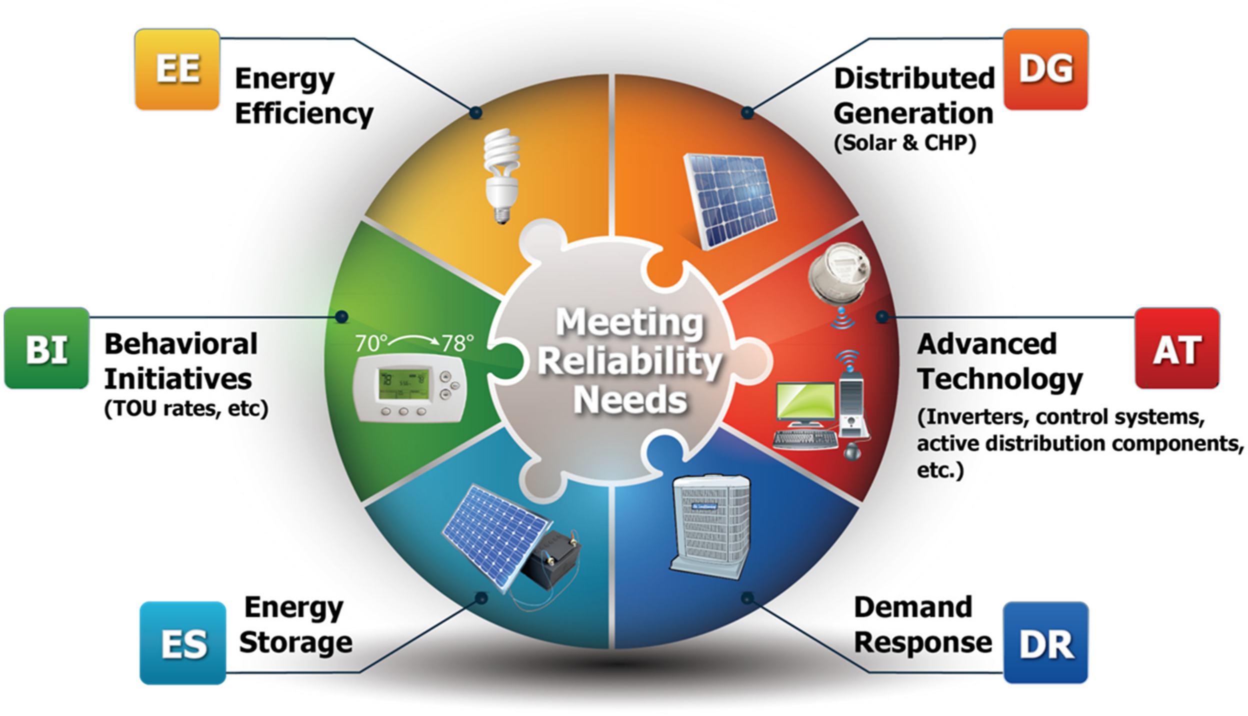

Southern California Edison

Preferred Resources Pilot

2015 Portfolio Design Report

Revision 1

February 5, 2016

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1. Executive Summary

As California moves toward a low-carbon future, the State and SCE are increasingly looking to clean sources of energy to meet energy and reliability needs. Several performance assumptions have been made about clean energy resources, in particular by state agencies, to meet the needs resulting from the closure of the San Onofre Nuclear Generating Station (SONGS) and the impending retirement of nearby once-through cooling (OTC) power plants. SCE is faced with the unique opportunity, which is pursued through its Preferred Resources Pilot (PRP), to investigate if and how preferred resources will allow SCE to meet local needs at the distribution level and manage or offset projected electricity demand growth. This investigation will be carried out in South Orange County, an area directly affected by the closure of SONGS. In particular, the PRP is focused in the area served by Johanna and Santiago (J-S) substations.

The PRP represents an innovative approach for three reasons. First, its goal to manage load growth in the PRP region to net zero solely with clean resources is unprecedented for SCE. Second, it departs from SCE's past practice of procuring clean resources simply to meet state energy-policy goals and adds a component to solve for a local reliability issue. Third, it represents an additional departure from SCE's current practice of conducting top-down, system-wide resource planning, to a bottom-up planning approach that forecasts customer load growth using local specific data and market potential of preferred resources based on customer meter data.

