY4 evaluation and briefly describes the PY5 evaluation approach. An updated PY5 evaluation plan will be provided prior to starting primary data collection for this program year. The activities described in this plan will support the development of an annual evaluation report for each program year. The evaluation team will also complete mid-year reports on special evaluation topics. However, these will be scoped separately from the annual report and are therefore not included in this document.

This evaluation plan is informed by an initial round of program administrator interviews and stakeholder interviews, as well as a preliminary review of the program tracking data and program materials. The evaluation team opted to complete a round of stakeholder interviews to inform the PY4 and PY5 evaluation plans, so that the those who are either directly involved with ILSFA or who represent communities benefitting from ILSFA have an opportunity to define the topics and priorities that most impact their experience with the program.

The PY4 evaluation will be a lighter touch approach as the evaluation team is focusing resources to support a more in-depth PY5 evaluation. This approach will allow the evaluation team to provide more relevant recommendations and information to support the program. CEJA resulted in substantial updates to the program during and after PY4, meaning that recommendations related to PY5 may be more actionable. In addition, respondents may recall program details easier during primary data collection for a more recent program year.

The ILSFA Program's PY4 evaluation will serve to provide information on the program's impacts and process during the 2021 – 2022 program year.

The PY4 and PY5 evaluation objectives are grouped into three primary assessment areas:

- **Participatory Evaluation Planning** to include stakeholders' input in the evaluation planning process. The evaluation team will conduct stakeholder interviews and host a stakeholder webinar to review the evaluation plan.
- An **Impact Assessment** to quantify program participation, costs, and impacts. The evaluation team will evaluate the following impacts:
 - **Energy impacts:** Evaluating energy impacts and peak demand savings.
 - **Bill impacts:** Evaluating customers' seasonal and annual bill savings in dollars.
 - **Environmental impacts:** Evaluating reduced pollutants, including greenhouse gases, NOx, SOx, Hg, and Pb.
 - **Social impacts:** Evaluating the extent to which communities are directly benefitting from program investments.
 - **Workforce and economic impacts:** Evaluating workforce and economic impacts, including but not limited to, jobs created, trainings, reduced energy burden, and access to other programs.

In PY4, the impact analysis will focus on the program's statutorily required metrics, including number of projects installed, job opportunities created, and social benefits by requested factors, including subprogram and geographic region. The social impact assessment and workforce impact assessment will be more in-depth in the PY5 evaluation.

- A **Process Assessment** to evaluate the overall program operations and process.

Program Year Four (PY4) Evaluation Approach

To conduct the PY4 evaluation, the program team will conduct participatory evaluation planning, an impact assessment, and a process assessment.

To ensure the evaluation plans reflected the experiences and priorities of program stakeholders, the program team completed ten interviews with stakeholders to inform the PY4 and PY5 evaluation plans. We describe our findings from these interviews in the Participatory Evaluation Planning section.

The following subsections describe the evaluation approach for the ILSFA PY4 evaluation. First, we describe the data sources and primary data collection activities that support across the evaluation assessment areas (participatory planning, impact assessment, and process assessment). Next, we describe our early work and planned methodologies for each assessment area. These methodologies are primarily focused on PY4 with some PY5 notes in italics.

1. Data Sources and Primary Data Collection Activities

The study approach relies upon many data sources and primary data collection activities that will serve to gather the data necessary to support the three assessment areas described above. Table 2 below presents the primary and secondary data sources that will feed into our analyses.

Table 2. PY4 Data Collection Activities and Sources

DATA SOURCE	TARGET COMPLETES	ACTUAL COMPLETES	OBJECTIVE
1.a. Program Materials	NA	NA	Understanding the program goals, design, and any recent changes made to the program that would impact our research activities
1.b. Program Tracking Data	NA	NA	Assess whether the information necessary to complete the evaluation was available, as well as for completeness and accuracy
1.c. Program Administrator Interviews	6	6	Understand program design, delivery, and implementation successes and challenges during the PY21-22 program year
1.d. Stakeholder Interviews	9-12	10	Understand the key challenges and opportunities associated with the communities each stakeholder serves and understand stakeholders' priorities as it relates to this evaluation
1.e. Trainer Interviews	8-10	TBD	Identify the objectives of job training programs, skills taught, and the types of positions trainees are prepared for. Assess alignment of these items with ILSFA objectives, as well as current engagement with ILSFA and approved vendors
1.f. Stakeholder Webinar	NA	NA	Give stakeholders insight into what to expect from the evaluation and ensure they can provide input into key questions and priorities that should be addressed

The remainder of this section provides an overview of these data collection activities. Complete details on the objectives and methodologies for the analyses are provided in the Analysis Methodologies section below.

1.a. Program Materials

The evaluation team reviewed many of ILSFA’s program materials for the purpose of understanding the program goals, design, and any recent changes made to the program that would impact our research activities. In total, our team reviewed 51 materials for the ILSFA program. These materials cover several aspects of the program, such as:

- Program design (e.g., the Approved Vendor manual, the Long-Term Renewable Resources Procurement Plan (LTRRPP))
- Vendor resources (e.g., the overview of the Vendor Portal)
- Customer resources (e.g., “Community Solar Opportunities for Owners and Renters”)
- Marketing materials (e.g., newsletters, announcements, brochures)
- Previous reports or evaluations (e.g., quarterly, and annual reports)

The team made extensive notes from their materials review that answer the questions summarized below in Table 3.

