REV Demonstration Project Outline

Clean Virtual Power Plant

Dated: July 1, 2015

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1.0 EXECUTIVE SUMMARY

More New Yorkers installed solar panels on the roof of their homes in 2014 than all previous years combined, and the trend is accelerating due to the incentives in place to install this low carbon footprint technology. There are benefits broadly to the population from the improved air quality, reduction in greenhouse gases and ability to generate energy closer to load, but these distributed solar systems' peak generation hours do not coincide with Con Edison's peak load hours, which typically occur after 5 PM. This means high carbon peaking turbines are still dispatched at night, limiting the total environmental gains solar could be providing. It also means the transmission and distribution systems do not benefit from the local generation because they must be built to supply the peak load. In addition, what has yet to be factored in is the potential for additional costs of voltage regulation in areas of very high solar adoption, as are already seen in areas such as Hawaii and Germany.

This REV demonstration project is designed to demonstrate how aggregated fleets of solar plus storage assets in hundreds of homes can collectively provide network benefits to the grid, resiliency services to customers, monetization value to Consolidated Edison Company of New York, Inc. ("Con Edison"), and results that will help inform rate design and development of distribution-level markets.

Aggregation of Distributed Solar Plus Storage into Virtual Power Plant

For the limited purposes of the proof of concept being tested in this demonstration project, Con Edison will partner with SunPower and Sunverge to integrate residential behind-the-meter storage resources into the grid. The SunPower / Sunverge platform provides aggregated control of individual residential resources, converting them into a "virtual power plant" (VPP), resulting in grid-scale impact and benefits to Con Edison and all its customers. The VPP will have a total capacity of 1.8 MW and an aggregated energy output of 4 MWh. The concept being tested is that the Virtual Power Plant would act as a controllable power generation source that can be optimized to provide distribution and transmission level benefits as markets evolve.

Resiliency Value

An integrated solar plus battery system provides customers with resiliency services in the event of a momentary or sustained utility outage. When a grid outage occurs, the integrated system will provide the customers participating in this demonstration continued power to critical components in their home automatically. This solution offers a simpler, cleaner alternative to the gasoline backup generators available in the market today. Among other concepts being tested, this demonstration project will examine customers' willingness to pay for resiliency services.

Network Value

Batteries installed with solar systems (photovoltaic or 'PV' plus storage) can mitigate intermittency and the peaking nature of an as available resource. For example, PV plus storage can be configured to smooth intermittency by charging the battery so that there is only a constant power output when a cloud passes by ("firm" solar output), and so that the system stores all of the energy produced during the day for a constant output at night ("shift" solar output). Together, solar energy and battery storage can be a reliable, dispatchable resource that can be deployed to help reduce load in a constrained area and has the potential to defer or avoid capital investments transmission and distribution ("T&D") deferral. The green energy produced during the day can also provide an alternative to other generation sources in the evening. Voltage fluctuations from partly cloudy days can also be eliminated are eliminated.

Market Mechanisms for Monetization Value

In this project, Con Edison will explore how hundreds of residential distributed energy resources ("DER") can be aggregated into grid operations to provide firm capacity for participation and monetization in competitive capacity and energy markets, e.g., New York Independent System Operator ("NYISO") wholesale capacity markets and demand response programs). The testing of competitive market mechanisms for the monetization of grid services is also consistent with the development of a distribution system platform ("DSP"). This demonstration provides a platform for evaluating the potential for new revenue streams related to aggregation and operations of aggregated fleets of distributed energy resources. This new grid services revenue stream will make battery installations profitable in the near future, as the price of the technology comes down.

Rate Design

The deployment of customer-sited solar plus storage assets also enables Con Edison to test how different rate designs may be used to incentivize desired customer behavior. Examples include time-of-use (TOU) tariffs that align cost of generating energy to customer bills, residential demand charges encouraging predictable and stable behavior patterns for customers, and other event payments for behind-the-meter energy storage participation in demand response events. The VPP software's capability in creating sub-groupings of assets enables Con Edison to create localized tests of rates.

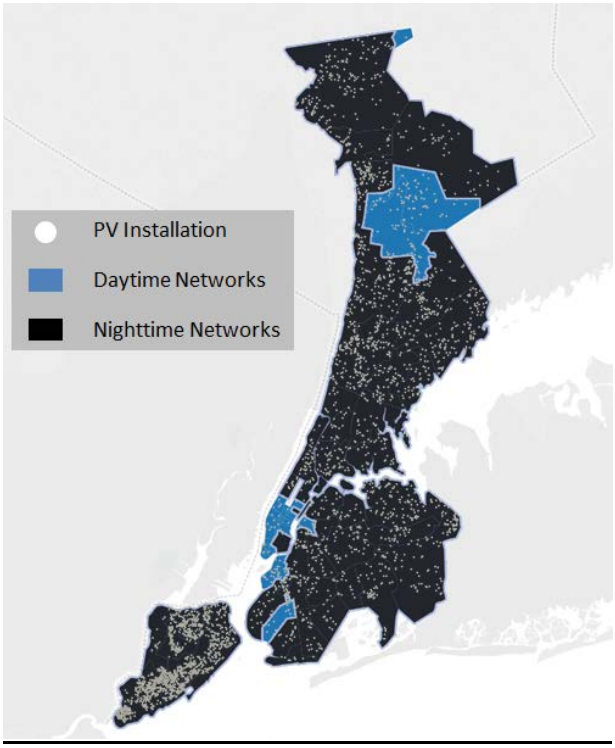
2.0 BUSINESS MODEL OVERVIEW

2.1 PROBLEM

Residential PV systems are being adopted by the Company's customers in increasing numbers. In 2014, over 2,000 customers installed PV systems, more than in all previous years combined. Since the start of 2015, another 1,000 customers installed PV, totaling over 80 MW of clean energy installed on the distribution system today. These numbers will continue to grow and some estimates show customers will add an additional 700-800 MW of solar in the next decade.

While residential PV systems provide important environmental benefits and offer savings to individual customers, power production can be intermittent and only a fraction of the installed capacity is available during periods of high energy use in the late afternoon and evening hours. Figure 1 shows the vast majority of PV installations are in networks that peak after 5PM. The result is a currently non-optimized opportunity to maximize the potential of distributed solar as an asset for the transmission and distribution systems.

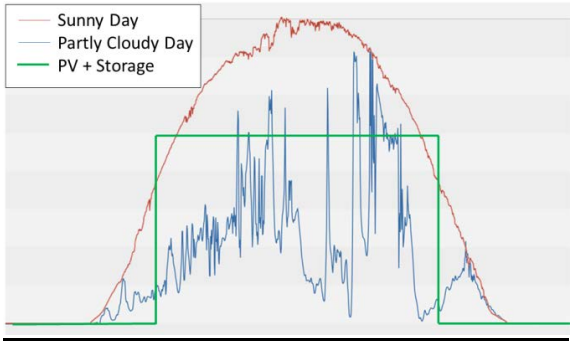
Figure 2-1: Con Edison Solar Installations in Day vs. Night Peaking Networks



The intermittent output of solar energy from grid-connected PV systems can also cause voltage regulation issues in areas of high penetration. The red line in Figure 2 shows a

typical production (kW) from solar on a sunny day; it is relatively smooth with little fluctuations. On cloudy days, the blue line is more typical, with power output swinging rapidly as clouds pass overhead. The grid must respond equally as rapid to fill in for the lost local production. Firmed solar (the green line) manages load fluctuations, mitigating system impact.