The first PRP Portfolio Design Report was published October 2014. This 2015 PRP Portfolio Design Report is an update to the 2014 version, and similar to the previous version, it provides guidance on the acquisition of preferred resources in the PRP region to meet the expected load growth – approximately 275 MW through 2022. To determine the best mix of clean resources to meet that need, SCE conducted a bottom-up analysis to identify portfolio options to serve the growth. The portfolio options first accounted for resources that can contribute over multiple hours, such as energy efficiency and distributed renewable generation, then layered the use of energy storage and demand response to meet the peak and shoulder hours.

This updated analysis continues to illustrate three portfolio options that could meet the forecasted need – (1) a Recommended Case that reflects what SCE reasonably believes the market can deliver to the PRP region; (2) a High Case in which the market delivers more customer demand side resources than historical trends predict, relying on existing programs; and (3) a Low Case in which the market delivers less than the expected customer demand side resources. The portfolio options serve as a starting point for implementing SCE's existing demand-side management and resource-procurement programs and identifying the need for targeted solicitations or bilateral contract negotiations.

Key 2015 Changes

- Expected load growth for Johanna and Santiago, combined, decreased from ~316 MW in 2014 to ~275 MW in 2015.
- Average load growth rate decreased to ~27.5 MW/year, a 4 MW dropped from 2014.
    - The change in forecast is driven by lower temperature adjustment in starting point peak analysis, load growth projects and customer expansion plans in 2014 not materializing, and removal of previously anticipated projects resulting in a decrease in projected growth.

- Based on the load shape analysis for Johanna, the number of events expected above the baseline decreased from 81 to 39 due to a decrease in capacity need. For Santiago, the number of events expected increased to 40 from 36 due to an increase in capacity need.
- Based on a better correlation of the capacity and energy assumptions, the Santiago need extends passed hour ending (HE)19 into HE21.
- The size of the Recommended Case portfolio of preferred resources to manage load growth to net zero changed from 419 MW to 437 MW. The Recommended Case portfolio continues to place slightly more weight on distributed generation from solar photovoltaic resources. Therefore, the portfolio size could be smaller if baseload-type distributed generation (e.g., biogas) were actually acquired. The assumptions are further described in the Section h: Determination of the Preferred Resources Selection for the PRP Portfolio.

This portfolio design update confirms that year over year variability is to be expected. Additionally, while the analysis indicates continued load growth, albeit at a lower rate, the 2015 portfolio design analysis does not cause significant changes to the mix of resources needed.

The design process will continue to go through annual iterations to account for updates to the distribution forecast, improved understanding of the market potentials, refinements in the design process based on lessons learned, and policy revisions. The iterative implementation of the portfolio design process will help ensure the acquisition of the right resources at the right time.

2. Purpose

This document describes the analysis and results associated with the PRP portfolio design process. The objective of this process is to provide guidance regarding the type and quantity of preferred resources to be acquired to manage load growth to net-zero in the PRP area, the basis of which is described in the "Background" section below. The results consider the operational constraints — availability, duration, and intermittency — of the preferred resources.

For purposes of the PRP portfolio design, preferred resources include the following:

- Energy efficiency (EE) resources that are quantified based on ex-ante savings estimates as reported to the CPUC for those upgrades that can be directly tracked to the PRP location
- Demand response (DR) resources that are expected to deliver a measurable impact at a customer's meter during peak hours as monitored by the PRP measurement process.
- Eligible Renewable Resources (ERR), including Behind-the-Meter (BTM) renewable resources that are expected to reduce a customer's load and may deliver excess energy to the distribution grid, and In-Front-of-the Meter (IFTM) renewable resources that can either help meet load growth or provide resource adequacy benefits.
- Energy Storage (ES) resources that can either help meet load growth or provide resource adequacy.
- Combined Heat and Power (CHP) and Fuel Cells (FC) resources may be acquired to support the PRP objectives.

3. Background

a. Genesis of the Preferred Resources Pilot (PRP) Program

The retirement of SONGS and impending closure of OTC generating plants by 2020 create capacity replacement needs that, if not met, may challenge system reliability in the Western Los Angeles Basin. The PRP region is located in the Western LA Basin, which in addition to being impacted by the retirement of generating plants previously mentioned it is also expected to experience population and business growth resulting in an increased peak demand. It is important to note, that CAISO's study results indicate local generation in the southwestern portion of SCE's service territory is effective to resolve reliability concerns. Currently, there are mitigation actions being pursued for the Western LA Basin that include transmission projects and a portfolio of resources procured through SCE's and SDG&E's Local Capacity Requirements solicitations. Through implementation of the PRP, SCE seeks to determine if preferred resources[1] (PRs) can deliver what is needed, when needed, and for as long as needed.