Table 3. Program Materials Review Questions

CATEGORY	REVIEW QUESTIONS
Program Design	What are the goals or objectives of the ILSFA program?
	How is the program designed to meet those objectives?
	Who are the key actors in program implementation and what are their roles?
	How is the program funded?
	How does the program define the communities that it is meant to assist with these programs?
	How does the program verify income for participants?
	What does program success look like?
Program Participation Processes & Barriers	What does project selection look like?
	What does participation look like from the perspective of an Approved Vendor? What barriers might prevent vendors from participating?
	What does participation look like from the perspective of a job trainer? What barriers might prevent job trainers from participating?
	What does participation look like from the perspective of a job trainee? What barriers might prevent job trainees from participating?
	What does participation look like from the perspective of a grassroots educator? What barriers might prevent grassroots educators from participating?
	What does participation look like from the perspective of an end-user? What barriers might prevent end-users from participating?
	What barriers have stakeholders raised?

CATEGORY	REVIEW QUESTIONS
Program History & Status	What is the history of the ILSFA program?
	What changes were made to ILSFA in PY21-22?
	What changes are in the pipeline for ILSFA, if any?
	Did the program meet its goals?
	What has been successful in the program? What has been challenging?
Program Marketing	Are there specific end-users, program actors, geographies, building types, etc. that seem to be underserved by the program?
	Through what channels does program marketing and outreach occur?
	Who does the marketing and outreach target?

1.b. Program Tracking Data

The evaluation team requested and reviewed tracking data for PY1-PY4. The team reviewed the tracking data to assess whether the information necessary to complete the evaluation was available, as well as for completeness and accuracy. Tracking data will be a fundamental input for both the impact and process analyses for this evaluation. The program implementer, Elevate, maintains a Salesforce database that houses the program tracking data for all Distributed Generation and Community Solar projects. The Elevate database will provide the following key elements necessary for the energy, environmental and bill, jobs, economic, and social impacts analyses:

- **Project information** such as application program year, project stage (including the date of the last project stage update), project specifications (installation type, system size, azimuth, tilt, etc.), and project financials (project costs, incentive values, total projected Renewable Energy Credits (RECs), etc.). This data will be used to assess program metrics required by statute and key performance indicators (KPIs) and to develop estimates of PV system energy production.
- **Location details** including if the project is in an Environmental Justice Community or in a Low-Income Census Tract. This data will allow us to evaluate if programs are being developed in more distressed areas.
- **Utility territory of the project, buyer information, and contract information** (e.g., length and contract type). This information will be used to segment and analyze the data by specific subcategories.

In-Depth Interviews

To better understand the PY4 program design, key updates and changes, challenges and successes, evaluation priorities, and job impacts, the evaluation team plans to conduct in-depth interviews with program administrators, program stakeholders, and job trainers.

For each data collection effort, the evaluation team will carefully develop an interview guide that is clear, concise, not overly burdensome, and can efficiently collect data that will assist the evaluation team with their assessment of the primary research objectives. The in-depth interview guides will take a semi-structured format to ensure they capture the key themes and metrics of interest to IPA and ILSFA stakeholders, while allowing room for the interviews to explore unexpected yet pertinent details associated with the program’s implementation. In many cases, these unplanned threads of conversation prove to be the most insightful. Where possible, our team will work to apply learnings from one interview to enhance our inquiry in the next. We will provide each interview guide to the IPA project manager for review and comment prior to commencing any of the data collection. All IDIs will be conducted by ILLUME or professional evaluation staff and recorded (assuming the interviewee provides their consent). Interview findings will be incorporated both into evaluation planning and the PY4 evaluation report.

1.c. Program Administrator Interviews

ILLUME conducted six interviews with IPA and the Elevate program teams. These interviews were held via Microsoft Teams, an online video conferencing software, between July and August of 2023. The primary purpose of these interviews was to understand program design, delivery, and implementation successes and challenges during the PY21-22 program year. We talked to key program staff at IPA and Elevate, as well as Elevate staff leading the Approved Vendor Management, Grassroots Educator, and Job Trainee components of the program. Interview topics included:

Table 4. Program Administrator Research Questions

CATEGORY	PRIMARY RESEARCH QUESTIONS
Roles and Responsibilities	<ul style="list-style-type: none"> What are the roles and responsibilities of IPA and Elevate staff? What is the participation process for each sub-program for end-users, approved vendors, and grassroots educators?
Program design and delivery	<ul style="list-style-type: none"> What are the key program components and steps? What role does each key actor play, and how do they work together? What changes have been made to the program since PY4?
Program Funding and Budget	<ul style="list-style-type: none"> How is the ILSFA program funded? How is funding allocated? How do the REC's incentive and contracting work?
Program Goals	<ul style="list-style-type: none"> What are program goals or Key Performance Indicators (KPIs)? What were the goals of the ILSFA program in PY4? Were there any PY4 goals related to societal benefits or impacts? What goals are IPA or Elevate required to hit?

CATEGORY	PRIMARY RESEARCH QUESTIONS
Program Performance	<p>Did the program meet its goals in PY4?</p> <p>Which aspects of implementation went well, and where did the program run into challenges?</p> <p>What are the participation barriers from the program administrator's perspective?</p>
Marketing and Outreach	<p>Are there specific KPI or guidelines for marketing and outreach?</p> <p>What channels does the program use for outreach?</p> <p>What works well with program outreach, and where is the program facing challenges?</p>
Evaluation Needs	<p>What are the evaluation priorities and needs for PY4?</p> <p>What are the evaluation and program data needs across the three-year evaluation cycle?</p>

Program administrator interviews complement our review of program material and tracking data informing PY4 process evaluation report. Interview findings will support the development of program process flows and provide context for interpreting the PY4 impact findings.