Figure 2-2: The Intermittence of PV output on Cloudy Days



In addition, utilities spend millions of dollars on grid infrastructure upgrades to ensure safe and reliable transmission of electricity to the homes of its customers. Solar PV systems act as unexpected sources of generation that are not controllable by the utility. There is no mechanism today that allows utilities to adapt their transmission and distribution planning and infrastructure investments to account for intermittent generation of energy near the customer load. An integrated solar and battery storage solution would allow for integration of that generation resource into the utility's planning and operations because its characteristics will make it controllable and reliable, i.e., it will be a firm power source.

In addition, recent severe weather events have heightened customers' interest in resiliency and their desire to utilize their solar system to provide backup power in those rare instances when the grid is not available to power their home. Currently, there are few options available to customers to prepare for these instances. Customers typically address this concern by purchasing fossil fuel-powered backup generators. While backup generators are effective means of providing power to the home during outages, they add noise pollution and carbon emissions to the environment and installation and setup is inconvenient, expensive and time-consuming. In addition, they require a constant fuel supply, which may be limited during natural weather events. An integrated solar and storage product provides a safe, clean and resilient solution for those periods when the grid may not be available to support customer energy needs. However, even as battery costs have trended downwards, the upfront installed cost of energy storage systems still prohibits wide-scale adoption.

2.2 SOLUTION

Pairing solar with energy storage has the potential to address the concerns raised above. For utilities, storage can smooth intermittency of solar and be used to dispatch energy at times when customers need it most. For the residential customer, solar plus storage provides access to a clean alternative to backup generators and that can also be dispatched to respond to price signals from the utility. The aggregation of a fleet of residential systems into a virtual power plant provides opportunities to both deliver resiliency services to homeowners, as well as additional distribution and transmission level value to Con Edison and the grid network.

In this demonstration project, Con Edison will partner with SunPower and Sunverge to offer a cost-effective solar and energy storage solution to customers and develop an advanced control platform to aggregate the distributed systems into a single, dispatchable capacity and energy resource. The platform will give Con Edison the ability to dispatch the assets and evaluate opportunities in existing and future competitive markets at the DSP and NYISO.

Key elements of the project include:

- SunPower, in partnership with Sunverge, will provide a platform that aggregates control of individual residential resources into a virtual power plant. Total aggregated VPP size will be 1.8 MW inverter capacity, and 4.0 MWh of stored energy capacity.
- Con Edison will purchase, own and control the fleet of energy storage assets during the duration of this Demonstration Project. Con Edison and SunPower are designing a mechanism through which Con Edison can designate a finite time period for its ownership and control of the energy storage assets after the completion of this demonstration project.
- Con Edison, along with SunPower, will offer residential customers an energy storage offering. This energy storage product will be presented to the customer by SunPower and SunPower's installation partners as an integrated solar and storage offering.
- SunPower will deploy an advanced end-to-end customer engagement process using sophisticated customer targeting and acquisition strategies.
- The customer offering would consist of the following elements
    - A solar system that would be financed or purchased by the customer in the same way as they would under a normal solar-only scenario,
    - An energy storage system that would be a Con Edison-owned asset , and
    - A monthly resiliency payment that the customer would pay to SunPower for the resiliency services that are offered by the integrated solar and energy storage system.

- An integrated solar and storage product will be installed at customer locations. Projects will be sized to customer loads at single-family residences.

Con Edison has designed a three-phase approach to the demonstration project.

Phase I: Customer Adoption of Resiliency Services

In Phase 1, Con Edison will partner with SunPower to present a fully packaged solar plus storage solution to residential customers. The customer offer can be SunPower-branded or co-branded with Con Edison-. SunPower will solicit residential customers in single family homes to sign up for a solar plus storage system. With no up-front cost to the customer, the provider will install the solar panels and battery system with inverter and other balance of system components. The solar system will be sized according to each prospective customer's profile and may vary by site.

In the customer economic model, i) the solar equipment and installation will be financed via a 20-year third-party provided lease product at no expected upfront cost to the homeowner, while ii) the storage equipment and installation will be purchased by Con Edison. Over the term of the customer contract, the customer would:

i) receive the benefits of solar generation and resiliency services without increasing their electric bill,
ii) make monthly lease payments over 20 years to the third party equity special purpose vehicle (SPV) for the SPV-owned solar system, and
iii) make monthly payments to Con Edison or SunPower for the resiliency services provided by the Con Edison-owned storage system.

To test the customer's willingness to pay for resiliency services, SunPower will use the results of customer segmentation analyses to create personalized solar proposals for prospective customers, including a presentation of i) how much money that household would be estimated to save by having only solar PV installed, ii) how much the customer would be charged for resiliency services provided by an energy storage appliance, and iii) how much money that household would be estimated to save after having solar PV plus storage installed. To test customer reception to different formulations of paying for resiliency services, SunPower plans to test three pricing frameworks: i) resiliency payment as a percentage of expected solar savings, ii) resiliency payment as a percentage of current electric utility bill, and iii) resiliency payment as a dollar value. Because different customers exhibit different profiles (e.g., level of existing load consumption, level of expected savings from solar), this methodology would provide Con Edison with findings on how to position resiliency payments to different types of customers, and what monetary values are ascribed to resiliency services by customers.

Con Edison and SunPower will work to determine a mutually agreeable way to operationalize the resiliency payments from the customer. The customers' total monthly

solar plus storage energy bill will be either equivalent to or less than current bills, while they gain the benefit of solar power and enhanced reliability.

SunPower is expected to install 1.8MW of aggregated storage inverter power capacity, with an estimated 4.0MWh of energy storage aggregated utilizing residential customers. The homes will have a solar array connected with the battery system.

Phase II: Virtual Power Plant Integration into Con Edison Operations

Part of the customer installation process is the establishment of communications from the provider's Network Operations Center (NOC) to each customer's energy storage system. In this way, performance metrics of each individual system will be captured from the day it is placed in service. Phase II will establish communications (data transfer and VPP control) between Con Edison's systems and the SunPower / Sunverge platform's NOC. The timing of this phase is in sync with Con Edison's existing SCADA system upgrade, which must be completed prior to beginning work with the vendor. Once this link is established, the VPP can be operated to meet system needs, and performance can be tested to assess risk of entering capacity and energy markets. Con Edison will determine how assets in the VPP will be controlled (e.g. set priorities and business rules). SunPower, in conjunction with Sunverge, can either operate the VPP fleet for Con Edison, or provide Con Edison with active operational control.

In Phase II, Con Edison will also conduct shadow bill analysis to inform rate design for residential DER. The SunPower / Sunverge platform has been deployed in utility projects to assess and test rate design. For example, the 2500 R Midtown housing development project in the Sacramento Municipal Utility District's service territory incorporated the following two rate structure use cases:

i. Demand response for a critical peak pricing structure, where solar and battery power was dispatched during high price demand response events, and
ii. Peak load reduction for a time-of-use rate structure, where solar and battery power was dispatched during utility peak load periods during which consumers are subject to TOU rates.

