REV Demonstration Project Implementation Plan

Community Power

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Executive Summary

This Project Implementation Plan for Consolidated Edison Company of New York, Inc.'s ("Con Edison" or the "Company") Community Power Reforming the Energy Vision ("REV") Demonstration Project ("Project") sets forth the Project's demonstration design, roles and responsibilities, work plan and budget, and reporting structure.

The Company's REV Demonstration Project Proposal ("Proposal") dated September 24, 2018 provided an outline and high-level overview of this Project. Department of Public Service ("DPS") Staff assessed the Proposal and found it to be in compliance with Ordering Clause 4 of the Public Service Commission's Order Adopting Regulatory Policy Framework and Implementation Plan, issued and effective February 26, 2015[1].

On October 16, 2018, DPS Staff filed an assessment[2] of the Project outline and directed the Company to file a Project Implementation Plan, which it did on April 23, 2019[3]. This document is a revision of that initial Implementation Plan. It is a living document and may be updated during Project execution to incorporate new learnings. Test hypotheses, population, and scenarios based on market analysis and targets for Project metrics may change over the course of the Project, requiring updates to the scope, schedule, and costs.

Con Edison, in partnership with the other Community Power Project team[4] ("Project team") members, are executing the Project to demonstrate a financially sustainable model for supporting community distributed generation ("CDG") for low- and moderate-income ("LMI") customers. Since filing the initial Implementation Plan, the Company has reevaluated the original project design in light of the Public Service Commission's Order Regarding Consolidated Billing for Community Distributed Generation ("Consolidated Billing Order").[5] The net crediting mechanism established in the Consolidated Billing Order minimized the value of several of the original hypotheses [6]. Therefore, the Company has modified the Project so that it:

- Tests new engagement models by partnering and co-marketing with community-based organizations ("CBO"). CBO-deployed customer engagement could increase program adoption, trust in the Company, customer satisfaction, and energy literacy, but there is little information on the efficacy of this strategy specifically for distributed energy resources ("DER") for LMI customers. This Project will increase the Company's understanding of barriers to LMI customers' participation and enrollment in CDG by

[1] Case 14-M-0101, *Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision* ("REV Proceeding"), Order Adopting Regulatory Policy Framework and Implementation Plan (issued February 26, 2015).

[2] REV Proceeding, REV Demo Letter (filed October 16, 2018).

[3] REV Proceeding, REV Demonstration Project – Community Power Implementation Plan (filed April 23, 2019).

[4] The Community Power Project team includes Con Edison, Solar One, and a team assembled by Solar One, which includes WE ACT, BMC, Green City Force, Co-op Power, Resonant Energy, and NYCHA. See Table 2-C-1 for more details on team roles and responsibilities.

[5] Case 19-M-0463, *In the Matter of Consolidated Billing for Distributed Energy Resources* ("Consolidated Billing Proceeding"), Order Regarding Consolidated Billing for Community Distributed Generation (issued December 12, 2019).

[6] Consolidated Billing Proceeding, CECONY Net Crediting Plan (filed February 12, 2020).

observing various CBO- and Con Edison-deployed marketing tactics and tracking ancillary benefits realized by participating customers (e.g., bill savings, increased satisfaction, improved energy literacy, etc.).

- Evaluates the potential for solar photovoltaic systems' smart inverter settings to provide value to the grid. Smart inverter functionalities have not been used widely because of limited experience with and understanding of how they perform in real-world situations to produce grid benefits. This project will increase the Company's understanding of smart inverter real-world performance by deploying and analyzing various smart inverter settings.

The Project team is executing the Project in four phases:

- Phase 1: Pre-Development
- Phase 2: Implementation
- Phase 3: Evaluation
- Phase 4: Closing

Community Power is focused on three core objectives, related to: (1) smart inverters, (2) marketing to LMI customers, and (3) business model feasibility of CDG projects for LMI customers. Specifically, the Project seeks to demonstrate:

1. The potential of deploying smart inverter settings at DERs, such as solar installations, to improve local grid conditions (*i.e.*, voltage, current, reactive power, power factor) while minimizing or eliminating undesired effects to the DERs under real-world conditions;
2. The efficacy of Con Edison- and CBO-deployed marketing to enroll LMI participants in CDG projects while also increasing participant satisfaction; and
3. The feasibility and economic benefits of the cooperative CDG ownership business model for LMI customers and for developers and potential investors, at scale.

Upon completion of the Project, the Project team expects to use the knowledge gained from the Project to help answer some of the following questions critical to achieving these objectives.

Smart Inverters

a. How do smart inverters perform under real-world conditions and can the Company use information about such behaviors to determine the optimal inverter settings for distribution grid needs?
b. How does real-world inverter performance compare with the performance represented in the Company's engineering models (*i.e.*, Power Flow model)?

Marketing Strategy

a. Does Utility partnership with CBOs increase the success of marketing CDG projects to LMI customers?
b. Do specific CBO-deployed marketing tactics or a customer's existing energy literacy level play a greater role in enrollment decisions?

c. Can a no-cash-up-front program increase LMI customers' adoption of DERs?

Business Model Feasibility

a. Can the Community Power business model for LMI CDG attract LMI customers, third-party developers, and investors at scale and therefore lead to a pipeline of similar projects?
b. Can an investment in LMI CDG projects also generate ancillary benefits (e.g., total bill arrearage reduction, enhanced energy literacy, emissions reductions, etc.)?

Section 1: Demonstration Design

The Community Power Demonstration Project is the result of a partnership between the Con Edison team and a team assembled by Solar One that includes WE ACT, Brooklyn Movement Center ("BMC"), Green City Force, Co-op Power, Resonant Energy, a third-party impact investor, and the New York City Housing Authority ("NYCHA"). Through this demonstration, Con Edison and its partners expect to: a) collect data on real-world smart inverter performance, b) assess LMI CDG participant awareness and engagement, and co-marketing strategies and tactics, and c) validate the Community Power business model by tracking financial metrics listed in the Appendix A, and other learnings described in the Executive Summary.

The Project team expects this Project to deliver a minimum of one megawatt (MW) AC rated capacity of CDG from rooftop solar arrays to approximately 350 directly metered LMI participants living in or near the NYCHA housing development where the solar arrays are located. As part of this demonstration, the team expects a workforce of 15 to 30 NYCHA housing residents to be trained to install the Project's solar system.

The Project is being executed in four phases. The phases are incremental and may occur in parallel. This section will detail the Project's hypotheses, the populations targeted, and the scenarios for evaluation. The Project team will use checkpoints, detailed in Section 1D, to monitor and inform progress. Throughout the phases and scenarios, the Project team will continuously evaluate benefits of the project to LMI customers to inform future similar Projects.

Additional detail on each phase of the Project follows.

Phase 1, Pre-Development, began in 2019 and is focused on creating the Project's LLC, raising tax equity, developing legal agreements, deploying project financing for capital costs (through a loan) and program costs (through an impact investment), selecting solar installers through a competitive request for proposals, negotiating pricing and terms for the solar installations, initiating site selections, and conducting community outreach partnerships.

Phase 2, Implementation, is scheduled to occur from 2020 to 2022. The Community Power Project team will procure and install solar arrays, smart inverters, pyranometers, and other data acquisition devices; design customer surveys; develop marketing materials; configure communications software to relay performance data from the installation to Con Edison; test communications software; recruit and train the workforce; engage and enroll subscribers on a rolling basis; and launch the Project in the market.

Phase 3, Evaluations, is scheduled to occur from 2020 to 2024, and will include ongoing quarterly reporting of project performance against expected results, documentation and Project closeout, final analysis of metrics, summary of findings during the Project period, and job placement for workforce trainees.

Phase 4, Closing, is comprised of several key milestones. By 2031 (or Year 10 after installation, whichever is later), tax equity investment will be fully repaid and Co-op Power will have the option to buy solar arrays on behalf of its membership. In this case, cooperative members will manage excess operating profit. In 2041 (or Year 20 after installation, whichever is later), the assets will reach the end of their useful life.

The Company and DPS Staff reviewed the engagement plan for the Project on August 7, 2019 as it relates to the uniform business practices ("UBP")[7] and coordination with other Demonstration Projects and Con Edison programs. In light of the COVID-19 pandemic, social distancing guidelines, and Executive Orders issued by the federal government and the State of New York, the Company modified the plan to focus more on virtual interaction with customers through tactics such as online workshops and online workforce training where possible and appropriate.

A) Test Statements

Smart Inverters Functionality

The Community Power team will evaluate smart inverter performance in two tests which will assess the various industry-standard smart inverter settings and will potentially develop new smart inverter settings. The first test ("Test 1") will assess the smart inverter performance under various industry-standard smart inverter settings. Based on the results of the smart inverter performances in Test 1, the Company will seek to develop and test additional smart inverter settings that could improve grid-beneficial operations and/or reduce undesired effects in a second test ("Test 2").

For Test 1, the Project team will use additional data acquisition equipment and analyses to assess multiple smart inverters that are in "close proximity" to each other – connected to the same local grid infrastructure, such as a manhole. These smart inverters tend to be within a one-block radius of the shared local grid infrastructure. The purpose is to investigate any potential interactions among smart inverters in close proximity to each other which have high functions (*e.g.*, reactive power controls) enabled.