1.d. Stakeholder Interviews

ILLUME conducted ten, 45-minute-long interviews with program stakeholders. These interviews were held via Microsoft Teams, an online video conferencing software, between July and August of 2023. ILLUME targeted a broad range of ILSFA stakeholders, including vendors, community-based organizations (CBOs), and members of the ILSFA Advisory Committee. These interviews had two primary objectives: first, to understand the key challenges and opportunities associated with the communities each stakeholder serves, and second, to understand stakeholders' priorities as it relates to this evaluation. Interview topics included:

- **General stakeholder information:** organizational mission, scope, and service territory
- **Stakeholders' perspectives on their communities:** their communities' biggest priorities
- **Perspectives on ILSFA:** program knowledge, perception of strengths and challenges of ILSFA
- **Communication preferences:** respondents' desired method to receive updates about ILSFA and the evaluation
- **Stakeholders' evaluation needs:** Evaluation expectations and interests

The results from these interviews provided a foundation for the ILLUME team to understand the nuances of the communities served by ILSFA and served as critical input in our PY4 evaluation planning process.

1.e. Trainer Interviews

To conduct primary research, the evaluation team will conduct 8-10, 45-minute-long interviews with job trainers identified by ILSFA as approved training programs. These interviews will be held via Microsoft Teams, an online video conferencing software, in October of 2023.

These interviews will have two primary objectives to answer research questions detailed in Workforce Impact Analysis Task 4: first, to understand the current approaches to training for solar with a specific focus on career development, and second, to determine the number of successful trainees entering the workforce. Interview topics will include:

- General trainer information: organizational missions, scope, and service territory
- Trainer perspective on training priorities
- Trainer perspective on IL-SFA, including program knowledge, connection to Approved Vendors and Approved Vendor workforce needs, and perceptions of strengths and challenges of IL-SFA

The Team will target a range of providers including the twenty-six currently ILSFA-affiliated training programs, including:

- Community Colleges (Lake County College, Wilbur Wright College, Southwestern Illinois College, Rock Valley College, Olive-Harvey College, and Lincoln Land Community College)
- Workforce Development not-for-profit organizations
- Private sector training programs

To answer research questions related to unaffiliated training programs to support the job, wage, and career models, the evaluation team will also conduct at least three, 45-minute-long interviews with a separate in-depth interview Guide focused on this cohort. Target interviewees include:

- Representatives of the 33 IBEW chapters representative of the ILSFA identified service territories (Southern, West Central, East Central, Northwest, Cook),
- District leadership in Illinois and the NECA Technical Institute in Alsip
- Community Colleges with job training programs related to trades, but not IL-SFA approved

1.f. Stakeholder Webinar (Evaluation Plan Review)

The evaluation team will present the PY4 and preliminary PY5 research questions and activities to program stakeholders in a webinar and will collect their input both during the webinar and afterwards in a two-week comment period. This will give stakeholders insight into what to expect from the evaluation and will ensure they can provide input into key questions and priorities that should be addressed.

KEY DELIVERABLES

The evaluation team will provide the following deliverables related to data sources and primary data collection:

- **In-depth interviews:** draft and final interview guides for the program administrator, stakeholder, participating trainer, and nonparticipating trainer interviews.
- **Data requests:** Data requests for project information, project specifications, project financials, location information, utility territory of the project, buyer information, contract information, and participant utility bill information.
- **Stakeholder webinar:** draft and final webinar slides.

2. Analysis Methodologies

2.a. Participatory Evaluation Planning

We conducted 10 stakeholder interviews to inform our evaluation planning. Our stakeholder interviews revealed several key themes around who stakeholders are serving, the needs and priorities of those communities, and ways in which ILSFA program design or implementation could improve to better serve those communities. Across the ten interviews, our team uncovered throughlines of key priority areas for this evaluation, as articulated by stakeholders. ILLUME took these findings and added them as key research areas for the PY4 evaluation. In other words, the interview findings will inform our evaluation approach and activities. The following key themes emerged in these interviews:

- **Customers are wary of the legitimacy of the ILSFA program.** Respondents mentioned that they educate customers (in their role as a vendor or grassroots educator) on the benefits of ILSFA. We heard from several respondents that customers believe ILSFA is “too good to be true,” and that there still exists general mistrust in both the government and these types of solar offers. *In PY5, we will interview grassroots educators to understand more about their strategies to educate communities on ILSFA, specifically how they build trust for the program.*
- **ILSFA materials are not always accessible to individuals who do not speak English as their first language.** Grassroots educators explained they have asked for ILSFA materials to be shared in the languages commonly spoken by their communities (e.g., Spanish) but were told translated materials are not available. Vendors also mentioned they do a lot of work to explain the ILSFA program to their customers, thus serving as another type of educator. *In PY5, we will ask ILSFA participants about their understanding of the program – not just for different languages, but for ease of understanding (e.g., are the materials written in such a way that a layperson can understand them?).*
- **Participation in smaller, residential distributed generation projects is low.** Vendor respondents explained that complicated funding structures and general “red tape” for ILSFA projects dissuade solar firms from pursuing them. Other stakeholders mentioned that the residential program is difficult to navigate from the customer side. *In PY5, we will include a battery of questions in the Approved Vendor Surveys about project financing and small residential projects. We will also discuss small residential projects in other research activities, such as stakeholder interviews with CBOs.*
- **Vendors struggle with the Elevate Approved Vendor portal.** Almost every vendor we interviewed shared various issues that they experienced with the Elevate portal. *In PY5, we will include a battery of questions in the Approved Vendor Surveys that address the portal, with specific questions related to usability.*
- **Stakeholders are very interested in the results of this evaluation.** Respondents mentioned they would share the results with their customers or communities, particularly to assure consumers they can trust ILSFA and the program’s benefits. *In our evaluation, we will highlight examples or case studies of successful projects in detail, including elements like vendor strategies of engagement, grassroots educators’ strategies of program participation, among other factors.*

One critical theme emerged across the stakeholder interviews: stakeholders felt their previous communications and input had not been recognized by the previous evaluators or the implementer. We plan to model participatory evaluation planning by communicating explicitly with stakeholders about what we heard from them – and how their insights will impact and shape the research.