Con Edison can use the asset base of DER resources to test how integrated solar and storage systems can help shape customer economics under different time-of-use or critical peak price rate structures.

Phase III: Market Participation

In Phase III, Con Edison expects to test the role of these VPP assets in the wholesale and/or distribution markets. Whether it be a Con Edison-NYISO transaction or one that involves an early version of the DSP, the Company expects to leverage the demonstration project to help understand the regulatory and market requirements to monetize distributed assets.

Also at this stage, Con Edison may expand the VPP to include more assets procured by the selected provider for phase 1 and 2 or to open up involvement to additional third parties to acquire qualified residential customers for solar plus storage, or storage alone. Expansion may not be necessary if alternative rules are developed or if the DSP is in place and creates complementary markets to link VPP assets to wholesale markets without direct integration with NYISO.

2.3 K EING TESTED

Phase I: Customer Adoption of Resiliency Services

- Customers are willing to pay for resiliency
  - Measurability: customer participation in the pilot
- Customers will value resiliency differently
  - Measurability: SunPower to share learnings with Con Edison through pilot reporting
- Customers respond differently to sales and marketing approaches
  - Measurability: SunPower to share channel and sales learnings with Con Edison throughout Demonstration Project planning and execution

Phase II: VPP Integration into Con Edison Operations

- Residential solar/storage can be aggregated to create a Virtual Power Plant
  - Measurability: successful control of VPP by Con Edison via manual and/or automated battery dispatch algorithms, energy storage system reliability and performance metrics
- New rate designs can incentivize customers with integrated solar/storage systems to optimize their load profile to provide distribution-level benefitsc
  - Measurability: results of rate design shadow modelling (e.g., time-of-use tariff, critical peak pricing for a pre-determined number of events per year, demand response pricing for events called upon by Con Edison, etc.)

Phase III: Market Participation

- VPPs can be integrated into DSP and NYISO markets
  - Measurability: test market participation requirements against VPP's actual operational data, evaluate payment considerations
- VPPs can be provide grid services as markets are developed and integrated?
  - Measurability: informed frameworks for market design

2.4 LINKAGES TO DEMO PRINCIPLES

Principle	*Proposed Measures*
1. **Partnership between utility and third party service provider; goal of third party capital contribution**	✓ Con Edison with partner with SunPower and its existing strategic partnership with Sunverge, leading battery storage technology provider ✓ The solar portion of the integrated solar and storage system will leverage third party financing via a special purpose vehicle designed for residential solar lease products
2. **Utility identify problems and market should respond with solutions**	✓ Provider to develop solar and storage system to address impact of untargeted DER penetration
3. **Clear delineation of how generated economic value is divided between the customer, utility, and third party service provider; proposal for how much capital expense should go into the rate-base versus competitive markets**	Con Edison expects its costs for this demonstration to be recovered through the Monthly Adjustment Clause (MAC). Revenues from third party service providers, lenders, and customers that participate in the demonstration will be credited to ratepayers. The Company may propose incentive mechanisms as the Demonstration Project develops. ✓ The proposed solution would create the following streams of economic value: 1) bill management for residential customers under the integrated solar and storage offering, 2) potential revenue streams from energy and capacity market participation to Con Edison, 3) potential avoided costs of transmission & distribution infrastructure build out by Con Edison, and 4) demo project payments to third party service providers
4. **Market for grid services should be competitive**	✓ The Demonstration Project provides a platform to inform the development of future markets for behind-the-meter resources' competitive participation in grid services and may show: 1) how should the customer offer should be structured, 2)

	how the DSP should control and operate the VPP, 3) how rate design could influence competitive market participation and customer behavior, and 4) other considerations for the development of competitive markets for DER integration into grid services.
5. **Propose rules that will help create subsequently competitive markets; establish regulatory proposals to ensure safety, reliability and consumer protection. [Service providers can retain intellectual property that results from base data that would be available to others. CASE 14-M-0101 -2-]**	✓ Demo will inform regulatory and market framework with the data and experiences obtained from operating assets in the field
6. **Inform pricing and rate design modifications and include opportunities for third parties to demonstrate how various rate design can be used to benefit consumers, encourage customer participation, and achieve REV's efficiency and bill management objectives.**	✓ Demo will test customer receptivity to different forms of resiliency services payment ✓ Demo will inform rate design through shadow billing analyses
7. **Utility and third party service provider(s) should consider deploying in their demonstrations advanced distribution systems, including two way communications, real time operation of dynamic load, and other system technologies that support awareness, flexibility, efficiency and cost-effectiveness.**	✓ The proposed technology platform provides advanced control of the fleet of behind-the-meter energy storage assets. The VPP software's capability in creating sub-groupings of assets enables Con Edison to create localized dispatch strategies according to the hypotheses tested. ✓ Web application and API for monitoring and control of distributed energy resources as a VPP will be provided via secure two-way communication protocols.
8. **Utilities should explore opportunities in their demonstrations to work with and include various residential, commercial, institutional and industrial customer participants.**	✓ SunPower will utilize advanced analytics to target residential customers at program onset

3.0 MARKET ATTRACTIVENESS

3.1 UNIQUE VALUE PROPOSITION

3.1.1 PARTICIPATING CUSTOMER

The integrated solar + storage solution provides value to customers on three dimensions:

1. No upfront cost to customers for integrated system

   Participating customers will have no upfront cost for the integrated system that provides clean energy and backup power. SunPower will structure the customer offering with the following components: i) the bill savings that customers would otherwise achieve through the solar-only offering, and ii) the payment customers to receive the resiliency services provided by the energy storage system. SunPower will structure the customer offering such that the customer's expected energy bill under solar plus storage (i.e., utility bill + solar lease payments for solar generation + payment for resiliency services) is less than or equal to their existing monthly utility bill.

2. Backup generation

   The rintegrated system provides customers with a cleaner, cheaper, and simpler alternative for backup generation, giving the customer the peace of mind that critical loads at their homes will be powered during times when the grid is down. These resiliency services will be made available to the customer as part of the offering by SunPower. ice

3. Customer insights into production and usage

   SunPower's customer portal provides customers with energy information services that enhance customer engagement. These services include insights into how energy is consumed in their homes, as well as recommendations for how energy consumption could be controlled.

3.1.2 PARTNER/THIRD PARTY

Con Edison will partner with SunPower and Sunverge for the purposes of this demonstration project. SunPower Corporation is one of the oldest, largest and most experienced solar technology providers worldwide, with a history of delivering high-efficiency solar cells and solar panels, which are unmatched in long-term reliability and guaranteed performance. SunPower is a publicly-traded company on NASDAQ (SPWR), with revenues of $3.0 billion in 2014. Its U.S. residential channel partners total over 470. SunPower has raised over $1.5 billion of funds for residential leasing programs, and more

than 20,000 residential leases have been sold through the SunPower dealer network. SunPower will work with local New York State based channel partners, dealers, and installation partners to execute this project.

Sunverge is the market leader in the residential storage-enabled virtual power plant market, with over 4MWh of distributed storage resources under management. SunPower has partnered with Sunverge for exclusive supply of Sunverge products for utility and residential Demonstration Project programs in the U.S.