In addition, the Company will establish a power flow model with an initial set of model assumptions ("Initial Model"). The Company uses power flow models during coordinated electric system interconnection review ("CESIR") studies conducted on new DERs interconnecting with the grid. During Test 1, the Company will compare the Initial Model and the actual smart inverter performance under the set of industry-standard inverter settings. In Test 2, the Company will seek to refine the model assumptions in the Initial Model to improve its accuracy when compared to actual smart inverter performance under various smart inverter settings.

[7] Case 98-M-1343, *In the Matter of Retail Access Business Rules*, Order Adopting Revised Uniform Business Practices (issued January 19, 2018).

Marketing Strategy

The Project team will conduct a tactical analysis on the Project's customer engagement program by assessing the marketing tactics to gain insights into their effectiveness at encouraging enrollment during two stages: (1) awareness (when the customer becomes knowledgeable about what the Project offers), and (2) engagement (when the customer decides to take an action such as attending an informational workshop or enrolling in the Project).

Business Model Feasibility

The Project team will assess the financial feasibility of the Project's co-op ownership business model by evaluating outcomes against specific financial performance metrics outlined, in an abbreviated form, in Appendix A. The Project is designed so that LMI participants will always receive a net savings on their bill – meaning that their bill will be lower than if they were not participating in the Project – which is expected to allow the Project to meet its revenue requirements and financial health indicators.

To execute this Project, the Community Power team will use a three-pronged approach: (1) a streamlined process for determining optimal inverter set points for the grid, the developer, and participating LMI customers; (2) a mission-aligned partnership among organizations with successful track records in delivering clean energy directly to LMI communities; and (3) a financing structure that is sustainable and supports the Project's revenue expectations.

The Community Power team will demonstrate the market potential of the Project model and test hypotheses, as defined in Table 1-A-1. The Project team expects that the completion of the Project will either support or not support these hypotheses and believes the Project to be sufficient in scale to test the following central hypotheses related to the three areas of focus:

Smart Inverters Functionality

- **Hypothesis 1:** Smart inverters will be at appropriate settings when they reliably and dynamically adjust to the needs of the local grid with minimal undesired effects on seven key metrics ((1) inverter response time, (2) ramp rate, (3) voltage curves (4) active power (5) voltage, (6) reactive power, and (7) power factor) when observed over different seasons and representative test scenarios and considered relative to other inverters located in close proximity.

- **Hypothesis 2:** Power flow model assumptions that are refined through an iterative process and incorporate information about inverter performance under real-world conditions[8] will improve model accuracy to (1) validate the process of determining

[8] The locations of the Community Power solar systems are not prone to high voltage conditions (*i.e.*, high DER penetration with low nearby loads) required to activate smart inverter higher functionalities at typical voltage set

optimal inverter settings used in the Project, and (2) establish a new benchmark of model assumptions needed to recommend inverter settings for similar CDG or other DER projects.

Marketing Strategy

- **Hypothesis 3:** 20 percent of customers solicited will engage with the Project, and of those who engage, 30 percent will enroll if encouraged to participate through CBO-led marketing strategy and tactics.
- **Hypothesis 4:** A workshop, whether in-person or in a virtual setting, that explains to customers the details of the Project and allows customers to ask questions will generate a significantly greater percentage of enrolled participants (10 percent or higher) when compared to enrollment generated by collateral materials like flyers, mailers, etc. that send the customers directly to the Project's website.
- **Hypothesis 5:** Energy literacy, trust in the Company, customer satisfaction with the Company, and other ancillary benefits believed to be associated with a CBO partnership will be higher for customers who participate in the Community Power project than for customers who do not.

Business Model Feasibility

- **Hypothesis 6:** Achieving specific Project financial health metrics and monthly customers' bill savings of 10 to 15 percent will attract LMI customers, CDG developers, and lenders to create a pipeline of similar projects in the future.

points. Therefore, Con Edison will set lower voltage set points on the smart inverters to activate and assess their higher function(s) performance.

Table 1-A-1: Implementation Hypotheses

Test Statement	Hypotheses
Smart Inverter Functionality • We believe that there are two key indicators of smart inverter stability at a given set point – (1) the inverter's ability to dynamically adjust to support the grid and (2) creation of minimal-to-no undesired effect – with both measured using seven key metrics: inverter response time, ramp rate, voltage curves, active power voltage, reactive power, and power factor. • We believe that undesired reactions will occur if settings on smarter inverters are not appropriately set. [9] • We believe that nearby inverters may adversely interact with one another, depending on their proximity, if settings are not appropriate.	If the smart inverters reliably and dynamically adjust to the needs of the grid… If they do not cause undesirable effects among key metrics, and… If this state remains constant when these smart inverters are observed over different seasons, different test scenarios, and relative to other inverters located in Close Proximity… Then the inverters can be determined to be at appropriate settings for the grid and the customer.
• We believe that real-world data from smart inverters set to operate statically and dynamically will improve assumptions in the Company's current Power flow model. • We believe that refining power flow model baseline assumptions through an iterative process that incorporates real-world project data will strengthen the accuracy of the power flow model used by the Company during CESIR studies to determine local hosting capacity and make recommendations to developers in the Company's service territory.	If power flow model assumptions are refined using real world solar project data from the Community Power project, and… If there is a clear process for refining these model assumptions and the smart inverter settings applied to the Project… Then the revised power flow model assumptions will improve the model and enable the Company to recommend settings for DER projects with smart inverters to potentially help increase the local hosting capacity.

[9]The locations of the Community Power solar systems are not prone to high voltage conditions (i.e., high DER penetration with low nearby loads) that are required to activate smart inverter higher functionalities at typical voltage set points. Therefore, Con Edison will set lower voltage set points on the smart inverters to activate and assess their higher function(s) performance.

Marketing Strategy • We believe CBOs delivering marketing strategies and tactics in partnership with the Company will produce greater customer conversion rates than without the Company partnership. However, finding strategic and tactical benchmarks for CDG projects where marketing is led by CBOs is challenging because tracking this kind of work is uncommon. • We believe that attempting to rigorously monitor marketing strategies and tactics applied in this project will help to benchmark customer engagement for LMI CDG if, when possible, tactics are clearly defined, tracked, and measurable.	If encouraged to participate by CBOs delivering strategies and tactics … Then 20% of customers will become engaged with the Project, and 30% of those engaged will choose to enroll.
• We believe that joining an LMI CDG Project and a community energy cooperative like Co-op Power is a complex process requiring additional support and explanation because customers may not be familiar with this type of offer and/or find it too complicated or confusing.	If customers have the option to either attend a workshop (including a virtual workshop) or go to the Project website… Then 10 percent more customer enrollments will be generated from the workshop than from the website.
• We believe investing in third-party DERs that serve LMI customers and partnering on LMI CDG projects provides an opportunity to achieve positive ancillary benefits (*e.g.*, increased energy literacy and customer satisfaction, etc.) as well as grid benefit.	If customers participate in the Project… Then they will experience increased energy literacy and increased trust in the Company and DER providers, and their customer satisfaction will be greater than the satisfaction of customers who do not participate.

Model Feasibility • We believe that customer engagement coupled with meaningful bill savings will lead LMI participants to manage their energy use and bills in new ways, including paying utility bills and associated subscription fees on time. This will support the Project's financial health and business model feasibility.	If the Project can achieve specific financial health metrics typically used by lenders, such as a predictable overall revenue realization rate (i.e., the percentage of solar customers who make timely payments on their electric bills – inclusive of associated subscription fees), and… If customer bill savings are significant (10 percent or higher)… Then the Project's business model will be considered feasible.

B) Test Population

Customer Population

The Project will focus on approximately 350 directly-metered LMI participants living in or near NYCHA housing. Customers will opt in to participate. Participant segmentation will apply the following criteria:

1. Participants must live in NYCHA or other income-restricted, non-NYCHA multi-family affordable housing in Upper Manhattan, Brooklyn, or the Bronx. The Community Power team plans to focus outreach and recruitment on specific affordable housing properties that have verifiable income restrictions for residents, such as NYCHA buildings (and buildings that are owned and operated by non-profit affordable housing providers as needed). Focusing on these buildings can help the Community Power team rapidly qualify and enroll eligible households. The customer outreach and recruitment will focus on eligible customers in proximity to the solar installations.

2. Participants must have a checking account or credit card[10]. Solar billing through automated clearing house ("ACH") transactions will allow the Project team to process large volumes of credit and debit transactions associated with CDG subscription charges in batches.

3. Participants must be a directly-metered Con Edison customer. To receive bill credits directly from Con Edison, participating customers must be metered directly and cannot live in a master-metered building. Participants will be required to provide their Con Edison account number as part of enrollment.

[10] This requirement is only for program partners choosing to not utilize net crediting.

Participants can stop participating at any time. Upon a participant's withdrawal, their subscription will end within 30 days of notification at no cost. Each exiting participant will be replaced by another LMI customer on the Project's waitlist.

Participants can be removed from the program for nonpayment of CDG subscription fee. Upon a participant's nonpayment, they may be replaced by another LMI customer on the Project's waitlist.