In PY5, we will conduct stakeholder interviews focused on community-based organizations to better understand their ongoing needs, perspectives, and priorities as they relate to this evaluation. Our team will home in on communities of interest that emerge from the Social Impacts analysis. We describe this analysis approach in the Social Impact Analysis section.

2.b. Impact Assessment Analyses

Energy Impact Analysis

The energy impact analysis will evaluate the energy impacts and peak demand savings of approved PY4 projects and energized projects through PY4. Approved PY4 projects are defined as: Projects that applied for the ILSFA program in PY4 and have received Part I approval by May 31, 2022 (including all subsequent project stages). Energized Projects are defined as: Projects that applied for the ILSFA program in PY1 through PY4 and have received Part II approval by May 31, 2022. The research questions addressed by the energy impact analysis are outlined in the table below.

Table 5. Energy Impact Analysis Research Questions

CATEGORY	PRIMARY RESEARCH QUESTIONS
Project Summary	<p>What is the total number of approved and energized projects?</p> <p>What is the total capacity (kW_{AC}) of approved and energized projects?</p> <p>What is the average system cost per kW_{AC} of project capacity (approved and energized)?</p>
Energy Impacts	How much energy would be produced in a typical meteorological year from approved and energized projects?
Demand Savings	How much peak load would be reduced by the energy generated by approved and energized projects?

The first step in the energy impact analysis will be to review the tracking data and summarize program participation. We will quantify the total number of projects, the total capacity (kW_{AC}) of projects, and the average cost per kW_{AC} of project capacity (approved and energized). These metrics will be reported by subprogram, owners versus renters, system ownership type, and geographic regions.

The evaluation team will produce hourly simulations to generate independently verified estimates of energy impacts. We will collect PV system configuration information (e.g., size, tilt, and azimuth) from the program tracking data. All simulations will be developed using the National Renewable Energy Laboratory (NREL) PVWatts Calculator API (version 8), allowing for transparency of modeling inputs and flexibility.¹

¹ <https://developer.nrel.gov/docs/solar/pvwatts/v8/>

We will develop simulations using typical meteorological year (TMY) weather from the NREL National Solar Radiation Database (NSRDB).² A review of the tracking data shows that no projects were paired with storage, therefore energy impacts will be based solely on hourly solar PV simulations. Hourly solar PV simulations will be aggregated to report annual energy impacts. These simulations will then be used to report impacts by variables of interest such as program type, geographic location, and income level.

The estimated hourly PV production will be used to calculate demand impacts during hours of MISO and PJM peak demands. We will analyze peak demand over the top 100 hours to provide insight into how ILSFA projects impact the grid during the hours of highest load. The top hours will be obtained from publicly available hourly historical load data from the MISO and PJM websites.

Data and tools that will be used for the energy impact analysis include:

- ILSFA program tracking data
- PVWatts API Version 8
- TMY weather data from NREL NSRDB
- MISO historical hourly load
- PJM historical hourly load

KEY DELIVERABLES

- Annual energy impacts and peak demand impacts will be reported in the energy impact section of the annual report.

Bill Impact Analysis

The bill impact analysis will provide an estimate of customer savings as the difference between bill savings and the participant’s costs to acquire solar PV (e.g., system costs, debt service payment, lease/PPA payments). Any project that applied for ILSFA from PY1 through PY4 and reached Part II approval by May 31, 2022, will be included in this analysis. The research questions addressed by the bill impact analysis are listed in the table below.

Table 6. Bill Impact Analysis Research Questions

CATEGORY	PRIMARY RESEARCH QUESTIONS
Bill Impacts	How much bill savings can participants expect due to the energy produced by ILSFA projects? How do bill reductions compare to the participant’s cost to acquire solar?

The evaluation team will leverage Verdant’s distributed energy resource cost-effectiveness analysis tool (DER CAT) to estimate bill impacts. The DER CAT includes a detailed cash flow model that accounts for all sources of revenues and costs, including REC revenue, federal tax incentives, debt service payments, and bill savings. We will model cash flows out 20 years (the estimated life of a PV system), accounting for retail rate increases, PPA rate increases, and using the appropriate discount rates.

² <https://nsrdb.nrel.gov/>

The analysis will leverage the estimated PV production from the energy impact analysis (described above). Where data is not available, assumptions will be made for the necessary inputs such as: loan terms, PPA terms, operating & maintenance costs, utility tariff structure, and customer load. The evaluation team will leverage load profiles from NREL’s database of end-use load profiles to develop the customer load assumptions.³

KEY DELIVERABLES

- Estimates of customer savings will be included in the bill impacts section of the annual report.

Environmental Impact Analysis

The environmental impact analysis will evaluate the energy impacts and peak demand savings of approved PY4 projects and energized projects. Approved PY4 projects are defined as: Projects that applied for the ILSFA program in PY4 and have received Part I approval by May 31, 2022 (including all subsequent project stages). Energized Projects are defined as: Projects that applied for the ILSFA program in PY1 through PY4 and have received Part II approval by May 31, 2022. The research questions addressed by the environmental impact analysis are listed in the table below.

Table 7. Environmental Impact Analysis Research Questions

CATEGORY	PRIMARY RESEARCH QUESTIONS
Environmental Impacts	What are the first-year and lifetime emissions reductions associated with approved and energized ILSFA projects?