SunPower will act as principal engineering, procurement and construction contractor for this demonstration project, and will provide customer acquisition, site inspection, design, installation and commissioning services. SunPower installs thousands of residential solar systems per month, and the integrated PV and storage solution proposed here has been deployed elsewhere in the U.S., as well as internationally in Australia and New Zealand. SunPower and Sunverge's combined experiences and the dedicated resources that will be allocated to this demonstration project will ensure streamlined approaches to both the interconnection challenges, and the technical requirements for system interconnection. During the project, SunPower and Sunverge will work together to provide the customer with an integrated customer service experience.

Con Edison is partnering with SunPower and Sunverge in this demonstration project in order to test the business model. Once the business model is proven, this platform concept will be opened to other third party solar and storage providers.

3.1.3 UTILITY

The value proposition of this demonstration to Con Edison is most easily understood as an opportunity to establish a central role for the utility in the coordination of distributed energy resources in order to integrate and dispatch those resources to create benefits for the grid, to improve value for customers, and to generate commercial revenues will create value for customers and shareholders.

1. **Test Value of Resiliency Services to Customers**

   How would a service provider market resiliency services to customers, and how much are customers willing to pay for resiliency services?

2. **Demonstrate VPP Aggregation**

   The SunPower / Sunverge technology platform enables Con Edison to demonstrate that hundreds of residential distributed energy resources can be aggregated into grid operations by providing Con Edison with advanced control of the fleet of behind-the-meter energy storage assets. The solar and energy storage technologies, in aggregate, would provide firm capacity for participation in competitive markets for grid services. By entering the market today and building out a capability to integrate, optimize, and dispatch distributed resources, Con Edison will be positioned as a

strong player in ensuring a highly efficient distribution grid as well as monetizing the full value of DER.

3. **Inform Market Mechanisms: Monetization by Con Edison and Grid Value for all Customers**

   Con Edison will be able to test how grid services provided by residential-sited resources could be monetized in competitive markets. These systems will provide a testing ground for a DSP to bring the energy market payments needed to incentivize storage for solar production in thousands of homes, benefiting all customers. These payments could come directly from the NYISO wholesale market, or a distribution program similar to demand response, or both. The VPP software's capability in creating sub-groupings of assets enables Con Edison to create localized tests of rates and other mechanisms. These grid services include firm network capacity for demand response events and wholesale market participation. This would also inform how Con Edison would be able to charge a fee as the provider of the DSP.

4. **Inform Rate Design: Enhanced Customer Motivators**

   Through shadow modeling of pricing levers, Con Edison could test how dynamic pricing might be used to incentivize desired customer behavior. Examples include TOU tariffs for the energy generated by the PV system, demand charges for the capacity of the battery system, and event payments for behind-the-meter energy storage participation in demand response events.

5. **Inform DER Ability to Deliver Avoided Costs**

   With operational data and learnings collected from this demo, Con Edison will assess the types of firm load relief that concentrated installations of integrated solar and storage resources can provide. This would inform valuation of such DER assets for transmission & distribution investment deferrals.

The three-phase approach described in section 2.3, with milestones required to proceed to the next phase, was designed to achieve the above goals in a structured and targeted way.

3.1.4 SYSTEM

A properly incentivized solar plus storage solution will lead to reliable capacity at the distribution level. As solar penetration becomes more prevalent in the Con Edison service territory, batteries will address any voltage fluctuations that may be caused by grid connected solar without storage, eliminating the potential need for additional regulation devices in very high solar penetration cases. It will also provide a reliable, local source of energy to meet peak network demand that has the potential to provide transmission and distribution capital investment deferral that will benefit all customers.

3.2 CUSTOMER SEGMENTATION

The demonstration project will focus on single family homes. SunPower will work with existing partners to run advanced analytics to target the highest-value program customers by pre-defined characteristics.

3.3 CHANNELS

SunPower delivers its residential business through both direct and indirect channels. SunPower has established energy storage trainings to equip channel partners with the support needed to successfully sell, design and install integrated solar and storage systems.

SunPower and the Company's channel partners' contact methods to prospective customers include:

- Online advertising
- Direct mail
- Cold call
- Localized media outreach and interviews
- Retail partnerships
- Customer referral platform
- Phone consultation
- In-house kitchen counter consultation
- Project information booths at farmers markets and regional fairs

Through the Company's advanced customer segmentation process, SunPower will work with the Company's channel partners to craft a successful customer acquisition strategy that is tailored to the community in question.

3.4 ABILITY TO SCALE

Connection with SunPower's NOC is the first step as a DSP for Con Edison. After market participation is demonstrated through this single aggregation point, and this demonstration deemed to be successful, Con Edison may open the program to other third party vendors. Connections to other aggregators will be established, establishing a central control point for all on the Distribution System Platform. Single participants (home owners that buy the equipment and want benefit from market participation) will also be incorporated.

4.0 DEMONSTRATION PLAN

4.1 METRICS FOR SUCCESS

Customer Adoption Metrics for Phase 1

In Phase 1, we will measure success by SunPower's ability to deliver 4.0 MWh of aggregated behind-the-meter energy storage capacity by the expected completion date. Table 4-1 lists keys metrics that SunPower will use to track progress throughout the REV Demonstration Project implementation process. During the customer acquisition period, SunPower will provide Con Edison with monthly updates on key metrics such as these. The specific types of data that will be tracked and shared will be finalized subject to further discussions with Con Edison to ensure conformance with confidentiality and privacy concerns.

Table 4-1. Key Customer Adoption Metrics for Demonstration Project Phase I

Key Metrics Measured	**Definition / Methodology**
Lead generation	- Number of customer leads generated
Lead-to-REV Demonstration Project-Customer %	- Number of prospective customer leads approached - Number of customers who signed up for REV Demonstration Project (solar + storage)
Installation Progress	- Number of installations completed - Number of installations interconnected - Number of installations commissioned
REV Demonstration Project Participant Characteristics	Compilation of the following data points for non-converted leads, leads converted to PV customer, and leads converted to REV Demonstration Project customer: - Customer monthly utility bill - Dollar value of estimated monthly year 1 PV-only savings - Year 1 PV-only savings as % of monthly utility

	bill - PV system size - Dollar value of resiliency services customer signed up for - Value of resiliency services as % of monthly utility bill - Zip code / region

System Integration Metrics for Phase II

The demonstration project will provide Con Edison with sufficient proof that residential solar and storage systems can be efficiently integrated into the operation of the distribution grid and dispatched via a DSP platform acting as intermediary to, or on behalf of, the ISO. To demonstrate this, the demo will test the virtual power plant's ability to accept signals from the ISO and optimize the performance of the fleet of solar and storage assets in response.

The results will be tracked and measured according to parameters, such as those listed below. Results can be reported and analyzed for individual systems, groups of systems, and for the entire fleet of assets. SunPower and Sunverge will work with Con Edison at program onset to agree to the appropriate structure and scope of such reporting.

- Ability to consistently receive and respond to dispatch signals
- Accuracy of response
- Speed of response
- Latency of communications
- System uptime

Dispatch Performance Metrics for Phase II

The demonstration will provide Con Edison with performance data on how distributed energy storage can, through aggregation, be used to satisfy distribution and transmission network demands, regardless of the small scale nature of each discrete component. The project will demonstrate the virtual power plant's ability to provide firm capacity services to the network by orchestrating distributed integrated solar and storage resources.