The current system capacity in the PRP region is sufficient to serve the current J-S load, but the load is expected to grow by ~27.5 MW per year, creating a need for more capacity by 2022.

b. Johanna and Santiago Substation Areas

Table 3.1 and Figure 3.1 provide a general description and map of the J-S substations and supporting B-Banks, respectively. Figure 3.2 is a representation of SCE's transmission system in the area.

Table 3.1: General Description of Johanna and Santiago Substations

	Johanna	Santiago
2013 Peak Demand*	452.8 MW	819 MW
Customer Characterization	Primarily commercial	Mix of commercial and residential
Supporting 66/12 B-Banks (# of Circuits)	Cabrillo (19) Camden (7)	Borrego (8) Crown (10)
	Chestnut (14) Fairview (12)	Estrella (14) Irvine (8)
	Johanna (9)	MacArthur (10) Morro (5)
		Moulton (13) Niguel (7)
		Santiago (17)

* 2013 Peak demand value is based on recorded Criteria Project load obtained from SCE's 2014-2023 A-Bank Plan and represents the current baseline to establish the point above which the PRP seeks to manage load growth to net zero.[2]

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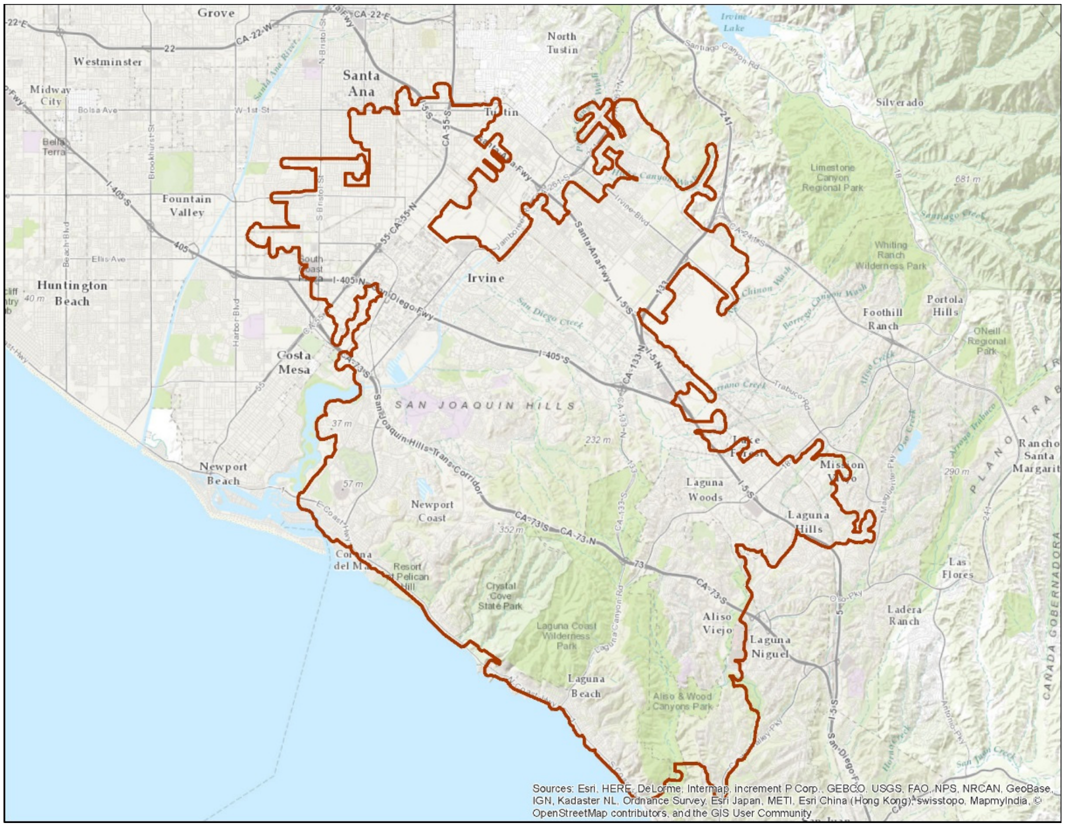
[1] Preferred resources are defined in the State's Energy Action Plan II, at page 2, as follows: "The loading order identifies energy efficiency and demand response as the State's preferred means of meeting growing energy needs. After cost-effective efficiency and demand response, we rely on renewable sources of power and distributed generation, such as combined heat and power (CHP) applications. To the extent efficiency, demand response, renewable resources, and distributed generation are unable to satisfy increasing energy and capacity needs, we support clean and efficient fossil-fired generation." Energy storage is a potential enabling technology, but is not a Preferred Resource because it stores power regardless of how that power is produced. However, in this document, similar to the CPUC decision, the PRP also includes energy storage in the category of preferred resources for ease of use unless otherwise noted. Additionally, the term distributed generation in this document refers to renewables and CHP interconnected at the distribution grid level, such as solar in-front-of-the meter and behind-the-meter.