Environmental impacts from solar PV generation are a result of reduced utility power plant operation. The evaluation team will use two methods to estimate avoided emissions.

The first method will follow prior evaluations of ILSFA that leveraged the Environmental Protection Agency (EPA) Emissions & Generation Resource Integrated Database (eGRID) to estimate environmental impacts.⁴ We will continue this methodology to allow for comparison with prior studies. We will combine the annual PV generate estimates with eGRID subregion annual CO₂-equivalent, SO₂, and NO_x, non-baseload output emission rates (lb/MWh) to estimate first-year avoided emissions. The eGRID datasets are developed retrospectively, with the latest available dataset being available for calendar year 2021.

The second method will leverage the NREL Cambium datasets, which contain hourly emission, cost, and operational data for modeled futures of the U.S. electric sector.⁵ Using both long-run and short-run marginal emissions rates, we will estimate the lifetime emissions impacts of approved and energized projects. The long-run marginal emission rates (LMER) are an estimate of the rate of emissions that would be either induced or avoided by a change in electric demand, considering how the change could influence both the operation as well as the structure of the grid (i.e., the building and retiring of capital assets, such as generators and transmission lines).

³ <https://www.nrel.gov/buildings/end-use-load-profiles.html>
⁴ <https://www.epa.gov/egrid>
⁵ <https://www.nrel.gov/analysis/cambium.html>

The evaluation team will use the Cambium 2022 LMER to estimate first-year and lifetime avoided CO₂-equivalent emissions. The NREL’s 2022 Standard Scenarios dataset will be leveraged to estimate first-year and lifetime avoided NO_x and SO₂ emission impacts.⁶ Our analysis will account for equipment degradation in estimating lifetime energy production.

Data that will be used for the environmental impact analysis include:

- Hourly PV simulations from the energy impact analysis
- EPA 2021 eGRID
- NREL 2022 Cambium datasets
- NREL 2022 Standard Scenarios datasets

KEY DELIVERABLES

- Estimates of the first year and lifetime avoided emissions will be included in the environmental impact analysis section of the annual report.

Jobs and Economic Impact Analysis

The Jobs and Economic Impact Analysis will examine the impact of ILSFA projects on jobs and earnings in Illinois. This includes direct (attributable to construction), indirect (supply chain), and induced (local expenditures) impacts and net impacts from energy savings. In addition, our research on the job training programs will explore how those programs are supporting ILSFA and supporting trainees that might enter the ILSFA market. The analysis will address the following key research questions outlined in Table 8.

Table 8. Jobs and Economic Impact Analysis Research Questions

CATEGORY	PRIMARY RESEARCH QUESTIONS
Training	What are wages, skills, and positions needed to serve the market? How well are the training programs meeting the needs of Approved Vendors? How well are the training programs meeting the needs of trainees? How many trainings were performed? How many installation hours are completed by qualified job trainees?
Jobs	What job roles, earnings, and wages are created in ILSFA projects? What follow-on non-energy jobs are created from the energy savings? What jobs are reduced in transmission & distribution? Are these jobs permanent or temporary?
Other Economic Impacts	What are the potential long term (20 year) impacts for a typical project based on projected energy costs? What are some other potential follow-on effects from installing solar PV on small residential projects? (e.g., roof replacement, electrification, etc.) and what are their potential impacts? How are the jobs and economic impacts distributed among the labor force? How do impacts differ by region within Illinois?

⁶ <https://www.nrel.gov/analysis/standard-scenarios.html>

PY4 Task 1: Trainer Interviews

We will conduct interviews with trainers to understand the alignment of training programs approved by the ILSFA program with the goals and objectives of the ILSFA program. We will assess whether training programs are meeting the needs of the Approved Vendors and Designated Installers in ILSFA and determine if training programs are making connections for trainees.

The team will also explore current interest, awareness, and trends in training and education for solar PV through a limited number of interviews with IBEW local chapters and City/Community Colleges throughout the State. These interviews may help identify non-approved program connections with ILSFA and CEJA. The Team will assess awareness of available programs from members, address other programs for association with approved programs (i.e., assess related training programs for crossover opportunities), and identify other training programs that may be able to add a solar PV component as part of their regular curriculum.

Trainer-specific research questions are summarized in Table 9.

Table 9. Trainer Research Questions

CATEGORY	PRIMARY RESEARCH QUESTIONS
Training design and delivery	<p>What are the key training program components and how do they align with IL-SFA objectives?</p> <p>What is the service territory served by the training program?</p> <p>What is the target audience?</p> <p>Does the training program work directly with other training programs? (e.g., graduates of soft skills trainings, etc.)?</p> <p>What are the prerequisites for trainees to enter the program?</p>
Jobs & Wages	<p>Does the program have estimates for job types, wages, and tenancy for trainees?</p>
Marketing and Outreach for Trainees	<p>What channels does the program use for outreach?</p> <p>What works well with program outreach, and where is the program facing challenges?</p>
Engagement with Vendors	<p>How does the training program engage with vendors?</p> <p>How does the training program determine what aspects of the training are required (e.g., certifications, topics, etc.)?</p> <p>What training needs have Approved Vendors and/or Designated Installers described?</p>
Engagement with IL-SFA	<p>How does the training program engage and align with ILSFA?</p>
Non-approved training programs	<p>Are there other training programs that are available that augment approved training programs?</p> <p>What topics and skillsets are covered?</p> <p>How do these programs potentially build on approved programs to improve ILSFA program outcomes in future program years?</p>

KEY DELIVERABLES

- In-depth interview guides for participating and non-participating trainers.
- Interview results and data: Results of the interviews will be presented in tables and brief narratives within the annual report. Additional data collected will be used as inputs for the Economic Impact Analysis.