The results will be tracked and measured according to the following parameters. Results can be reported and analyzed for individual systems, groups of systems, and for the entire fleet of assets. Data can be reported at a granular level of detail, down to intervals of

seconds. SunPower and Sunverge will work with Con Edison at program onset to agree to the appropriate structure and scope of such reporting.

- Capacity (power or energy) requested
- Total capacity (power and energy) dispatched by the Virtual Power Plant
    - Percent of dispatched capacity provided by solar
    - Percent of dispatched capacity provided from battery storage
    - Total capacity (power and energy) exported to the utility grid
    - Total capacity (power and energy) provided to local loads
- Actual performance versus modeled performance
- Actual performance of distributed solar with battery storage compared to solar-only
- Total solar power and energy generated
- Total power and energy consumed by local loads
- Total energy stored in battery

4.2 TIMELINES, MILESTONES, AND DATA COLLECTION

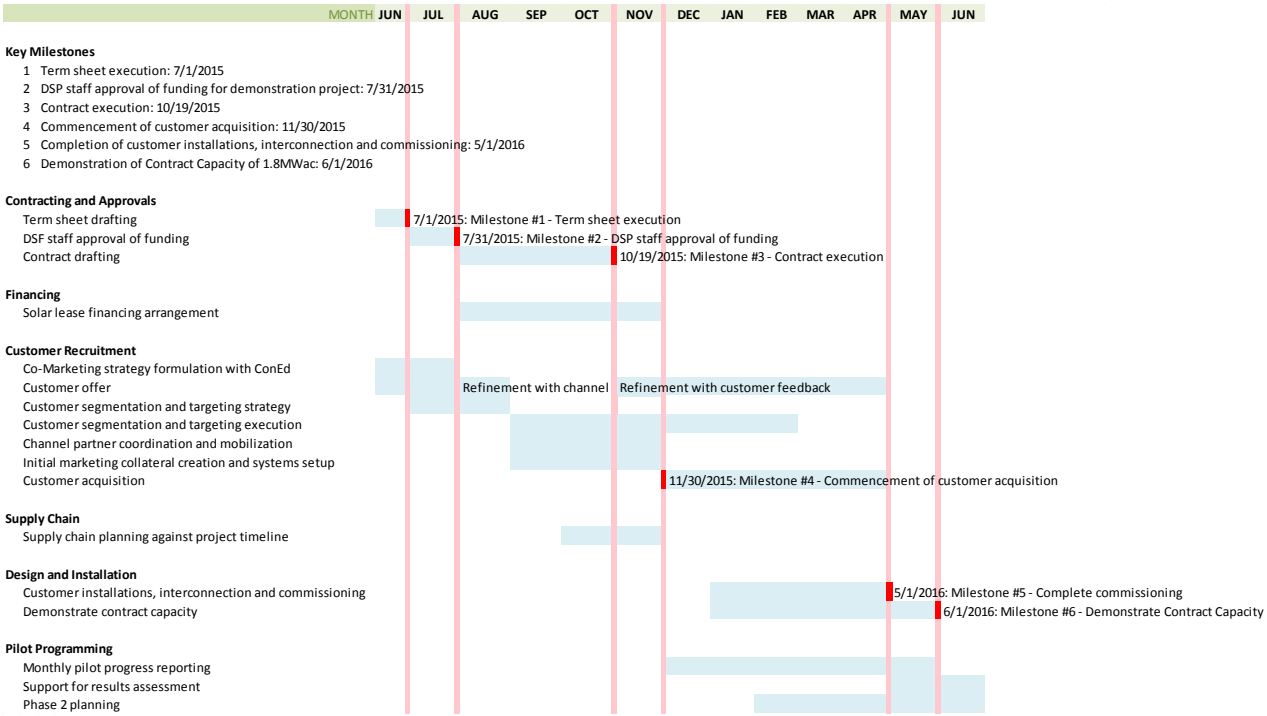
The demo will be deployed over three phases. The first phase will focus on testing the value of resiliency. The second phase will test the technical ability of the VPP to reliably perform. It will also provide a valuable testing ground for various rate structures to incentivize certain customer behavior. The third phase will test actual participation in a capacity and energy market, with possible expansion of the total available capacity and energy of the VPP, with additional installations to meet the minimum requirements to bid into a capacity and energy market.

Table 4-2. PHASED APPROACH

Phase	1 Resiliency	2. VPP	3. Market Participation
Timing	June 2016	June 2017	TBD
Key Elements	Acquisition of residential customers for an integrated solar and storage offer priced at a premium to a solar-only lease	Establishment of communications (data transfer and VPP control) between Con Edison's systems and the provider's NOC. Once this link is established, the VPP can be operated to meet system needs	• Participation in ISO or DSP capacity and ancillary markets
Milestone (Stage Gate to Next Phase)	• **Customers acquired and in contract by June 2016** • **Report of customer willingness to pay for resiliency**	• **VPP can be controlled to create system benefits while still providing customer resilience** • **Clarity around ISO or DSP capacity and energy participation requirements for distributed assets**	

The timeline for phase 1 kicks off in July following meetings with DPS Staff, with the objective of customer installation completion by June of 2016.

Figure 4-3. Implementation Plan



4.3 PARTICIPATION

4.3.1 Target Population and Control Cells

SunPower will use customer segmentation analytics to tailor a targeted sales approach. SunPower will create personalized solar PV and storage proposals for prospective customers, including the following key proposal components:

- Estimates of how much money that household could save by having solar PV installed,
- Presentation of the payment for the resiliency services provided by an energy storage appliance, and
- Estimates of how much money that household could save by having solar PV + storage installed.

The customer offer will be structured as follows:

- No upfront cost for the solar and storage system,
- Monthly lease payment from the customer for the solar installation, and
- Monthly resiliency payment from the customer for first right of access to their onsite battery in the event of an outage.

To test customer's willingness to pay for resiliency, and reception to different ways of selling resiliency services, SunPower will create three test cases with the following characteristics:

Table 4-4. Target Customer Test Blocks

Test Block	Test: Resiliency Payment Value	Test: How to Sell Resiliency Services to Customers
Test Block 1	Resiliency payment presented as a % of savings from the solar system	SunPower has existing sales and marketing tools and messaging for selling energy storage to residential customers. For the REV demo, SunPower will provide to Con Edison information on lessons learned during sales activities.
Test Block 2	Resiliency payment presented as a % of total existing Con Edison bill	
Test Block 3	Resiliency payment presented as a fixed monetary payment	

Throughout the demo, SunPower will work actively with the Company's channel partners to collect data on customer reception to the integrated solar and storage offering presented in the different test blocks, and refine the customer offering to ensure successful customer adoption. Key marketing metrics are outlined in Table 4-1. SunPower will work with Con Edison to finalize the metrics shared during reporting, subject to conformance with privacy and confidentiality considerations.

4.3.2 Third Party Partners

Con Edison expects to partner with SunPower and Sunverge who have been executing together on integrated system deployments since late 2013. SunPower will provide project financing, engineering, procurement, and construction services under this proposal. Sunverge maintains a strong supply chain and incorporates only off-the-shelf components into the system. Given a reasonable forward looking forecast, factory ramp up will meet the demand from this proposal. Through SunPower's customer portal, customers will achieve enhanced insights, choice, and control over their energy consumption, achieving the REV principle of creating novel ways to engage with and motivate customers.