To secure the participation of 350 subscribers, the Community Power team will engage more than 6,500 LMI households. The Community Power team will recruit participants from areas surrounding the three NYCHA public housing developments hosting the solar energy systems below:

Table 1-B-1: NYCHA Public Housing Developments

Campus	Campus Location and Zip	Neighborhoods Included In Recruitment	Outreach Lead
CARVER HOUSES	East Harlem, Manhattan (10029)	Harlem, Washington Heights	WE ACT
KINGSBOROUGH	Bedford-Stuyvesant, Brooklyn (11233)	Bedford-Stuyvesant, Canarsie, Crown Heights, Brownsville	BMC
GLENWOOD	Canarsie, Brooklyn (11234)		BMC

Based on the parameters above, approximately 13,330 customers are eligible to participate. The Community Power team will divide the eligible customers into two groups of equal size: an encouraged group of 6,665 customers who receive the program marketing and a non-encouraged group of 6,665 customers who do not receive the program marketing. Customer engagement partners WE ACT and BMC will market to the 6,665 encouraged customers, with the goal of engaging 1,333 customers and enrolling 400 customers (350 subscribed and 50 waitlisted). Encouraged and non-encouraged customers may live in the same housing development campus (either the Carver, Glenwood, or Kingsborough NYCHA campus) but in different buildings. The Community Power team intends to market to only encouraged customers but non-encourage customers may learn about the Project by word of mouth or by visiting buildings that received "encouragement" (*e.g.*, mailers, tabling events, flyers, and other marketing). The Project team will randomly select buildings that receive encouragement, and will not turn away non-encouraged individuals who may have learned about the Project.

The Project team will compare survey responses from the encouraged group from the non-encouraged group to determine the effectiveness of the marketing strategies and tactics deployed (described later in this document).

Inverter Population

Approximately 1.2 MW AC rated capacity of solar will be installed on 40 NYCHA rooftops – four rooftops at the Carver housing development (~128,000 Watts DC), 20 at the Glenwood housing development (~691,000 Watts DC), and 16 at the Kingsborough housing development (~413, 000 Watts DC). The system on each rooftop will use Solar Edge smart inverters. Carver will have eight inverters, Glenwood will have 47 inverters, and Kingsborough will have 30 inverters. The Smart Inverter Settings Sheet in Appendix C shows Test 1 smart inverter settings: IEEE 1547, California, Hawaii, CECONY Res, CECONY 1, CECONY 2, and CECONY 3.

Carver Housing Development: four building rooftops, eight inverters total (of these, no rooftops and no inverters are in the Close Proximity evaluation in Hypothesis #1)

- two rooftops will be operating with the CECONY Res setting (four inverters total)
- one rooftop will be operating with the IEEE 1547 setting (two inverters total)
- one rooftop will have no settings installed (two inverters total)

Glenwood Housing Development: 20 building rooftops, 47 smart inverters total (of these, 11 rooftops and 28 inverters are in the Close Proximity evaluation in Hypothesis #1)

- two rooftops will be operating with the CECONY Res setting (four inverters total)
- four rooftops will be operating with the CECONY 1 setting (nine inverters total)
- five rooftops will be operating with the CECONY 2 setting (13 inverters total)
- five rooftops will be operating with the CECONY 3 setting (15 inverters total)
- two rooftops will be operating with the IEEE 1547 settings (four inverters total)
- two rooftops will have no settings installed (two inverters total)

Kingsborough Housing Development: 16 building rooftops, 30 total smart inverters (of these, two rooftops with a total of four inverters are in the Close Proximity evaluation in Hypothesis #1)

- three rooftops will be operating with the CECONY Res setting (six inverters total)
- two rooftops will be operating with the CECONY 2 setting (four inverters total)
- three rooftops will be operating with the California setting (five inverters total)
- three rooftops will be operating with the Hawaii setting (five inverters total)
- three rooftops will be operating with the IEEE 1547 setting (six inverters total)
- two rooftops will have no settings installed (four inverters total)

For more technical detail regarding the test procedure applied at these locations, please see the Test Process section of the Test Plan in the Appendix B.

Table 1-B-2: Test Population Selection

Test Population Description	Selection Method
PARTICIPATING CUSTOMERS	The Project team will randomly select affordable

Eligible Population 13,330 Con Edison customers in Harlem and Brooklyn Study Population 6,665 NYCHA and affordable housing residents that are directly metered and receive marketing Sample Population 350 NYCHA and affordable housing residents that are directly metered Control Group 6,665 NYCHA and affordable housing residents that are directly metered and do not receive any marketing material related to this project	housing buildings to receive marketing. Thereafter, the Project team will identify and recruit individual participants on an opt-in basis. Sample sizes identified in the Test Population section above have been calculated so that the team can assess research questions with statistical validity and causal attribution.
SMART INVERTERS Study Population 40 NYCHA rooftops at three different developments (Carver 4 rooftops, Glenwood 20 rooftops, and Kingsborough 16 rooftops; 85 smart inverters in total.) Sample Population 15 rooftops (28 smart inverters in total) for the Close Proximity evaluation 35 rooftops (77 smart inverters in total) with settings being tested) Comparison Group 5 rooftops with no settings applied (8 smart inverters total) Power Flow model with initial assumptions to be determined before the test begins and to be refined during Test 1 and Test 2 – please refer to the Test Plan in the Appendix B for details.	The inverter study population was selected because they were awarded to the Community Power team as part of NYCHA's Access Solar project where a subset of NYCHA rooftops, with low- to no-cost leases, were made available to small businesses and nonprofit organizations creating CDG projects that serve LMI customers and employ NYCHA residents. The Project team selected "no setting" sites based on their similarity to sites with settings, so they can act as a control.
WORKFORCE Eligible Population NYCHA Resident Economic Empowerment & Sustainability (REES) program participants and other interested NYCHA residents Study Population ~45 applicants Sample Population 15 NYCHA residents selected for workforce training and a paid apprenticeship with the Project	Priority will be given to residents who live in the NYCHA buildings where the solar systems are installed. The opportunity will be promoted broadly by WE ACT, BMC, and NYCHA. However, anyone who lives in NYCHA housing who is interested in this opportunity can attend a workshop, confirm their interest, and complete an application. Potential candidates will be selected based on their application, a math skills assessment, and an interview. Candidates will be scored based on specific selection criteria (see Appendix D), and their scores will be weighed against other candidates' scores on each criterion to ensure equitable access to this 15-person

Comparison Group The pool of workforce participants that matriculated through Green City Force's programs and had a 60 percent placement rate with full-time employment after their training and apprenticeship.	opportunity.

C) Test Scenarios

The Project team will evaluate the following test scenarios for the smart inverter hypotheses:

- Test 32 smart inverters to determine if they remain stable when the inverters are close to others – under close proximity conditions.
- Observe eight sets of inverter settings over four different seasons to assess seasonal impacts on inverter performance. This will make Project findings more representative of actual impacts on the grid. Please see the Test Set Points section of the Smart Inverter Settings Sheet in Appendix C for the list of inverter settings to be applied.
- Refine one set of initial[11] model assumptions for the Company's power flow model over the course of two separate test periods as described in the Test Process section of the Test Plan in the Appendix B.

Based on prior CESIR and engineering studies at NYCHA, the Project team does not expect the Community Power project to produce an overvoltage condition to local customers. Such conditions are needed to assess smart inverter performance under typical conditions. Because the PV size of the Community Power project is much smaller than the minimum load of the typical residential building in the local vicinity, the Community Power team will lower the smart inverter dynamic volt-VAR curve (VVC) set points in the demonstration to produce a smart inverter response that the team can further study and analyze.

The Project team will apply an evaluation of the following test scenarios for the marketing hypotheses:

- Survey customers who receive marketing, the encouraged group (*i.e.*, half of the study population).
- Survey customers who do not receive marketing, the non-encouraged group (*i.e.*, the control group).

The team will divide encouraged participant survey responses into those who received marketing and decided to participate and those who received marketing but decided not to participate (encouraged participants and encouraged non-participants). Survey results allow the

[11] Base case is the model's expected case, determined by using the assumptions that the Community Power team considers most likely to occur.

Community Power team to compare different marketing tactics used during the awareness and the engagement phase of participant interaction with the Project.

The Project team will survey encouraged participants three times – pre-participation, mid-way through participating in Year 1, and at the end of the two-year demonstration period – to test the marketing hypotheses and measure satisfaction with the program, increased energy literacy, trust in and perception of Con Edison, and other ancillary benefits of interest. Once the Project team conducts the surveys, the team can compare the encouraged group responses to the non-encouraged group responses to determine if a causal relationship can be established between project outcome and the marketing strategy and tactics deployed.

The Project team will apply an evaluation of the following test scenarios for the financial hypotheses:

- Assess the financial health of the Project – i.e., on-time customer payment and revenue realization rate – compared to modeled and projected performance
- Assess the financial benefit to participating customers – i.e., 10 percent or higher monthly bill savings – compared to modeled and projected performance

Participants will be educated and recruited by trusted community partners and, once enrolled, are expected to see a monthly bill savings that is 10 percent or higher. The Project team expects this scenario to help participating customers, in aggregate, to make on-time payments of their utility bills.

The Project team will proactively manage participants by providing monthly statements and prompt follow up so that, when necessary, participants who must be removed from the program due to nonpayment can be replaced with another customer from the Project waitlist. The team expects this will help the Project reach a high revenue realization rate.

D) Check Points

This Project is a new and innovative demonstration that will be managed by Con Edison with support from other Community Power members. The team will establish a Project management team and governance structure (see Section 2B) to review and monitor Project implementation.

The Project team will establish key checkpoints, listed in Table 1-D-1, to assess the status of key metrics during the market launch phase and allow for adjustments in project execution strategy to account for new learnings. Each checkpoint has associated key metrics; when implementation execution as measured at checkpoints does not meet expected targets, they will undergo further analysis to ascertain impacts on the Project and identify root causes. The Company's quarterly reports, as detailed in Section 4, will detail checkpoint status, applicable remedies (where necessary), and strategy modifications. Due to the dynamic nature of the demonstration and the intent to test multiple hypotheses (see Table 1-A-1), checkpoint targets may occur earlier or later within phases and the Project team may adjust checkpoint metrics based on customer and market partner reaction to the marketplace and operational and

financial risk. These risks can include changing economic dynamics and the outcomes of related proceedings.