PY4 Task 2: Employer Needs

The purpose of this task is to understand employer needs and identify any trends that could impact ILSFA program structure. In PY4, the team will examine employer needs through secondary research and describe the current and potential future needs of Approved Vendors and Designated Installers.⁷

For the PY5 evaluation, the Team will incorporate questions into the AV surveys that explore approved vendors' needs as they relate to solar training requirements. Based on survey response, the team may also develop a short AV In-Depth Interview Guide and conduct interviews with 5 – 8 small and large Approved Vendors that also install projects and/or Designated Installers to determine employer needs.

Table 10 shows key research around employer needs. We will use secondary research to begin to address these as part of the PY4 evaluation and extend the research with in-depth interviews in PY5.

Table 10. Employer Needs Research Questions

CATEGORY	PRIMARY RESEARCH QUESTIONS
Roles and Responsibilities	What are the roles and responsibilities of solar PV contractor staff? What are the positions available within a typical solar PV organization? What are wage ranges (if available) for each position? What is the job tenancy of a typical position?
Training requirements	What are the training requirements of each position? What are the certifications required of each position?
Preventive Maintenance	Do training programs cover preventive maintenance? What are typical industry component failure rates, and how do these potentially affect preventive maintenance in the program?

KEY DELIVERABLES

- Summary of Employer Needs and Trends: This summary will provide a narrative of the results of the research as well as descriptive statistics where captured.

⁷ Illinois Clean Energy Jobs Potential Through 2030. NREL.gov. (2019). Retrieved September 20, 2023 from <https://www.nrel.gov/docs/fy22osti/82188.pdf>

PY4 Task 3: Develop Model Inputs

The team will develop an Illinois-centric model of the direct, indirect, and induced jobs and monetary impacts in the state from the approved and pipeline projects developed in ILSFA during PY4. We will develop model inputs based on ILSFA data, secondary research, and findings from Trainer interviews. Model inputs will be carefully considered and documented. We will also conduct sensitivity analysis to test alternative scenarios.

Secondary research sources for model inputs may include the following (not an exhaustive list):

- Research from the National Renewable Energy Laboratory (NREL) ⁸
- Solar Energy Industries Association ^{9,10}
- State and national solar impact studies ^{11,12}

KEY DELIVERABLES

- A description of model inputs and sources

Economic Impact Analysis

The Economic Impact Analysis will quantify the direct, indirect, and induced jobs and economic (monetary and trend) impacts of the ILSFA program for the State and, where data is available, by region and subprogram.

The team will use IMPLAN, economic modeling software developed by Minnesota IMPLAN Group. Economic and jobs data for IMPLAN is available for the previous year close to the end of each calendar year (i.e., 2022 data is available at the end of 2023 or early 2024). Models will use data for the calendar year before, which most of each program year falls (e.g., PY4 will use 2021 data). Models will include:

- Direct economic and employment impacts (wages, earnings, and jobs during construction).
- Indirect supply chain impacts (Economic throughput, wages, earnings, and jobs during construction).
- Induced impacts from operations and maintenance (wages, earnings, and jobs from maintenance activities)
- Net impacts from energy savings (wages, earnings, and jobs from consumer spend in other industries). These include follow on Impacts from retail, services from increased cash flow to customer.
- Net impacts from avoided revenue to the utility industry (wages, earnings, and jobs reduced from avoided electricity spend).
- Tax models for applicable subprograms

⁸ Solar Supply Chain and Industry Analysis. NREL.gov. (2018). Retrieved September 19, 2023 from <https://www.nrel.gov/solar/market-research-analysis/solar-supply-chain.html>

⁹ Solar Energy Industries Association, 2023. "State Solar Spotlight, Illinois." <https://www.seia.org/state-solar-policy/illinois-solar>

¹⁰ Truitt, S., Elsworth, J., Williams, J., Keyser, D., Moe, A., Sullivan, J., & Wu, K. (2022). (rep.). State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030. NREL

¹¹ Igogo, T. (2022). (rep.) America's Strategy to Secure the Supply Chain for a Robust Clean Energy Transition Retrieved September 19, 2023 from <https://www.energy.gov/policy/articles/americas-strategy-secure-supply-chain-robust-clean-energy-transition>

¹² Wood Mackenzie & Solar Energy Industries Association (2023). (rep.). US Solar Market Insight. Retrieved September 19, 2023, from <https://go.woodmac.com/l/131501/2023-09-19>

KEY DELIVERABLES

- Model Results Summary Tables: These tables will provide the raw data outputs of the models, detailing the model approach and providing notes and explanation where needed.
- Economic Impact Analysis Narrative: This narrative will present the results of the models in narrative form, provide more in-depth detail on the results, and address the findings and how they answer the research questions in this Task.

Social Impact Analysis

As part of our evaluation, we plan to examine ILSFA’s goals in creating social and energy sovereignty impacts. To do this, we must clearly identify, define, and measure numerous impact, geographic, and demographic data inputs into our analysis. Social impacts occur not in isolation but in concert with other, co-occurring impacts – therefore, our social impacts analysis is reliant on the outcomes of the energy, environment, impact, and jobs impact analyses.

In PY4, the ILLUME team will conduct a baseline geospatial analysis to understand where project penetration exists geographically and how these overlays with geographically based *disadvantaged communities’ criteria*. Note that for the purposes of this evaluation plan, we use the term *disadvantaged communities’ criteria* to broadly refer to indicators or criteria used to identify a geographic area that has been (and may continue to be) marginalized.

PY4 Task 1: Conduct landscape analysis of Disadvantaged Communities Criteria and indicators.