4.3.3 Utility Resources and Capabilities

Con Edison will assign one dedicated project manager to this demonstration project who will be responsible for managing partners as well as ensuring the right utility resources, from engineering to PR, contribute to the demo when needed.

In particular Con Edison engineering resources will be critical for the integration of the SunPower network operations center (NOC) with Con Edison distribution management systems. This integration will be critical in order to deploy the communication and control platform necessary to operate the resources in the VPP.

Con Edison will also develop visualization and communication solutions to provide real-time operational visibility to the energy control centers at Con Edison and at the NYISO.

We also expect to deploy our rate engineering and energy efficiency teams to work as part of the demonstration project to develop new residential rate structures to be tested as part of the demo. In order to recruit customers to participate in the Demonstration Project rate structures and ensure appropriate tracking and analysis we will likely need to deploy shadow billing or other systems to be supported by our information technology team.

Our Public Affairs and marketing teams will also be integral to overall customer outreach, customer education, and customer acquisition.

4.4 OUTREACH TO TARGETED COMMUNITIES

We intend to provide outreach in a four step process:

1. Create **awareness** of the program as a new idea in customer service from a utility that they know and trust. As a broad-reaching strategy, this will serve to educate both targeted and non-targeted customers.
2. Generate **interest** in the program based on direct benefits to the customer.

3. Drive **desire** to participate in the program for all customers by describing success stories.
4. Facilitate **action** to participate with follow up customer service and resource information.

There are two potential, independent metrics for this outreach:

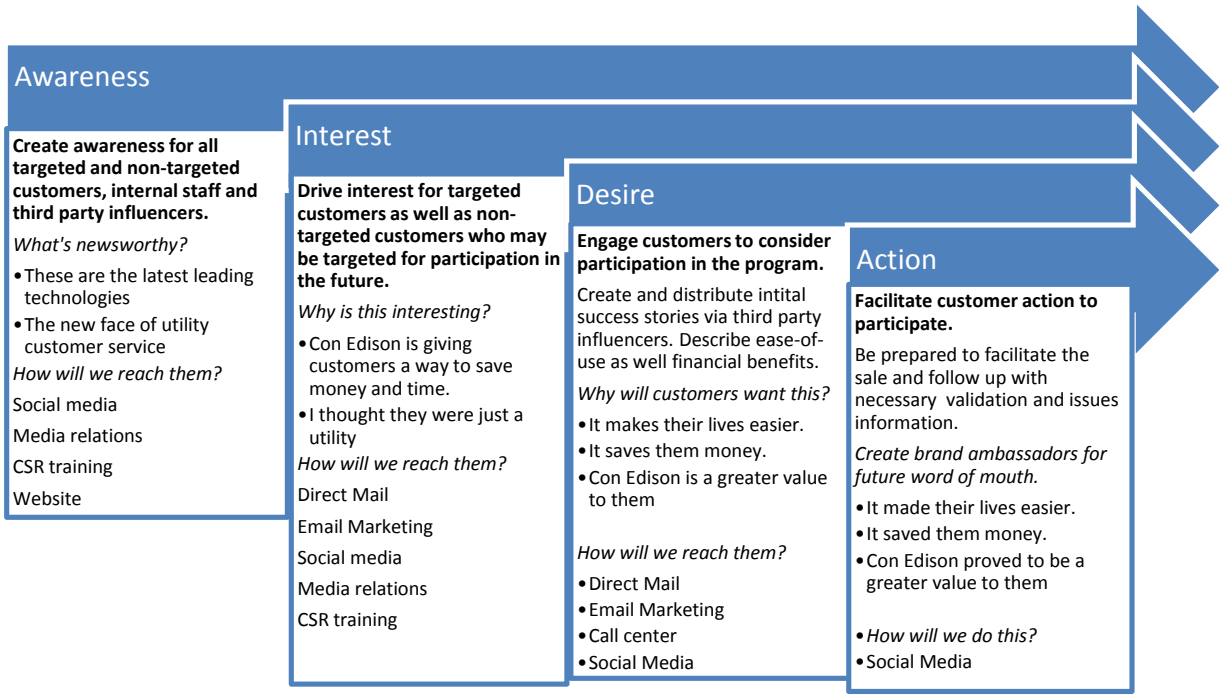
1. Program participation by customers who are directly contacted.
2. Clear and effective message management for those customers who are not part of the targeted group. We will need to mitigate confusion and feelings of exclusion by customers who have not yet been targeted.

Message Strategy

The key messages for this program will include:

- This is a legitimate Con Edison program.
- Con Edison is a leader in customer focus.
- This program combines technology with customer service to benefit individual customers participating in the program and all customers by optimizing system benefits.

Figure 4-2. Outreach Process



The primary audience for this program is targeted customers as designated by the data analysis. These and additional audiences to consider are noted below with potential messages, channel tactics and communication objective

Table 4-5. Strategy by Target Segment

Audiences	Message	Channel Tactics	Objective/Value
Targeted Customers	Con Edison is helping you to save energy and money and providing clean source of backup power.	Direct Mail Email Bill Inserts	Engage customers in offer clean, simple, cheaper alternative to backup generators.
Non-targeted Customers	Con Edison is on the leading edge of customer service and innovation by deploying battery storage technology to maximize the benefits solar energy can provide to customers.	Website Social Media Collateral	Create and nurture interest in the DER program so that if and when the program is expanded, non-targeted customers are solicited, they will be primed for the message and interested in participating
Media	Con Edison is starting a program that can help customers save money, cut energy use, and increase electricity reliability through the integration of solar energy, battery storage, and innovative control systems	Website Social Media Media Relations	Educate the public about Con Edison's demonstration projects involving a targeted group of customers and the greater system benefits of integrating distributed solar with storage.
Public Officials	Con Edison is providing a new service to residential customers. This service will increase opportunities for our customers to use solar energy and maintain reliability. It can lead to cleaner energy usage and potential for	Personal Meetings Collateral	Educates public officials about the new initiative to provide environmental benefits and potential savings to their constituents. Make them aware that not all customers will be targeted, at least not initially, and why.

	cost savings		
Internal: **Customer Outreach** **Call Center Staff** **DSM**	Con Edison is on the leading edge of customer service by providing the resources that can help our customers use battery storage and technology to maximize the benefits solar energy can provide.	Elevator Screens Postmasters Intranet Site Training	Educate Con Edison staff on the program so that non-particating customers are given accurate information.

4.5 CONDITIONS/BARRIERS

4.5.1 Market Rules and Standards

The proposed design of the Demonstration Project program is closely aligned with the goals and objectives laid out for REV demonstration projects by the Public Service Commission. The PSC emphasized in its December 2014 guidance for demonstration projects that "Customer engagement and measuring customer response to DER and data sharing will be a crucial element of these demonstrations. Demonstrations should include opportunities for third parties to demonstrate how various rate designs, information sharing, and other technologies can be used to benefit consumers, encourage customer participation, and achieve REV's system efficiency and bill management objectives. Data on customer acceptance of DER and data sharing will provide commercial and operational benefits when implementing these programs on a larger scale. Utilities should submit proposals that involve various customer groups across the state".