A detailed list of the metrics and a proposed reporting schedule is below. The Project team expects to measure the metrics below against a baseline of pre-demonstration targets.

Table 1-D-1: Checkpoints

Checkpoint	Description
Business Structure Established (Phase 1)	*Measure:* LLC created, tax equity raised, legal agreements developed and signed, and final course of project finance deployed *When:* Phase 1 *How*: Create a completion schedule for each milestone above; have bi-weekly Community Power team check-ins between milestones. *Expected Target*: Q3 2020 *Impact:* A specific business structure is foundational to the deployment of the financial mechanisms in this project. Without this structure the project cannot be financed or operated. *Solutions/Strategies (in case the results are below expectations):* Active involvement of Con Edison in each stage of contract development and biweekly progress reports from the Community Power team on the status of each measure above that falls within the Community Power team's purview.
Workforce Trained (Phase 2)	*Measure*: 30 apprentices successfully complete their training and work with the installers *When*: Phase 1 *How*: Green City Force will provide paid training to the selected residents and then assist them in securing employment. *Expected Target*: Q3 2020 *Impact*: Positive long-term community level benefits for under-employed individuals and steady stream of installers for the project's arrays. *Solutions/Strategies*: Active discussions with Green City to understand recruitment and training bottlenecks, and to develop preemptive plans and mitigation strategies to address them over the course of the project.
Subscribers Enrolled (Phase 2)	*Measure*: At least 350 participants signed up to receive discounted solar energy credits on their utility bill *When*: Phase 2 *How*: Solar One and WE ACT will educate and enroll residents and target a total of over 1,300 potential participants to reach and maintain the desired enrollment of 350 participating customers. *Expected Target*: Q4 2019 *Impact*: Participant enrollment and retention is the key to the success of the project. Continuous resident engagement will encourage enrollment. *Solutions/Strategies*: Periodic evaluation of enrollment and participant satisfaction will help orient energy literacy education to attract more residents.
Arrays Installed (Phase 2)	*Measure*: Complete system installation, inspection, and commissioning *When*: Phase 2 *How*: Solar One will work closely with Con Edison project manager to complete the array installation. *Expected Target*: Q3 2021 *Impact*: Any delay in this process will impact revenue realization and the project budget. *Solutions/Strategies*: Solar One and Con Edison will collaborate and determine ways to expedite the installation process. Solar One will provide ongoing reports about potential

	bottlenecks in the construction schedule and appropriate mitigation strategies.
Smart Inverter Setting Testing and Modeling (Phase 2 and 3)	*Measure*: Solar project data observed vs. power flow model results; smart inverter performance under various inverter settings; and any undesired and desired effects amongst the seven key metrics – (1) inverter response time, (2) ramp rate, (3) voltage curves, (4) active power, (5) voltage, (6) reactive power, and (7) power factor – for all eight different smart inverter set points. *When*: Phase 2 *How*: Please refer to the Test Process section of the Test Plan in Appendix B. *Expected Target:* Q1 2022 - Q1 2024 *Impacts*: Comparison of modeled outcomes to real world outcomes will enable setting refinement and optimization. *Solutions/Strategies*: Frequent review to check settings impacts, pyranometer acquired data, and utility distribution equipment data and connections. Potentially modifying smart inverter settings to mitigate severe undesired effects. Modify power flow model to better emulate actual inverter performance.
Pre-, Mid-, and Post-Project Surveys (Phase 2 and 3)	*Measure*: Participant awareness (receiving a flyer or mailer), engagement (e.g., attending a workshop, enrolling), trust in and satisfaction with the Project and the Company, and energy literacy. *When*: Phase 2-3 *How*: Solar One will ask nine questions during the enrollment / participation agreement signing process. Afterward participants will be sent a link to a 10-minute survey with additional questions to answer. After six to 10 months of participation, they will receive an online mid-point survey to complete in exchange for a $10 incentive. Dividing the questions in this way and providing a small incentive helps to decrease the size of the survey and increase customer response rates. At the close of the demonstration, a final survey will be administered online with another $10 incentive. Non-participants (in the non-encouraged buildings) will be administered the pre- and post-demo surveys as well. These surveys will act as a point of comparison from participant responses. *Expected Targets: Q1 2021 -* Q4 2023 *Impacts*: Understanding the customer experience with the Program is critical to answering key project question and hypotheses. These surveys will capture important customer insights *Solutions/Strategies*: The workflow for the surveys includes a follow-up email to those who have either not completed their survey or have not finished their survey. There will also be two waves of customer engagement, allowing for a second opportunity to get additional respondents.
Monthly / Quarterly Metrics Collection (Phase 2 and 3)	*Measure*: Access (to participants who benefit from this DER and to workforce opportunities), affordability (for customers in the form of bill savings received), and sustainability (emissions reductions gained and solar energy generated from the project) *When*: Phase 2-3 *How*: Solar One and all Project partners will be given monthly targets for key metrics, and they will report on these key project metrics monthly. *Expected Targets:* Q1 2019 – Q1 2024 *Impacts*: Tracking metrics related to the Project's key performance indicators quarterly will help identify issues of concern so they can be address promptly. *Solutions/Strategies*: Con Edison's active involvement in each stage of project development and weekly progress reports from the Community Power team on the status of each measure will be deployed to address underperformance, bottlenecks, risks, and concerns.
Adequate Revenue Realization (Phase 3-4)	*Measure*: A high project revenue realization rate *When*: Phase 3-4 *How*: Evaluate annually and analyze revenue realization rates. *Expected Target*: Q2 2022 and Q1 2024 *Impact*: Revenue requirements will help with repayment of the tax equity investment and the

	loan in the required number of years. *Solutions/Strategies*: An additional third wave of customer enrollment maybe deployed if results are below expectations.
Customer Energy Savings (Phase 4)	*Measure*: Average net utility bill savings delivered to LMI participants, percent reduction in energy costs (target 10 percent or more), and projected solar energy generation versus actual solar energy generated *When*: Phase 4 *How*: Evaluate monthly and quarterly. Analyze saving in comparison to saving projections in relation to monthly participant bills. *Expected Target*: Q4 2021 *Impact*: Customer energy savings is one of the key objectives of this project. Absent sufficient savings, the business model will not be viable. *Solutions/Strategies*: Consistent under performance will result in closing of the Project.

Section 2: Project Structure & Governance

A) Project Team

Community Power is a partnership between Con Edison and a team assembled by Solar One, which includes WE ACT, BMC, Green City Force, Co-op Power, Resonant Energy, and NYCHA.

Con Edison will maintain overall responsibility for Project execution. However, each partner will provide key skillsets and be responsible for certain Project functions in order to execute a successful demonstration project. The high-level Project team makeup and alignment are depicted in Figure 2-A-1.

Figure 2-A-1: Team Leadership / Organization

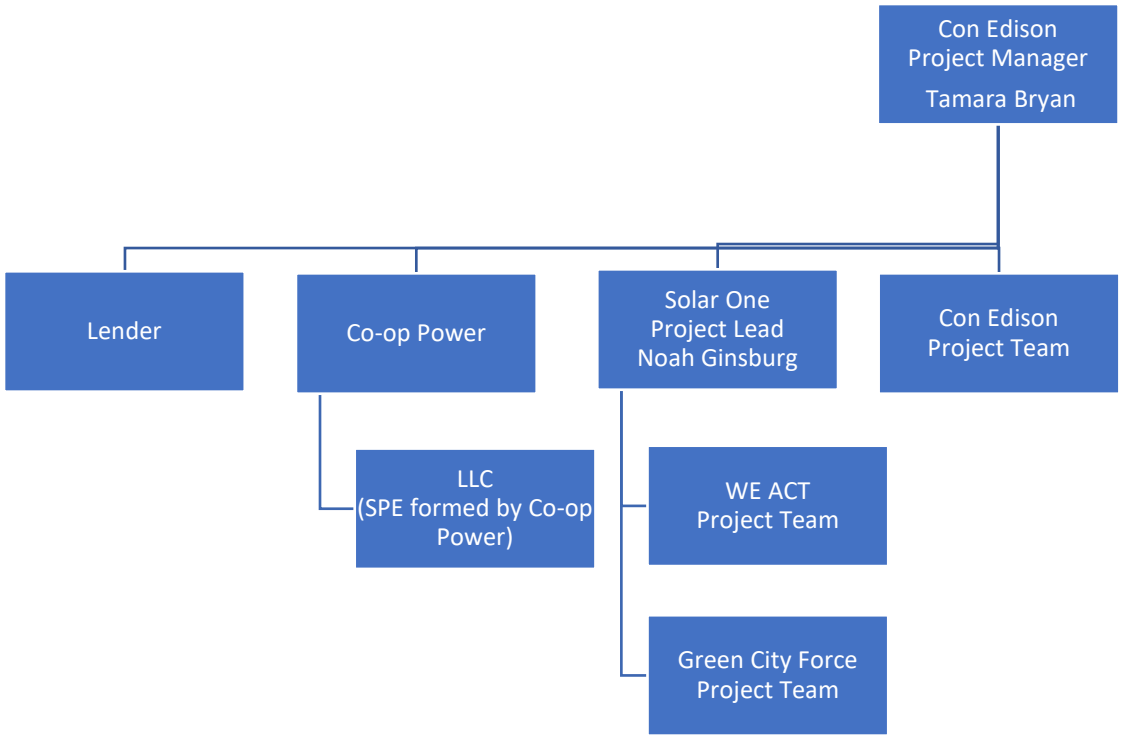


Table 2-A-2: Utility & Partner Skillsets

Con Edison Team Key Skillsets
• Program Management
• Customer and Energy Market Expertise
• Distributed Resources Integration
• Community Outreach and Engagement
• Legal and Regulatory Expertise
• Customer Billing and Operations
• Research Design and Oversight
• T&D Operations and Maintenance
• Marketing and Communications
• Measurement & Verification (M&V) Oversight