First, our team will synthesize geographically based *disadvantaged communities’ criteria* in use across the state and at the federal level. While we understand that IPA leverages its Environmental Justice Communities (EJC) definition to define areas that may experience disadvantage, we recognize the importance of understanding other criteria that are in use across the state – and at the federal level. This will provide a more holistic understanding of the ways in which IPA has identified *disadvantaged communities* to date, and where there may be gaps in that approach. Table 11 summarizes the criterion we may review.

Table 11. Disadvantaged Communities Criteria

DISADVANTAGED COMMUNITIES’ CRITERIA	SOURCE
Environmental Justice Communities (EJCs)	Illinois Power Agency
Equity Investment Eligible Communities (EIEC)	Climate and Equitable Jobs Act (CEJA)
Restore Renew Reinvest (R3) Areas	2019 Cannabis Regulation and Tax Act (CRTA)
Disproportionately Impacted Areas	Illinois Department of Commerce and Economic Opportunity (DCEO)
Historically Redlined Grade C and Grade D	National Community Reinvestment Coalition
Justice40 Disadvantaged Communities (DACs)	Justice40 Initiative

The purpose of this exercise is to understand which criterion are in use and, for each criterion, what indicators are used to define geographic areas where communities may face disproportionate impacts from climate change and/or inequitable energy services. We note that some criteria have overlap – for example, the EIEC definition consists of R3 Areas and EJs. However, understanding the breadth of area that each criteria covers – and the indicators underlying each criterion – is important foundational knowledge to characterize the equity landscape within Illinois. For each criterion, we will also review data sources and level of granularity. Table 12 highlights a selection of indicator categories and sample indicators to illustrate the types of indicators we will review:

Table 12. Example Indicators Included in Disadvantaged Communities Criteria

CATEGORY	SAMPLE INDICATORS
Social vulnerability	BIPOC, Income, SNAP Linguistic Isolation
Environmental	Air toxics cancer risk, drinking water contaminants, indoor air quality, pesticide use
Workforce and industry	Agricultural land use, employment change, high school degree, length, unemployment
Housing conditions	Energy burden, housing cost burden, lead paint
Health vulnerability	Access to healthy food, asthma, diabetes, heart disease, low birth rate
Climate risk and hazard	90-degree days, drought, expected agriculture loss rate, extreme storms, inland flooding
Environmental services and benefits	Open space, tree cover

PY4 Task 2: Map priority *disadvantaged communities’ criterion* in use.

ILLUME will share preliminary results with the IPA team and define which criterion are of key interest. From here, we will conduct a geospatial analysis to map the criteria across Illinois. The purpose of this mapping exercise will be to overlay the different criteria across the state to understand where there is overlap across criterion – and where there is not. Our team will produce an interactive map with different layers of criterion, and users can ‘toggle’ between different criteria to see where it identified *disadvantaged communities* across the state. This will provide clarity around where the IPA EJC definition demarcates areas that may experience disadvantage, and how this compares to another criterion.

PY4 Task 3: Map Illinois Solar for All participation on the *disadvantaged communities’ criterion* map.

Finally, our team will map Illinois Solar for All participation over our *disadvantaged communities’ criterion* map. This will enable ILLUME to characterize where Solar for All project penetration exists and how program benefits have been received geographically. This will help our team assess where communities of interest exist for the PY5 evaluation cycle social impacts evaluation.

The following section describes our team’s anticipated approach for the PY5 social impacts analysis.

PY5 Task 1: Conduct a data needs analysis.

After identifying communities of interest in **PY4 Task 3**, ILLUME will coordinate with the other evaluation teams to collate the data needed to assess social impacts. Through this task, our team will characterize a) the social impacts we plan to measure and b) the data needed to measure each social impact.

PY5 Task 2: Define social impacts for analysis.

The data needs analysis in PY5 Task 1 will enable our team to define the social impacts we can feasibly measure through our evaluation. Through this task, our team will finalize the list of social impact for analysis. Below, we list a few examples meant to characterize the extent to which communities are directly benefiting from investments:

- Proximity of jobs created to income eligible communities
- Reduced energy burden
- Reduced total fixed expenses
- Increased access to electric transportation
- Increased access to energy efficiency programs
- Changes in community attitudes, beliefs, perceptions
- The longevity of program market effects (primarily jobs)

Note that many of these metrics will be captured through other evaluation streams – energy impacts, bill impacts, environmental impacts, and workforce and economic impacts.

PY5 Task 3: Measure social impacts.

In concert with the other evaluation teams (energy, bill, environmental, workforce and economic impacts), our team will measure social impacts across Illinois Solar for All Projects.

PY5 Task 4: Map social impacts.

Drawing on the mapping process from PY4, our team will create a series of “heat maps” to examine social impacts across communities. These heat maps will provide clarity around where social impacts are distributed, where they co-occur, and how they relate to one another. These data will help the Agency understand where benefits may be being received and where gaps in service may also be occurring.

KEY DELIVERABLES

- Summary of *disadvantaged communities’ criteria* and associated indicators (PY4)
- Maps of priority *disadvantaged communities’ criteria* and IL Solar for All program participation (PY4)
- Data collection plan for social impacts (PY5)
- Heat maps of social impacts (PY5)

2.c. Process Evaluation

The first process evaluation of this three-year evaluation cycle will primarily focus on mapping key actors who implement and participate in the ILSFA program, clarifying their respective roles and responsibilities, and touchpoints and interactions between these key players in the IL-SFA program ecosystem. The process evaluation will also catalog updates to the program between PY4 and PY5, including those due to CEJA, and assess their effects on program processes and administration. We will document program successes and challenges during PY4 and use this information to contextualize findings from the PY4 impact analyses.