NYISO rules governing the participation of DERs may pose barriers. First, while the NYISO is currently allowed to pay DERs for providing peak demand reduction that could change dependent upon how the Supreme Court rules on the appeal of FERC Order 745. Second, FERC recently ruled that a payment for distribution reliability could affect how a customer with a DER resource is allowed to bid in the NYISO's capacity markets under its buyer-side mitigation rules.[1] While neither of these address renewable generation resources, both of these legal/regulatory issues could impact how Con Edison is able to monetize these assets.

4.5.2 Consumer Protections

Compliance with CAN-SPAM

Outbound communications sent by email will contain advertising content and thus may be subject to the provisions of CAN-SPAM. As such, the emails will be designed to comply with CAN-SPAM requirements. They will include a subject line that clearly communicates the purpose of the email. They will use clear and accurate header information ("To" and "From"), including the originating domain name and email address, and will include a clear and conspicuous interactive unsubscribe option that will permit consumers to immediately opt-out from all future email communications.

Compliance with FTCA, Section 5 - Unfair and Deceptive

[1] New York Independent System Operator, Inc., 150 FERC ¶ 61,208 (March 19, 2015)

DER targeted offerings will be reviewed and vetted for any environmental claims that might be deemed false or deceptive under FTCA.

4.5.3 Channel or Market Challenges

There is some risk that the market could raise challenges to the selection of a third-party ESP partner without the use of open competitive bidding. Con Edison recognizes the importance and value of competitive bidding for promoting transparency, cost-effectiveness, and quality of service. The demonstration project is a proof-of-concept program. It is, therefore, imperative that Con Edison is able to partner directly with one provider who has a track record of success in this category.

5.0 FINANCIALS

5.1 UTILITY REVENUE STREAMS

Con Edison expects to test five future revenue streams and sources of value:

1. Value of firm solar capacity in demand response and/or wholesale markets—Con Edison can pay a fixed monthly fee to the solar system provider for the firm capacity and can then, in turn, commit the capacity to DR and/or wholesale markets, subject to FERC's and NYISO rules on buyer-side mitigation referenced above under section 4.5.1;

2. Referral fees from the sale of solar and storage systems;

3. Generation of system benefits (e.g., avoided costs) from coordinated dispatch of VPP assets—The VPP will be controlled in order to relieve system constraints and in turn defer T&D investments;

4. Premium pricing for resiliency— value to customers of the resiliency benefits of onsite battery storage; and

5. Revenue generated as the distribution service platform (DSP) provider – the DSP will be required to create new monetization opportunities for distributed assets. The value of the VPP will be best captured if both distribution and NYISO level opportunities combine to explore the potential value of both distribution system and wholesale power benefits.

Pricing for the Demo Offer

Customers participating in the demonstration project will have no upfront cost and will pay a monthly lease for the solar installation along with a monthly resiliency fee that gives them first right of access to their onsite battery in the event of an outage.

The solar assets will be owned by a third party special purpose vehicle, which in turn leases to the homeowner over a 20 year contract. The lease payment includes:

- Upfront solar equipment
- Operating and maintenance
- Rate of return to SPV investor

- Value of resiliency offered by battery

Pricing for Resiliency

It is Con Edison's hypothesis that some segment of customers will pay a premium for guaranteed, clean back up power in case of an outage. It is difficult to estimate today, how much customers are willing to pay for this service given the already high levels of reliability in our service territory. The demonstration project will allow us to test various price levels and payment structures that will be necessary to develop a commercial offering and to inform future rate design

5.2 INVESTMENTS

The total projected cost attributed to the demonstration project over the term is approximately $12M. The costs that will be incurred in the demonstration project include the energy storage system, balance of system components, installation and associated O&M services, fees for development and implementation of the program, operation of the Virtual Power Plant, and integration of the VPP into Con Edison's communication and control systems. Con Edison expects its costs for this demonstration to be recovered through the Monthly Adjustment Clause (MAC). Revenues from third party service providers, lenders, and customers that participate in the demonstration will be credited to ratepayers. The Company may propose incentive mechanisms as the Demonstration Project develops.

The residential solar systems deployed during the demo will be financed to the customer through a lease arrangement with SunPower by leveraging third party equity capital at no cost to Con Edison. The payments made by program participants for resiliency services, or backup power, will offset the total project cost to Con Edison.

5.3 RETURNS

Revenue to Con Edison for the duration of the trial comes from selling the firmed capacity captured by the VPP to the wholesale market, DR programs, or the DSP as well as a resiliency payment per unit. We value that capacity by using the forward curve for capacity starting at $20 per kW per month. Due to the high price of storage today, we will not generate profit on the sale of firmed capacity during the 2+ year term of the demonstration project. Should we generate profit during the course of the trial, those returns will be returned to the ratepayers.

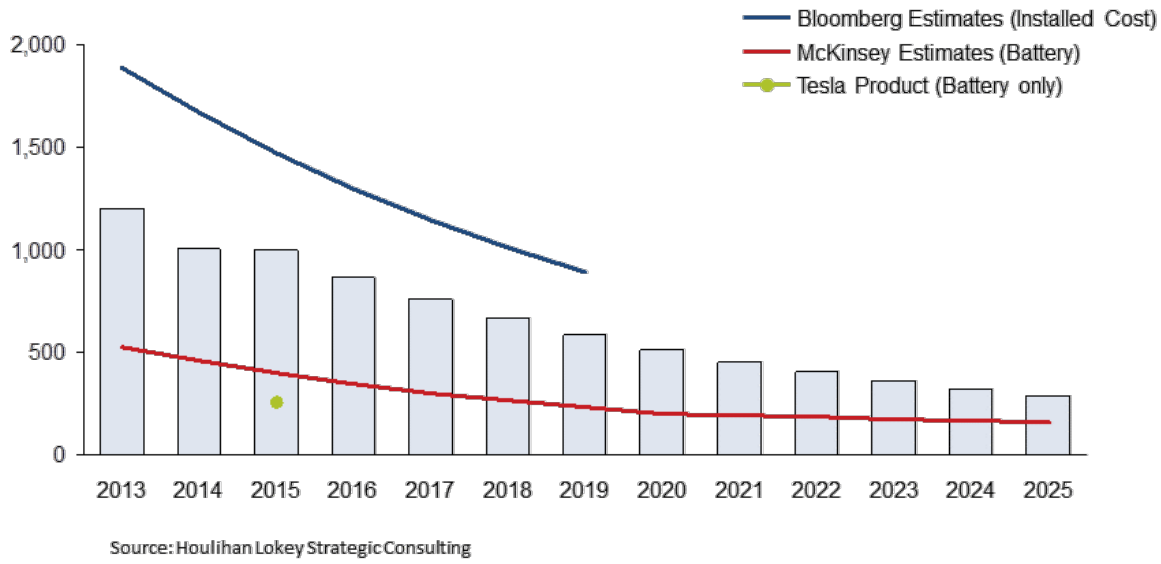
5.4 COST EFFECTIVENESS

By all estimates, the cost of battery storage is declining. Figure 5-1 shows our estimates relative to those by Bloomberg and McKinsey and the announced price from Tesla. As the price of storage come down, the value of capacity and resiliency are going up – there is a clearly a cross point in the near future. Our analysis suggests business model viability in

2021 based on the cost of storage relative to the value in the wholesale market alone. If you incorporate additional value from DR market participation and/or resiliency payments it could happen much earlier (Figure 5-2).