Project Team Key Skillsets		
• Site Selection	–	Solar One
• Outreach Planning	–	Solar One
• Financing	–	Resonant Energy, Co-op Power
• Customer Outreach and Community Engagement	–	BMC, WE ACT, NYCHA, Solar One
• Design & Permitting	–	Solar One
• LMI Participant Recruitment	–	BMC, WE ACT/NYCHA/ Solar One
• Green Workforce Training and Recruitment	–	Green City/NYCHA/Solar One
• Solar System Installation	–	Solar One
• Inspections & Commissioning	–	Solar One
• Technology Configuration	–	Solar One
• Results Measurement and Reporting	–	Solar One

A detailed description of the identified partner organizations is provided below.

The Team Lead, Solar One, is a leading environmental nonprofit organization in New York City that specializes in education, green workforce training, and technical assistance programs to help New Yorkers adopt clean energy solutions. Solar One assembled the team members below during the request for information ("RFI") process and together they submitted a joint RFI response:

- **WE ACT** is an established environmental justice organization in Northern Manhattan that has significant experience conducting outreach to, engaging with, and educating low-income neighborhood residents on issues related to energy and the environment.
- **BMC** is a direct-action, community-based, Black-led community advocacy organization. BMC has successfully led hyper-local and citywide mass engagement campaigns around environmental justice, food sovereignty, police accountability, tenant displacement, and education equity.
- **Green City Force** runs a city-wide Clean Energy Corps in New York City that provides paid green jobs training to cohorts of 18-24-year-olds living in NYCHA public housing.
- **Co-op Power**, a consumer-owned energy cooperative membership across New England and New York, has financed a number of large renewable energy projects, including portfolios of third party-owned solar projects throughout the Northeast U.S.
- **Resonant Energy** is a mission-driven, solar energy development company dedicated to making solar power accessible to urban low- and moderate-income communities.
- **The New York City Housing Authority** is the largest rental housing provider in North America and manages the nation's largest housing voucher program.

B) Project Staffing

Con Edison has created a REV demonstration program team within its Customer Energy Solutions department dedicated to identifying, developing, and implementing new projects related to REV. From this team, a Project Manager has been identified to lead the Project. In addition, Con Edison will provide support through additional internal and external resources in key areas (e.g., expertise related to smart inverters and their testing, marketing, information resources, legal, procurement, and engineering) to augment and support demonstration activities and objectives. Con Edison's demonstration project team members are listed in Table 2-B-1, along with their functional areas and current duty titles.

Table 2-B-1: Con Edison Project Team

Team Member	Title	Functional Area
Tamara Bryan	Project Manager	Management
Raghu Sudhakara	Director, Demonstration Projects	Governance
Katelyn Tsukada	Program Manager, REV Demonstration Projects	Oversight

Team Member Title Functional Area

Con Edison's Project team has access to more than 13,000 employees, representing a full set of skills necessary to run the day-to-day operations of the Company. Additional Project team members will be identified and recruited as necessary during the course of Project execution. As part of the shift of the project towards tests related to smart inverters, Con Edison has augmented the team with additional staff with related expertise. Community Power is a committed partner for the Project.

Table 2-B-2: Project Partner Team(s)

Solar One

Team Member	Title	Functional Area
Christopher J Collins	Executive Director	Oversight
Noah Ginsburg	Director, Here Comes Solar	Management and oversight
Juan Parra	Community Solar Program Manager	Program management
Gretchen Bradley	Senior Community Solar Associate	Program support
Michael Weiss	Solar Site Assessor	Solar site assessment

Green City Force

Team Member	Title	Functional Area
Lisbeth Shepard	Executive Director	Workforce program oversight
Mara Cerezo	Senior Program Officer	Program management
Aram Marcelle	Career and Alumni Services Manager	Apprenticeship coordination

WE ACT for Environmental Justice

Team Member	Title	Functional Area
Cecil Corbin-Mark	Deputy Director	Community engagement oversight
Charles Callaway	Senior Community Organizer	Outreach planning
To Be Determined	Outreach Associate	Outreach

Brooklyn Movement Center (BMC)

Team Member	Title	Functional Area
Mark Winston-Griffin	Executive Director	Community engagement oversight
Michael Higgins	Community Organizer	Community outreach and engagement

Co-op Power

Team Member	Title	Functional Area
Lynn Benander	President	Project financing and ownership
Mark Skinder	Director of Energy Services	Operations and billing
Shakoor Ajuwani	New York City Coordinator	Member organizing

Resonant Energy

Team Member	Title	Functional Area
Isaac Baker	President of Development	Financial modeling
Alec Henry	Senior Project Manager	Project management

C) Roles & Responsibilities

Con Edison has entered into an agreement with Solar One, and Solar One has entered into sub-contractual agreements with the other Community Power members as appropriate to delineate detailed roles and responsibilities with respect to the Project execution.

Table 2-C-1: Roles and Responsibilities

Project Partners	Roles
Con Edison Investor-owned utility	Project sponsor, oversite and guidance, smart inverter setting development and analysis, financing (for program costs) funding, as deemed appropriate, in support of the Project's success
Solar One Environmental nonprofit	Team lead, solar strategy, and training
WE ACT Environmental justice nonprofit	Community engagement and enrollment, LMI customer strategy
Brooklyn Movement Center (BMC) Community advocacy nonprofit	Community Engagement and Enrollment, LMI Customer Strategy
Green City Force Environmental training and service program	Workforce Recruitment and Training
Co-op Power/Resonant Energy Community energy cooperative	Solar Development, Operation, and Ownership, Delivery of Tax Equity Investment
Impact Investor (Lender) Social and environmental benefit seeking debt provider	Project Finance (for Capital Costs)
New York City Housing Authority (NYCHA) Public housing provider	LMI Housing Resident Engagement and Enrollment Partner

In Phase 1, the Community Power team will be responsible for initiating the financial and legal structures needed to launch the Project. The Community Power team will also begin assessing Project sites.

Table 2-C-2: Phase 1 – Pre-Development

Lead Responsibilities	Con Edison	Solar One	WE ACT	BMC	Green City Force	Co-op Power/Resonant Energy
Create LLC						X
Identify solar host sites and complete on-site assessments		X				
Prepare site reports for Con Edison and sign conditional site lease		X				
Finalize community partners and subcontractors		X				
Develop outreach plan		X	X	X		
Initiate financing and legal agreements	X	X				X
Complete debt and tax-equity financing						X

In Phase 2 the Community Power team will begin and finalize engagement with Project participants, including initiating and completing solar installations.

Table 2-C-3: Phase 2 – Implementation

Lead Responsibilities	Con Edison	Solar One	WE ACT	Green City Force	Co-op Power/Resonant Energy
Initiate and complete resident engagement and enrollment		X			
Initiate series of surveys	X				
Recruit workforce development participants		X			
Initiate and complete design and permitting of systems		X			
Initiate and complete system installment		X			
Initiate and complete systems inspections and commissioning		X			
Begin Smart Inverter Test 1	X				

In Phase 3, the Community Power team will assess the Project outcomes and begin the final report.

Table 2-C-4: Phase 3 – Evaluations

Lead Responsibilities	Con Edison	Solar One	WE ACT	Green City Force	Co-op Power/Resonant Energy
Begin Smart Inverter Test 2	X				
Initiate documentation and project closeout	X	X			
Conduct job placement for workforce trainees				X	
Start final report		X			

In Phase 4, the Community Power team will conduct surveys of participants, analyze financial results, and complete the final report.

Table 2-C-5: Phase 4 – Closing

Lead Responsibilities	Con Edison	Solar One	WE ACT	Green City Force	Co-op Power/Resonant Energy
Survey participants for satisfaction rates, energy literacy impacts		X	X		
Survey workforce trainees six months post-program		X		X	
Analyze rates of default and revenue realization		X			
Complete final report	X	X			

D) Governance

The Company will have overall responsibility for execution of the Project. The governance structure will encompass the Project management team, detailed in Sections 2-A-1 and 2-B-1. The Con Edison Project Manager and Project Management team will have day-to-day execution responsibility for managing the project, coordinating tasks and activities, and conducting overall project management. The team will continuously coordinate activities throughout the project. Team meetings will be held in person, via conference calls, WebEx/MS Teams, or other communication means. The Community Power team will be responsible for coordinating and executing quarterly reports. Con Edison's Vice President, Customer Energy Solutions will have final governance oversight of all team activities and will be kept apprised of progress through regular team meetings.

Partner Governance Structure

The governance structure will encompass the Project management team, detailed in Sections 2-A-1 and 2-B-1. Solar One, as the third-party team lead, will enter into a contractual arrangement with Con Edison, and Solar One will enter into a subcontract agreement with all other companies that are part of the team in order to provide services to execute the Project.