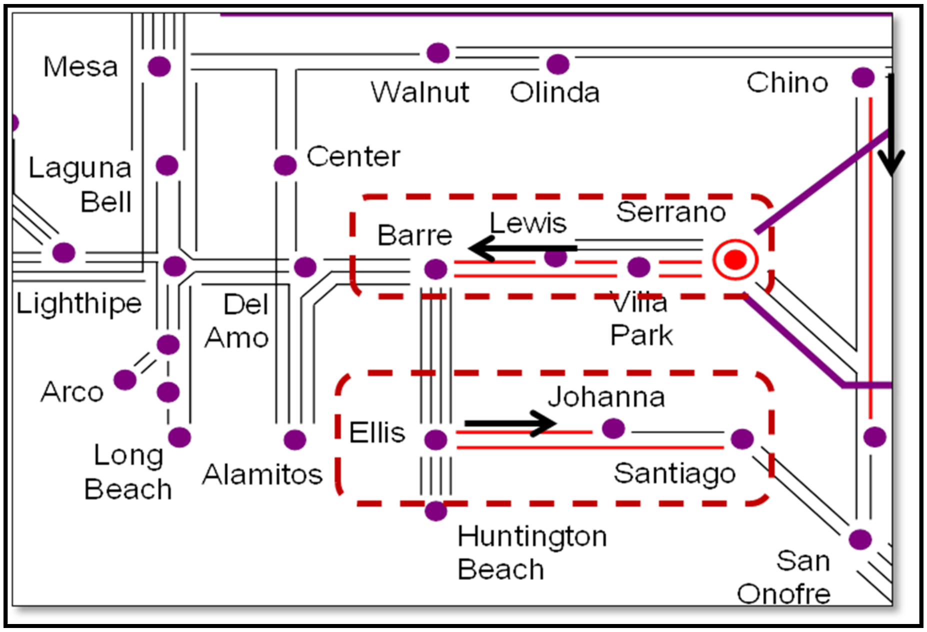
[2] The Criteria Projected Load is the forecast starting point based upon recorded data adjusted up to the expected value in a 1 in 10 year heat storm. In further iterations of the PRP Portfolio Design Report the team will look into establishing the baseline based on peak power flow models to plan the amount of preferred resources needed to manage load growth to net zero.

Figure 3.1: Map of J-S in Southern Orange County



Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Figure 3.2: SCE's Transmission Map for Southern Orange County



c. PRP Objectives

The PRP's objectives are to:

- Measure the local grid impact of preferred resources,
- Implement a preferred resources portfolio to address local peak needs,
- Demonstrate that preferred resources can be used to meet local capacity requirements,
- Minimize or eliminate the need for gas-fired generation at these locations, and
- Identify lessons learned for application to other grid areas.

The expected outcome from implementing a preferred resources portfolio to address local peak needs and meet local capacity requirements is that load-growth will be managed to net zero. Based on this 2015 portfolio design analysis, load in the J-S area is expected to grow by ~27.5 MW/year through 2022. As preferred resources are added to the system, the PRP grid-level measurement of their performance will quantify the ability of preferred resources to manage load growth to net-zero.

d. PRP Project Workstream Components

Through workstreams, the PRP will meet its objectives of measuring, implementing, and demonstrating PR in the J-S region. While focusing on their general scopes of work, the workstreams will also cooperate with and provide feedback to each other in support of the project's overall objectives. The workstreams are Stakeholder Engagement, Design & Acquisition, Portfolio Implementation, and Measurement & Verification. The interdependence of each workstream allows for the flow of information between work groups and helps to minimize silos.