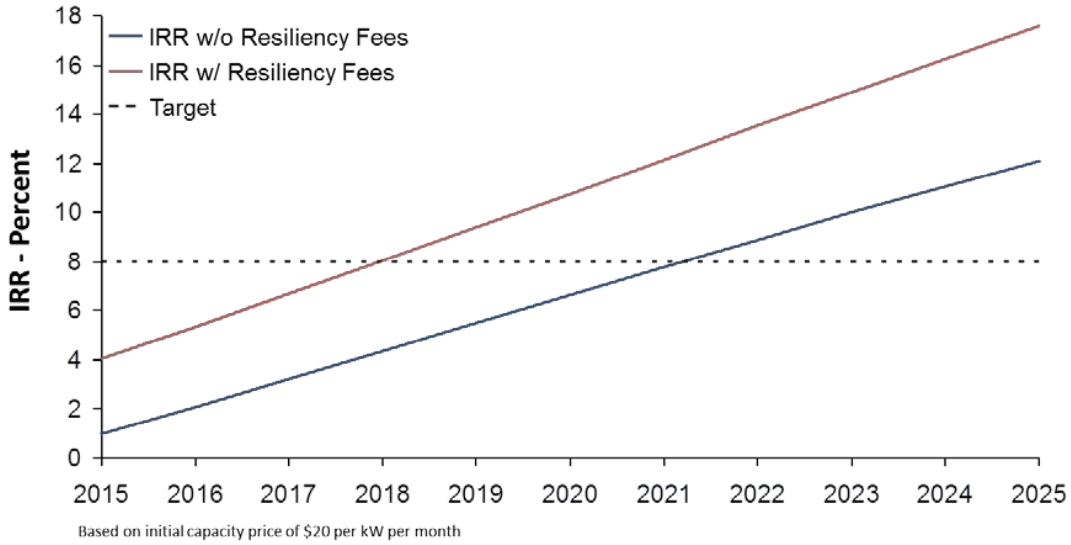
The reason to start now is to get the technology in place in terms of establishing a market for distribution level services. This provides the intelligence and control that would come at scale over time. These costs are currently embedded in the Sunpower storage solution and would then in future be spread over many more units – reducing cost and allowing more commodity solutions to enter the marketplace.

Figure 5-1. Cost Curve for Behind the Meter Batteries (Installed Cost, $kWh)



Source: Houlihan Lokey Strategic Consulting

Figure 5-2. IRR Based on Value of Firmed Capacity and Resiliency



6.0 REPORTING

Con Edison will provide quarterly metrics tailored to each phase of implementation.

Phase 1: Customer Adoption

We will measure success by our ability to deliver 4.0 MWh of aggregated behind-the-meter energy storage nameplate capacity by the expected completion date. Table 6-1 lists keys metrics that SunPower will use to track progress throughout the REV Demonstration Project implementation process.

Table 6-1. Key Customer Adoption Metrics for Demonstration Project Phase I

Key Metrics Measured	Definition / Methodology
Lead generation	- Number of customer leads generated
Lead-to-PV-Customer %	- Number of prospective customer leads approached - Number of customers who signed up for solar-only
Lead-to-REV Demonstration Project-Customer %	- Number of prospective customer leads approached - Number of customers who signed up for REV Demonstration Project (solar + storage)
Installation Progress	- Number of installations completed - Number of installations interconnected - Number of installations commissioned
REV Demonstration Project Participant Characteristics	Compilation of the following data points for non-converted leads, leads converted to PV customer, and leads converted to REV Demonstration Project customer: - Customer monthly utility bill - Dollar value of estimated monthly year 1 PV-only savings - Year 1 PV-only savings as % of monthly utility bill - PV system size - Dollar value of resiliency services customer signed up for - Value of resiliency services as % of monthly utility bill - Zip code / region

Phase II: System Integration

We will demonstrate that residential solar and storage systems can be efficiently integrated into the operation of the distribution grid and dispatched as a firm resource. To demonstrate this, the demo will test the Virtual Power Plant's ability to accept signals from the ISO and optimize the performance of the fleet of solar and storage assets in response.

The results will be tracked and measured according to the following parameters. Results can be reported and analyzed for individual systems, groups of systems, and for the entire fleet of assets.

- Ability to consistently receive and respond to dispatch signals
- Accuracy of response
- Speed of response
- Latency of communications
- System uptime

Phase III: Dispatch Performance

The demonstration project will assess how the distributed energy storage can, through aggregation, be used to satisfy distribution and transmission network demands.

The results will be tracked and measured according to the following parameters:

- Capacity (power or energy) requested
- Total capacity (power and energy) dispatched by the Virtual Power Plant
    - Percent of dispatched capacity provided by solar
    - Percent of dispatched capacity provided from battery storage
    - Total capacity (power and energy) exported to the utility grid
    - Total capacity (power and energy) provided to local loads
- Actual performance versus modeled performance
- Actual performance of distributed solar with battery storage compared to solar-only
- Total solar power and energy generated
- Total power and energy consumed by local loads
- Total energy stored in battery

7.0 CONCLUSION

7.1 POST-DEMONSTRATION BENEFITS

7.1.1 Qualitative

While the cost of an integrated solar+storage product is prohibitive on an individual customer basis, the aggregation of multiple residential systems into a VPP provides opportunities to capture additional value in distribution and transmission level markets. Con Edison will partner with a 3rd party provider to offer a cost-effective solution to customers and develop an advanced control platform to aggregate the distributed systems into a single, dispatchable capacity and energy resource to create T&D system benefits as well as to evaluate opportunities in existing and future competitive markets at the DSP and NYISO .

7.1.2 Quantitative

Based on the value of firm capacity alone we expect a VPP comprised of distributed solar+storage could generate returns of 8% by 2021 (Figure 5-2). By entering the market today and building out a capability to integrate, optimize, and dispatch distributed resources, Con Edison will be positioned as a strong player in ensuring a highly efficient distribution grid as well as monetizing the full value of DER.

7.2 PLANS TO SCALE

Given the current cost of behind the meter storage we do not expect the demonstration project to break-even, instead it is meant to allow Con Edison to test key REV hypotheses and build a platform for managing and dispatching DER. However, we believe that given the declining cost curve for stationary storage, the business model may represent a sustainable profit opportunity. If battery costs decline, as illustrated in Figure 5-1, we would expect the business model to be profitable within 10 years. If milestones are met we would expect to leverage the platform built during the demonstration project to roll out a full scale program sized to optimize customer and grid benefits.

7.3 ADVANTAGES

Via this project we will demonstrate how the value of PV + storage in hundreds of homes can be reliably aggregated together and monetized in capacity and energy markets. This new revenue stream alone will make battery installations profitable in the near future, as the price of the technology comes down. It will also test how much customers are willing to pay for the added benefit of grid backup power, adding to the revenue stream and accelerating the timeline for commercial viability.

By entering the market today and building out a capability to integrate, optimize, and dispatch distributed resources Con Edison will be positioned as a strong player in ensuring a highly efficient distribution grid as well as monetizing the full value of DER.