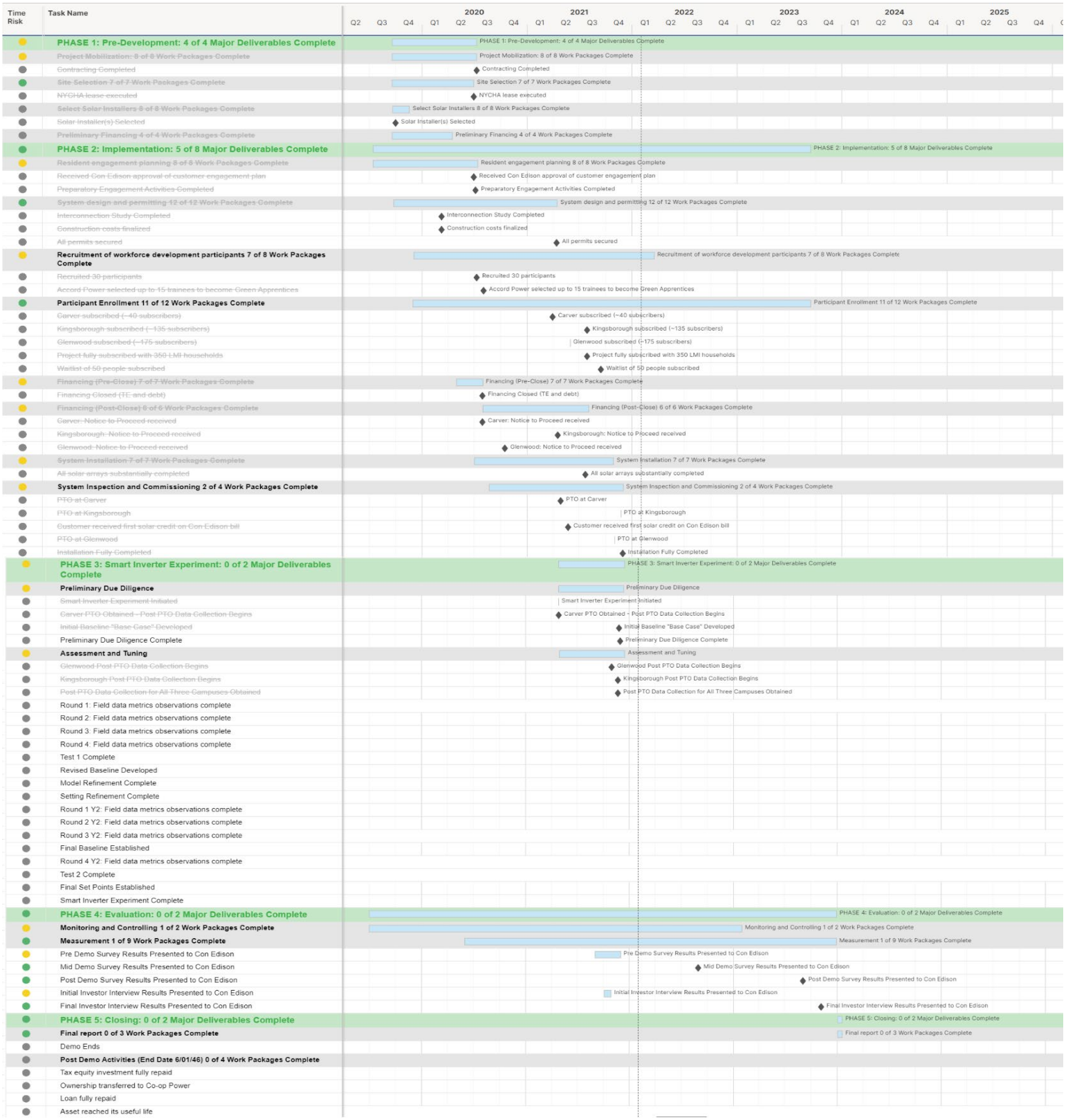
Section 3: Work Plan & Budget

A) Work Plan

The Community Power team will implement the Project in four phases, as defined in the work plan and budget (Table 3-A-1). The plan details the phases, tasks, associated activities, and first level of sub-activities, along with an overall budget estimate. The work plan and budget are part of this living document. Start and end periods and budget estimates of each task and activity may occur earlier or later in the schedule due to various inputs and risks that include, but are not limited to, customer participation, system integration, and permitting. The key milestones for this Project align with the completion of each phase, meeting the checkpoints within the stage, and demonstrating phase success. Milestones are noted by a black diamond in Table 3-A-1. The Community Power team will monitor progress and milestones through various checkpoints, as discussed in Section 1, Demonstration Design, and report to the Commission quarterly. Reporting will conform to the Commission's direction and with Section 4-A of this document, Reporting Expectations.

The Work Plan was revised in Q1 2021 with the new tasks that better represent Project activities and an updated timeline. The Project close is expected to occur in 2024. An overview of the Project by phase and control group (major category of work packages), with milestones, is below. Completed milestones have been crossed out.

Table 3-A-1: Work Plan



Phase Control Group ◆ = Milestone

B) Project Budget

Con Edison's Project Manager will be responsible for managing and tracking the Project's costs and overall budget. The quarterly report to the Commission will provide budget updates and align with the work plan in Section 3A. The Community Power team will provide updates to the Project Manager for inclusion in the quarterly report and program management.

The budget estimates discussed below and provided in Table 3-B-1 represent calculated estimates over the course of the Project and are not adjusted for inflation. Changing budget estimates will be reflected in the quarterly reports to the Commission. Partner costs are trade secrets, commercial confidential information, and financial information that Con Edison and its partners believe to be exempt from public disclosure, because disclosure could reasonably be expected to cause substantial competitive harm. Therefore, the Community Power team will provide costs to the DPS confidentially.

The updated total project budget is $4,068,054. Con Edison will provide funds to support the success of the project if needed. Table 3-B-1 shows the demonstration project budget by calendar year.

Table 3-B-1: Community Power Budget

Budget Year(s)	Budget
2019 – 2021	$2,878,740*
2022	$592,157
2023	$542,157
2024	$55,000
Total	$4,068,054

*Amount spent to date.

This demonstration project will leverage third-party capital in the form of tax-equity investment, which will cover approximately 50 percent of the total upfront capital costs for the project, cash equity, and debt. Co-op Power will serve as the project sponsor and will be principally responsible for incorporating the ownership entity (the LLC), raising tax equity from investors who can benefit from the federal solar tax incentives (through Resonant Energy), and operating the solar energy systems for the 25-year operating life of the solar arrays.

Section 4: Reporting Structure

A) Reporting Expectations

The Project team will provide quarterly reports to the Commission during the Project. The reports will provide an update on implementation progress according to the work plan and budget (see Tables 3-A-1 and 3-B-1), detailing deviations and noting task and activity progress. In addition, each quarterly report will capture, to the extent available, key project information, such as in-service dates, incremental costs incurred, operating results, use case results, and market learnings as well as other observed project benefits. The quarterly report will be structured as follows.

Figure 4-A-1: Quarterly Report Outline

1.0 Executive Summary
2.0 Project Highlights
- 2.1 Since Previous Quarter
  - 2.1.1 Major Tasks Completion
  - 2.1.2 Activities Overview
  - 2.1.3 Sub-Activities Overview
- 2.2 Next Quarter Forecast
  - 2.2.1 Checkpoints/Milestone Progress
  - 2.2.2 Planned Activities
  - 2.2.3 Expected Changes
- 2.3 Issues

3.0 Work Plan & Budget Review
- 3.1 Phase Review
  - 3.1.1 Activity 1.0
    - Progress Assessment
    - Issues
    - 3.1.1.1 Sub-Activity 1.2
      - Progress Assessment
      - Issues
    - 3.1.1.2 Sub-Activity 1.3
- 3.2 Work Plan
  - Table 3.2.A – Updated Work Plan
  - Table 3.2.B – Updated Budget

4.0 Conclusion
- 4.1 Lessons Learned
- 4.2 Recommendations

The quarterly report will focus on the phase(s) that occurred the previous quarter or are scheduled to occur within the next two quarters in order to focus on the Project's current progress while providing the Commission insight into the near future. The governance structure and Project management team will maintain oversight over all Project progress and include in

Section 2.3 of the report a discussion of any impacts on Project execution beyond the report's timeline.

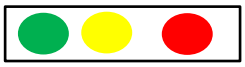
Checkpoint, milestone, and activity progress will provide detailed status information of implementation progress and highlight issues, such as changes in scope, incremental cost, or shifts in the timeline. A stoplight chart will be used to detail progress for activities in the quarterly reports. Con Edison will provide narrative information to support the progress report.

Figure 4-A-2: Checkpoint/Milestone/Activity Progress Example

Checkpoint: Residents signed up for solar energy credits

Target: At least 350 subscribers enrolled (Phase 2 completion)

Progress Status:



Budget Impact: (Yes / On-Target / No Impact)
Incremental Cost Incurred:
Previous Quarter Updates:
Future Quarter Impacts:

The Project management team will maintain regular contact with DPS Staff to review the quarterly report and respond to any follow-up questions.

Appendix A: Abbreviated List of Metrics

Below is an abbreviated list of metrics to be tracked in the Community Power project. Finance metrics will be filed with DPS Staff confidentially.