1. **Stakeholder Engagement:** The goal of this workstream is to engage in a two-way learning discussion to obtain increased customer participation and to share status, challenges, insight, and results through clear, consistent, and open communications with affected SCE customers and key stakeholders.

2. **Portfolio Design and Acquisition:** The goal of this workstream is to define and acquire the mix of preferred resources to meet the forecasted needs for the PRP target area through 2022. The portfolio mix of resources will be based on MW, location, time of day, duration, frequency, and season. These are collectively referred to as the **resource attribute needs**. Resources will be acquired through existing solicitation processes, as part of the Demand Side Management (DSM) program planning process, and possibly through unique PRP solicitations. In establishing the PRP DSM targets, focus will be placed on those programs that produce dependable and persistent grid level savings.

3. **Deployment:** The goal of this workstream is to ensure that the acquired Preferred Resources are fully deployed and performing in the PRP target area. Improving customer adoption is critical to meeting the PRP DSM targets. Additionally, this workstream will explore interconnection improvement opportunities for generation-type preferred resources.

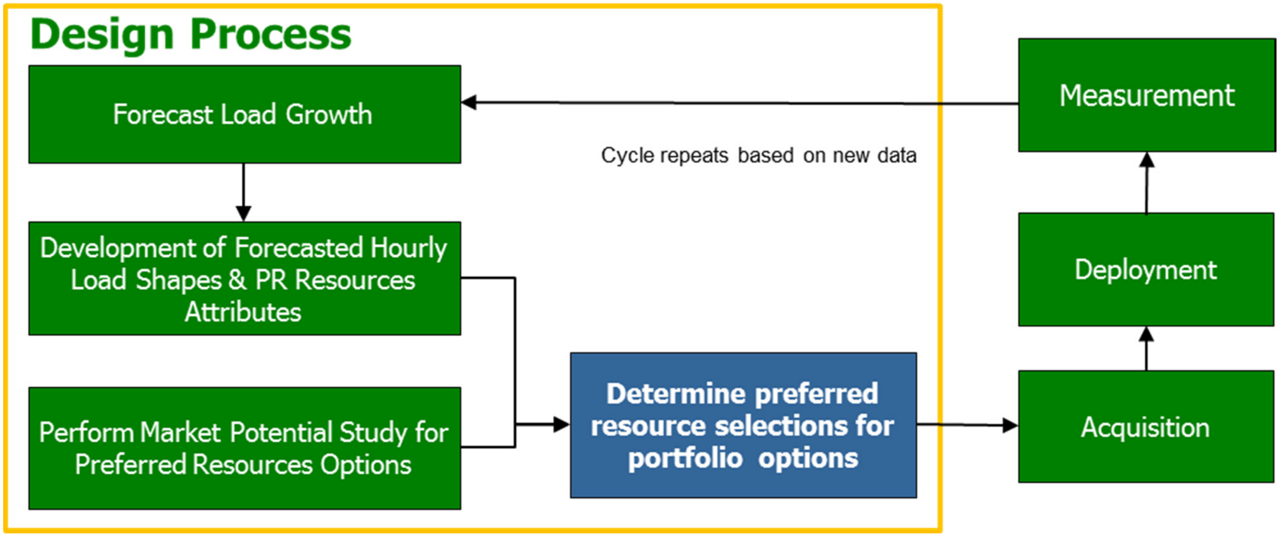
4. **Measurement:** The goal of this workstream is to measure the grid impacts of preferred resources in the PRP area. Where and when available for all resources, the use of raw Advance Metering Infrastructure (AMI) data, Supervisory Control and Data Acquisition (SCADA), and other metered data will enable analysis of the performance of the preferred resources in the PRP area.

4. PRP Portfolio Design Process

a. Overall Process Definition and Components

The objective of this process is to provide guidance regarding the type and quantity of preferred resources that will best meet the forecasted load needs in the PRP area within the operational constraints of preferred resources (availability, duration, and intermittency). The steps involved in the portfolio design process are outlined in Figure 4.1 and described in more detail throughout this report. This design process is intended to be iterative. Both the addition of preferred resources and the development of new forecasts can trigger re-evaluation of the portfolio. Periodic re-evaluation of the entire process will be necessary to incorporate updates based on actual measurements.