We will conduct the PY4 process evaluation through a program materials review, program tracking data review, program administrator interviews, stakeholder interviews, and trainer interviews. *The PY5 process assessment will include these same elements, as well as approved vendor surveys, participant focus groups, grassroots educator interviews, and job trainee surveys.*

As part of the PY4 process evaluation, we will develop program process flows or diagrams. The ILLUME team will use process diagrams to record program adjustments resulting from CEJA. The documentation of process flows will include the identification and recording of pain points and inefficiencies, which we learned from interviews with program administrators and stakeholders. This data will establish a more robust groundwork for future evaluation years. Furthermore, this process flow and visual process mapping will also be used to orient external parties to the program process and future evaluation findings.

Finally, the PY4 process evaluation will inform recommendations for additional research questions for subsequent evaluation studies.

Table 13. Process Evaluation Research Questions

RESEARCH THEMES	PRIMARY RESEARCH QUESTIONS
Program design and delivery	<p>What are the roles and responsibilities of program administrator, IPA, and other key players?</p> <p>What is the participation for each of the sub-programs for end-users, approved vendors, and grassroots educators?</p> <p>What changes have been made to the program since PY4?</p> <p>Are there any parts of the program processes that may be inefficient or confusing for customers?</p>
Program actors	<p>What role does each key actor play (including approved vendors, grassroots educators, job training organizations, and related efforts) and how do they work together?</p> <p>Are there any opportunities to improve or streamline coordination?</p>
Program goals	<p>What were the goals of the ILSFA program in PY4?</p> <p>What are program goals or Key Performance Indicators (KPIs)?</p> <p>What strategies or interventions did the program use to achieve these goals and KPIs?</p>

RESEARCH THEMES	PRIMARY RESEARCH QUESTIONS
Program performance	<p>Did the program meet its goals in PY4?</p> <p>Which aspects of implementation went well, and where did the program run into challenges?</p> <p>What barriers might prevent participation?</p> <p>How can PY4 process results be used to contextualize PY4 impact findings?</p>
Marketing and outreach	<p>Are there specific KPI or guidelines for marketing and outreach?</p> <p>What channels does the program use for outreach?</p> <p>What is working well with program outreach and where is the program facing challenges?</p>
Data tracking	<p>What does the program track, and who is responsible for tracking and reporting?</p> <p>How does program data get QC'ed?</p>

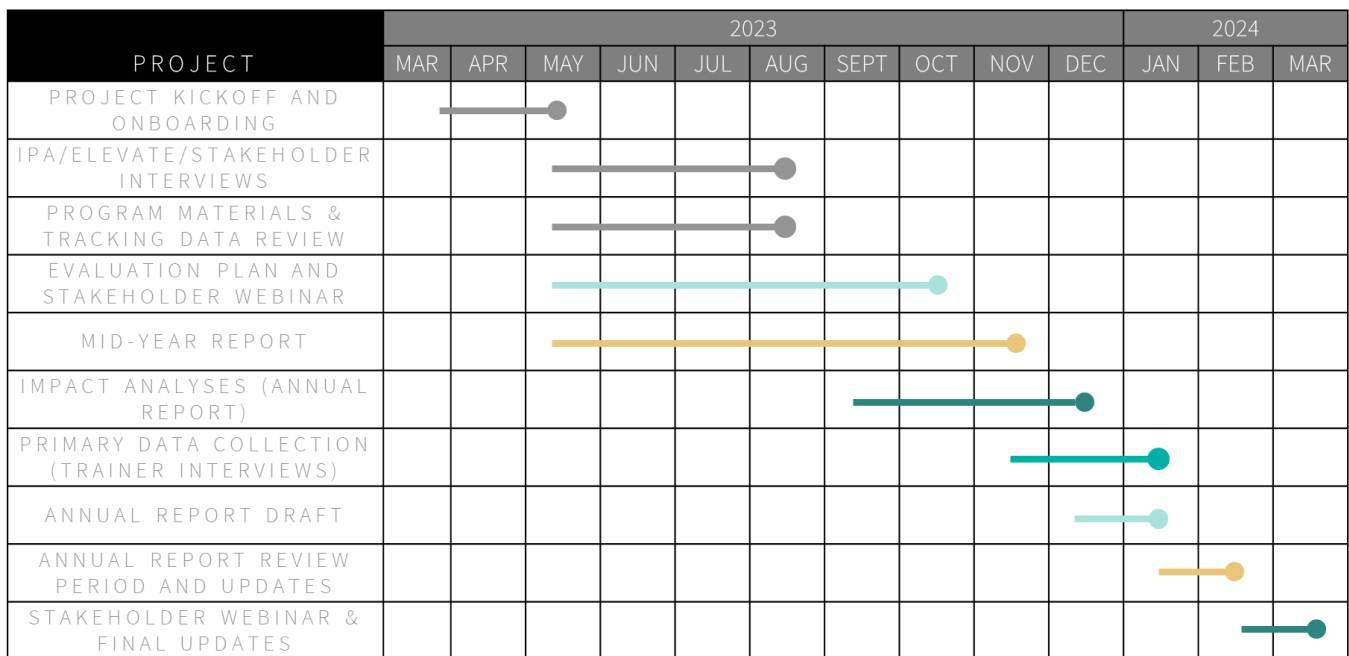
KEY DELIVERABLES

- A section in the annual report that includes program process flow diagrams and recommendations for PY5 process evaluation focus.

3. Project Timeline

Figure 1 below shows the detailed timeline for the PY4 evaluation:

Figure 1. Program Year 4 Evaluation Timeline



The evaluation team will aim to deliver a draft report to IPA by January 31, 2023 and a final report by March 31, 2024. The evaluation team will share results with stakeholders via presentation and a condensed fact sheet of findings and recommendations by March 2024.