Category of Effect	Performance Metrics	Reporting Cycle
Smart Inverter Settings & Power Flow Model Baseline Development	• Results from observation of seven key metrics at each of eight smart inverter settings: (1) inverter response time, (2) ramp rate, (3) voltage curves (4) active power (5) voltage, (6) reactive power, and (7) power factor • Initial model vs. actual system behavior comparison • Modifications to the model assumption inputs • Revised model vs. actual system behavior comparison (including percent of improvement)	Quarterly
Affordability	Participating Customer Savings: • Average net utility bill savings delivered to low-income program participants (target = $120/household/year) • Average percent reduction in energy costs (target = seven to 15 percent) • Average reduction in late fees and penalties • Reduction in the number and cost of disconnections Project Financial Performance: • Default rate for LMI subscribers, defined as the percentage of participant payments that are more than 30 days overdue (target = < 10 percent) • Project revenue realization rate, defined as the percentage of total kWh sold at the target subscription rate (target = > 95%)	Quarterly
Sustainability	• Total solar capacity installed (target = 1 MW-AC) • KWh of solar energy generated (target = 1,416,000/year) • Reduced greenhouse gas (GHG) emissions in (target = 1,727,520 lbs of CO_2 equivalent in GHG per year)	Quarterly
Engagement	• Number of LMI customers engaged and educated regarding opportunities to participate (target = 1,170 LMI customers assuming a 30 percent conversion rate, to achieve a total of 350 participants) • Net promoter score • Increase in energy literacy • Reported perceptions of the utility and demonstration program design	Quarterly
Access	• Number of LMI households that subscribe to the CDG projects compared to target of 350 • Number of NYCHA residents and other LMI customers who participate in the project as job trainees (target = 30) • Workforce training program completion rate (target = 90 percent) • Percentage of green workforce trainees employed in the trades six months following installation (target = 65 percent)	Quarterly

	• Participant satisfaction measured six months following system commissioning via phone survey (target = highly satisfied)	

Appendix B: Community Power Test Plan

HYPOTHESES

Hypothesis 1: Smart inverters will be at appropriate settings when they reliably and dynamically adjust to the needs of the local grid with minimal undesired effect on the harmonious interaction of seven key metrics: (1) inverter response time, (2) ramp rate, (3) voltage curves, (4) active power, (5) voltage, (6) reactive power, and (7) power factor when observed over different seasons and representative test scenarios and considered relative to other inverters located in close proximity.

Hypothesis 2: Power flow model assumptions that are refined through an iterative process, under real-world conditions,[12] will improve model accuracy to (1) validate the process of determining optimal inverter settings used in the Project, and (2) establish a new benchmark of model assumptions needed to recommend inverter settings for similar community-designated generation (CDG) projects that could help increase hosting capacity.

DATA REQUIREMENTS

During the two-year REV demo period, the Community Power team will provide Con Edison the following project data from the photovoltaic (PV) solar systems in real time through the SolarEdge inverter website[13].

1. Timestamped measured electrical data values from smart inverter:
    a. Real power (P)
    b. Reactive power (Q)
    c. Apparent power (S)
    d. Current (Amps)
    e. Voltage (V)
    f. All other exportable data points from smart inverter
2. Meter data at solar system PCC (Point of common coupling – expected AMI meter)
    a. Current
    b. Voltage
    c. Active power
3. Meter data at campus buildings (Building load meters)
    a. Current
    b. Voltage
    c. Real/reactive power
4. Irradiance data with same timestamp resolution
5. Voltage and current at nearby grid infrastructure (e.g., manhole)

[12] The locations of the Community Power solar systems are not prone to high voltage conditions (i.e., high DER penetration with low nearby loads) required to activate smart inverter higher functionalities at typical voltage set points.
[13] *See*, https://www.solaredge.com/sites/default/files/solaredge-monitoring-portal-user-guide.pdf.

EQUIPMENT

The following equipment is required for this demonstration:

Previously Specified Equipment (already included in the Project)

1. Smart inverters
2. Data acquisition system and/or communication equipment

Newly Specified Equipment

1. Pyranometers: a type of actinometer used for measuring solar irradiance on a planar surface, and it is designed to measure the solar irradiance flux density. (Co-op Power will provide Pyranometers)
2. Supervisory control and data acquisition ("SCADA") boxes at designated underground facilities (Con Edison will provide SCADA boxes)

TEST SETUP INSTRUCTIONS:

The following activities must occur in order to conduct this demonstration:

1. Install and maintain the solar systems as outlined in the agreement between Co-op Power and Accord Power and its amendment, which incorporated the requirements contained in this test plan.
2. Set smart inverters to the settings outlined in Appendix item two, the spreadsheet, for each NYCHA housing development address.
3. Set up pyranometers, with a minimum of 1, at each of the three campuses outlined in Appendix item two to ensure the appropriate coverage of solar irradiance per campus.
4. Con Edison will set up measurement equipment (SCADA systems) at nearby Con Edison grid infrastructure (e.g., manholes) as outlined in Appendix item two.
5. As the Project progresses, new smart inverter settings will need to be set for each New York City Housing Authority (NYCHA) housing development address when appropriate.

TEST POPULATION

1.2 MW of solar will be installed on 40 NYCHA rooftops – 4 rooftops at the Carver housing development (~128,000 Watts DC), 20 at the Glenwood housing development (~691,000 Watts DC), and 16 at the Kingsborough housing development (~413, 000 Watts DC). The system on each roof top will use Solar Edge smart inverters. Carver will have 8 total inverters, Glenwood will have 47 total inverters, and Kingsborough will have 30 total inverters.

Carver Housing Development: 4 building rooftops, 8 inverters total (of these 0 rooftops and 0 inverters are in the close proximity evaluation for Hypothesis #1)

- 2 roof tops will be operating with the CECONY Res setting (4 inverters total)
- 1 roof top will be operating with the IEEE 1547 setting (2 inverters total)
- 1 roof top will have no settings installed (2 inverters total)

Glenwood Housing Development: 20 building rooftops, 47 smart inverters total (of these 11 rooftops and 28 inverters are in the close proximity evaluation for Hypothesis #1)

- 2 roof tops will be operating with the CECONY Res setting (4 inverters total)

- 4 roof tops will be operating with the CECONY 1 setting (9 inverters total)
- 5 roof tops will be operating with the CECONY 2 setting (13 inverters total)
- 5 roof tops will be operating with the CECONY 3 setting (15 inverters total)
- 2 roof tops will be operating with the IEEE 1547 settings (4 inverters total)
- 2 roof tops will have no settings installed (2 inverters total)

Kingsborough Housing Development: 16 building rooftops, 30 total smart inverters (of these 2 rooftops with a total of 4 inverters are in the close proximity evaluation for Hypothesis #1)

- 3 roof tops will be operating with the CECONY Res setting (6 inverters total)
- 2 roof tops will be operating with the CECONY 2 setting (4 inverters total)
- 3 roof tops will be operating with the California setting (5 inverters total)
- 3 roof tops will be operating with the Hawaii setting (5 inverters total)
- 3 roof tops will be operating with the IEEE 1547 setting (6 inverters total)
- 2 roof tops will have no settings installed (4 inverters total)

TEST SET POINTS

Please see Appendix C for detailed description of the eight sets of smart inverter settings that the Community Power project will initially test. The eight settings to be initially applied in this demonstration are:

Preliminary Settings:[14]

1. CECONY RES: Dynamic Volt-VAR set points that have been previously installed at other Con Edison underground network PV residential customers.
2. CECONY 1: Dynamic Volt-VAR set points seeking voltage regulation solution to trigger at about 122 volts to absorb reactive power to reach the 121 volts dead band set point at a faster response rate.
3. CECONY 2: Dynamic Volt-VAR set points seeking voltage regulation solutions to trigger at about 121 volts to absorb reactive power to reach the 120 volts dead band set point at faster response rate.
4. CECONY 3: Dynamic Volt-VAR set points seeking voltage regulation solution to trigger at about 124 volts to absorb reactive power to reach the 120 volts dead band set point at slower response rate.

Industry Standard Settings:[15]

5. Hawaii: Dynamic Volt-VAR set points required by the State of Hawaii Regulatory body for all DERs, including PV.
6. California:[16] Dynamic Volt-VAR set points required by the State of California's Rule 21 Regulatory body for all DERs, including PV.
7. IEEE 1547: Basic Dynamic Volt-VAR set points recommended by the IEEE 1547 standard.

Control Group Settings:[17]

[14] Settings 1-4 have been included as a starting point from which setting improvements can be made.
[15] Setting 5-7 have been included to test current industry best practices and standards set by states where solar is widely pervasive. Learning from these settings will also be incorporated in the setting improvement process.
[16] Initially, smart inverter Volt-Watt function will be activated for those inverters with "California" settings.

8. Manufacturer Default: No smart inverter functionality applies.

TEST PROCESS

The smart inverter portion of this project will be conducted in two parts, Test 1 and Test 2, and each test follows the process outlined below. Con Edison reserved the right to modify the test process below, as appropriate.

Test 1 – BASELINE DEVELOPMENT
Purpose

- To establish a point of comparison for results observed in the field by which beliefs about inverter and voltage behavior can be either confirmed or disproven.
- To understand the cause and magnitude of the undesired "negative effect" or undesired impact at the point of connection (PCC) related to the metrics from Hypothesis #1.
- To observe system reaction to settings outlined in the Test Set Points section of this document

Step 1 Build a base case model of assumptions using computerized modeling software to include:

1. Generating resources (including PV solar, ESS battery, etc., within the electric distribution network)
2. Loads
3. Feeder model (the distribution grid circuit model)
4. Voltage
5. Reactive power criteria
6. Baseline settings

Step 2 Observe and record the field data metrics defined in the Data Requirement section.