Figure 4.1: Preferred Resources Portfolio Design Process



b. Development of Starting Point Peak Load

Development of the starting point peak (SPP) load is an annual process conducted by SCE as part of its distribution planning purposes. The process calculates projected load shapes which are used to determine if the distribution system has adequate capacity to meet future demand requirements. The SPP data was necessary for the development of a summer peak baseline for the PRP. SPPs can be described as normalized peak demand values, where adjustments are made to recorded peaks based on the temperature, day of the year, abnormal conditions, generation, and other preferred resources (such as EE and DR) operating on the peak. The annual analysis leading to the development of SPPs for Johanna and Santiago was based on the following inputs and assumptions.

Inputs

- Raw Peak: Raw trend data for 2014 summer peaks, obtained from the SCADA systems installed at Johanna and Santiago.

- Temperature Adjusted:
    - Daily effective temperature value, used to normalize peak loads for temperature impacts.
    - Mean peak effective temperature value, based on a historical assessment of yearly peak effective temperatures and used to adjust the peak load.[3]
- Transfer/Abnormal Adjusted: Data from transfers or abnormal events (such as outages) experienced during the 2014 summer peak season.
- Date Adjusted: A date/calendar normalization routine prorating load growth to adjust to the regular calendar year, based on the date the peak occurred in 2014 versus Sept. 15th (a constant date used to represent the end of summer for tool modeling and calculations).
- Generation Adjusted: Data on daily solar photovoltaic (PV) generation during the summer peak season, obtained from SCE's California Solar Initiative (CSI) team, grid interconnection data, and metered solar generation data.
- DR Adjusted: DR load reduction during the 2014 summer peak season, based on values provided by SCE's DSM-DR programs (see Appendix B).

Assumptions

- The difference between *daily* effective temperature and *mean peak* effective temperature, combined with a temperature sensitivity constant, contributes to the temperature adjustment.
- To ensure a conservative approach, the forecast assumes SCE will need to supply the "non-dependable" portion of solar PV generation.[4]

Methodology

The SPP development process began by identifying a number of "raw" peaks from the SCADA system information. The peak values were then adjusted based on the difference between the daily effective temperature and the mean peak effective temperature. This step normalized the actual peaks to what would be expected if the temperature for the selected day was at the mean peak effective temperature. The peaks were then corrected for the effects of transfers and abnormal events, and also date-normalized, which prorated load

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[3] Effective temperature is a calculated temperature value that more accurately represents a linear relationship between ambient temperature and peak demand.

[4] The "non-dependable" and "dependable" solar PV generation values were calculated by the Distribution Engineering team for solar PV generators sized 1 MW or smaller. These calculations were based on a comprehensive solar PV generation study which the team conducted across the SCE service territory to assess solar PV system output and intermittency (see Appendix A for graphic representations of the results). The portion of the solar PV generation used as "dependable" is dependent on the timing of the peak demand at each circuit or substation. On average, Distribution Engineering has found that approximately 17% of solar PV nameplate generation capacity can be considered "dependable" in SCE's service territory. The amount of PV counted as "dependable" might actually increase pending PRP measurement results. The "non-dependable" generation is the difference between the maximum output as a function of nameplate capacity and the "dependable" portion (minimum). For solar PV generators sized larger than 1 MW, the Distribution Engineering team imputed the actual generation value based on SCADA information from substations. Since all 1 MW or greater generators are required to install telemetry, the system output can be measured. In situations where telemetry data is not available, the engineers may impute the information based on the same solar PV study previously mentioned.

growth based on the date the peaks occurred versus Sept. 15th. Next, a peak day was selected on which the adjusted peak demand best represented the typical peak demand of the corresponding substation.

Once the SPP day was selected adjustments were made for actual conditions on the J-S system.

Findings

Based on the methodology described above, the 2014 Starting Point Peak Load for the Johanna substation was determined to be 432 MW and for the Santiago substation was 770 MW (rounded up from 769.5).

c. Forecasting of the Distribution Load Growth

The next steps in the design process were forecasting load growth for the Johanna and Santiago substation areas and developing projected area peak loads through 2022. Forecasting of load growth across SCE's service territory is an annual process conducted by SCE for distribution system planning purposes. The load growth forecasting and subsequent load projection process is a "bottom-up" process that aggregates expected load growth up from the circuit level to B and A substations:

Inputs

- Base growth, based on expected new load sources (that is, new residential, commercial, or industrial developments),
- "Dependable" solar PV generation,
- Electric Vehicle (EV) impact based on information provided by the SCE Transportation Electrification team, as follows: EV nameplate data for each circuit, and demand curves for each year in the forecast with kilo-volt-amperes (KVA) demand implemented at the time of the circuit peak,
- Energy efficiency impact (based only on lighting[5] and SmartConnect programs), and
- Expected permanent load transfers. This input occurs after load growth forecasts are completed and is used to develop projected peak loads.