Step 3 Compare/contrasting resulting system parameters of different smart inverter settings to better understand the under effects related to different setting parameters.

Step 4 Analyze the gathered data and compare/contrast with model base case assumptions with field results in the following conditions.

a. Maximum power gap between PV generation and building load
b. Clear vs. no cloud cover
c. Clustered inverters (via SCADA systems)

Step 5 Identify revised model base case assumptions derived from the observations above and recommended changes to smart inverter settings 1-7 in the Test Set Points section of this document.

Test 2 - MODEL AND SETTING REFINEMENT
Purpose

[17] Setting 8 has been included to provide a point of comparison for preliminary, industry standard settings, and all field observations.

- To find improvements to inverter setting from Test 1 and reduce PV generation degradations or improve grid operations, if possible.
- To refine the model assumptions from Test 1.

Step 1 Complete optimization of settings through iterative "tuning." Iterate to determine the best combination of individual variables and settings for optimum inverter performance. This can involve up to 4 modifications of settings per smart inverter. The schedule of smart inverter setting modification will be developed in coordination of Solar One, Co-op Power, Accord Power, and Con Edison prior to the Q1 2021 test start date for this project.

Step 2 Observe and record the field data metrics defined in the Data Requirement section under the new inverter settings.

Step 3 Test model assumption refinements for Test 1 with the new inverter setting. Implement any model refinements as appropriate.

Step 4 Determine the percent improvements from the smart inverter and model assumptions refinements for Hypothesis #2.

Analysis

Below is a list of variable types that will remain constant during data analysis and how data will be clustered during each round of analysis.

Name of Variable	**Analysis Segmentation**
Voltage-VAR Settings	CECONY RES, CECONY 1, CECONY 2, CECONY 3, Hawaii, California, IEEE 1547, and Manufacturer Default (no settings applied)
Volt-Watt	For California Setting (See Volt-Watt Settings tab of Appendix B)
Power gap between PV generation and building load	Ranges: TBD
Cloud Covering	Clear, Partially Cloudy, and Cloudy
Clustered Inverters (via SCADA systems)	Clustered Inverters and Not Clustered Inverters

Test Timeline

Q1 2022 - Q1 2024

ROLES AND RESPONSIBILITIES

1. Con Edison agrees to
    a. Develop all tests related to the three smart inverter hypotheses outlined in the implementation plan
    b. Determine the smart inverter settings in consult with Solar One

c. Perform data management, quality control, and analysis
d. Manage and deliver quarterly reports on test outcomes
a. Develop additional smart inverter settings and testing procedures, as appropriate, from the data analyses
e. Inspect the site of the solar system for compliance with the demonstration test requirements

2. Solar One agrees to
    a. Ensure that Accord Power and Co-op Power perform inverter installation that conforms to test requirements outlined in this document
    b. Acquire, aggregate, and provide Con Edison with the required data listed above
    c. Ensure that communications software required to capture the data listed above is purchased and installed
    d. Test all data acquisition and reporting processes with Con Edison as needed
    e. Provide the necessary data security
    g. Set smart inverter settings according to specification provided by Con Edison as needed
    h. Ensure that Co-op Power and Accord Power purchase and install the smart inverters and maintain the solar systems in a manner that allows Con Edison to execute the test desired and to obtain the data needed
    i. Facilitate the amendment of the agreement between Co-op Power and Accord Power for the purchase of non-scoped equipment and any additional labor as outlined in the Equipment section of this document

<u>REPORTING REQUIREMENTS</u>

1. Quarterly report (to be written by Con Edison)
    a. Summary of metric results and analysis from different smart inverter settings
    b. Major test-related tasks completed since last quarter, with brief summary
    c. A forecast for next quarter with detail regarding expected changes to the test plan currently in place
    d. A summary of issues of concerns/risks
    e. Status of modeling development, as appropriate
        i. Description of the baseline model and changes associated with the tests above:
            a. Initial model vs. actual system performance comparison
            b. Modifications to the model assumption inputs
            c. Revised model vs. actual system performance comparison

2. Annual report (to be written by Con Edison):
    a. Summary of each tested smart inverter setting
        i. Compare and contrast the metrics in the Data Requirement section under the different inverter setting
        ii. General trends of inverter performance
        iii. Any unexpected inverter behavior
    b. Status of modeling development
        i. Description of the baseline model
            a. initial model vs. actual system behavior comparison
            b. Modifications to the model assumption inputs
            c. Revised model vs. actual system behavior comparison

ii. Summary of all finalized model modifications after the iterative refinement process
iii. Final model vs. actual system behavior comparison

Appendix C: Community Smart Inverter Settings Sheet

See Appendix C workbook attached.

Appendix D: Community Power Workforce Evaluation Process

See Appendix D details on following pages.

Community Power Apprenticeship - Candidate Evaluation Process

Process Overview

The purpose of this document is to explain the evaluation process for candidates who apply to the community power apprenticeship program. The evaluation process is broken down into five rounds detailed below and has been designed to find the candidates who are most interested/committed to the training, have a relevant/complimentary background, and who live in the target areas. Candidates will only be considered for the program if they submit a complete application.

After a candidate makes it past the three rounds, GCF will conduct a final evaluation of the applicants (criteria detailed below) and submit their recommendations to Solar1 for a final review and sign off. Upon final decisions being made, GCF will follow-up with each selected candidate to invite them to the first day of orientation, where the program expectations will be reiterated and they will be given a program agreement to sign.

Candidate Basic Eligibility Requirements

All candidates who meet the basic eligibility requirements are encouraged to apply:

- Must be a NYCHA resident
- Open to learning new solar installation and construction skills
- Comfortable with physical labor and working on a rooftop
- Able to lift at least 60 lbs. overhead

Candidates are automatically are disqualified if they are:

- Not a NYCHA resident
- Unable to commit to the full apprenticeship timeline
- Fail to complete all rounds before the recruitment deadline
- Fail to demonstrate an interest/commitment to the training

1st Round – Confirming Interest in Program

To make it past the first round of the application, candidates must:

1. Register for an Info session
2. Attend Info session

Candidates who complete this round have demonstrated that they have more than a passing interest in the program and will be sent the next steps to complete the 2nd round of the process.

2nd Round - Submitting Complete Application

To make it past the second round of the application, candidates must:

- **Submit Online Application** – Explains the applicant's background and why they are interested
- **Send Resume** – Gives insight into the applicant's work experience and career interests
- **Submit Math Assessment** – Gives insight as to the applicant's math proficiency and their ability to follow-through on an assignment while also preparing them for some of the material the class will cover.

All applicants who complete this round will be eligible for interviews unless their application indicates that they are not a NYCHA resident or unable/unwilling to commit to the full program.

3rd Round – Candidate Interview

To make it past the third round candidates must participate in an interview with a GCF staff member. Interviews will evaluate candidates on the following criteria:

- Career Motivation
- Self-Awareness
- Critical Thinking
- Technical Skills
- Social Skills
- Problem Solving
- Curiosity/Interest

After the interview the candidate will be given a score of 1 – 5 in each of the areas described above, using the rubric below:

1 - Unsatisfactory	2 - Below Average	3 - Average	4 - Above Average	5 - Exceptional

Candidates who have an average a 3 or higher will be given a final evaluation.

4th Round - Final Evaluation

Applicants who make it to the 3rd round will be given a final evaluation by GCF that will take into account the person's complete application, interview, and responsiveness throughout the recruitment process. The final evaluation will be conducted based on the following criteria:

1. **Level Interest** - Have they demonstrated a strong level interest/commitment to the full program, both the online training & field apprenticeship?
2. **Background** - Do they have a relevant/complimentary background that demonstrates that they will be successful in the training & field apprenticeship?
3. **Target Area** - Do they live in one of the developments?

Once GCF has evaluated the candidates, they will share the list with Solar1.

5th Round - Final Selections

All candidates who make it past the 4th round will be shared with Solar1. Solar1 will then review their full application to make final decisions and share with GCF.

Interview Rubric

GREEN CITY FORCE

Interviewer's Name					
Candidate's Name					
Scale	**1 - Unsatisfactory**	**2 - Below Average**	**3 - Average**	**4 - Above Average**	**5 - Exceptional**

Factors	Sample Question	Score	Notes
Career Motivation	Why are you interested in this training? In solar jobs? How would a job as a solar installer connect to your long term career interests?		
Self-Awareness	What makes you a good candidate for this training? What past job or training experiences do you have that relate?		
Critical Thinking	Tell me about a long term commitment you've made. How did you achieve your goal and follow through?		
Technical Skills	Solar work is often physically demanding, involving moving equipment, working in all weather, and focusing on technical details. Can you give me an example of when you worked in a similar		
Social Skills	Solar, and the construction industry in general, tend to provide very direct feedback to employees. Tell me about a position where you received direct feedback. What did you do? How		
Problem Solving	What is a difficult situation you've overcome in your professional career?		
Curiousity/Interest	Do you have any questions?		

Average Score				Identify areas for growth.
Eligibility	Verification of eligibility - NYCHA tenancy; Resume; Availability for timeframe of training/apprenticeship; ability to work in/around Carver, Glenwood, & Kingsborough Houses			Any barriers?