Assumptions

- Only "dependable" solar PV generation can be reliably counted on for load growth projections.
- Lighting-related EE savings were proportionally allocated to circuits based on an assumption of 95% residential and 5% commercial energy use for 2014. The SmartConnect EE savings figures were proportionally allocated to circuits based on an assumption of residential energy use only.
- A 1-in-5-year heat storm adjustment was used for A substation peak forecasting.

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[5] The lighting component of EE impact is based on AB 1109, Huffman. Energy resources: lighting efficiency: hazardous waste, at http://www.leginfo.ca.gov/pub/07-08/bill/asm/ab_1101-1150/ab_1109_bill_20071012_chaptered.pdf

Methodology

In order to develop load growth forecasts, an assessment was conducted of all potential sources of load growth in the Johanna and Santiago substations through the year 2022, starting at the circuit and substation levels. This effort provided an estimate of the expected additional load SCE will likely need to serve. These incremental new loads can come from expected new residential, commercial, and industrial developments and projects. Historical growth trends in the area were also considered and adjustments made to the load growth number to reflect their impact. The outcome of this process is considered the "base" growth.

Subsequently, the forecasted "dependable" solar PV generation and energy efficiency MWs were subtracted from the base growth, while the incremental increase in demand due to increasing penetration of EVs was added to the base growth. The net result of this step yielded the growth forecast for Johanna and Santiago areas.

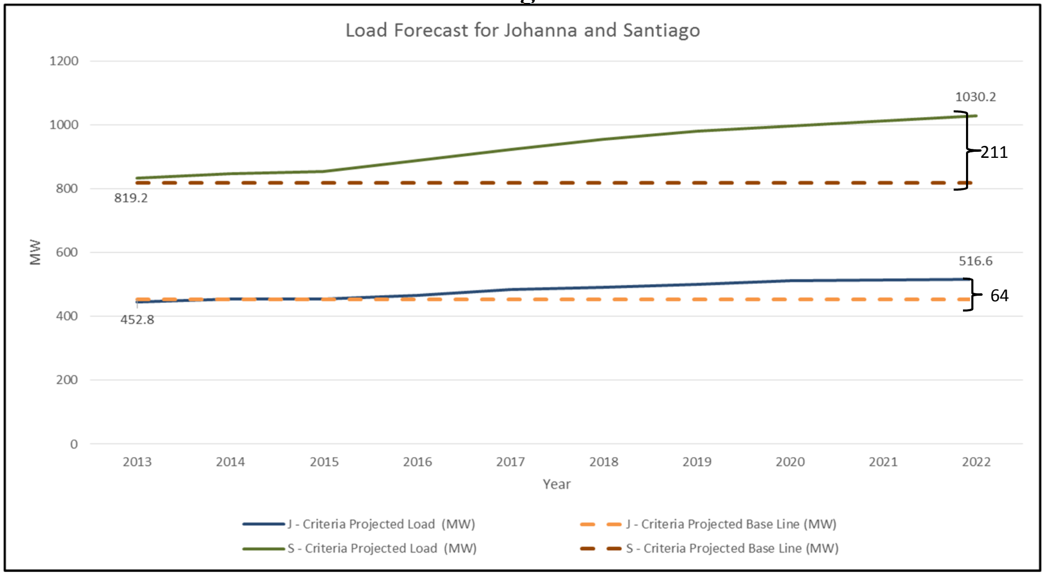
The next step in the process was to use the growth forecast values to develop projected loads for Johanna and Santiago through 2022. This was achieved by adding the growth forecast to the starting point peaks to develop the total projected loads. However, before finalizing the projected loads, two more adjustments were necessary:

- One adjustment involved accounting for any expected permanent load transfers by incorporating the impact of any such transfers into the projected loads.
- The other was to incorporate the 1-in-5-year heat storm adjustment to develop the final design criteria, based on the projected load forecasts for Johanna and Santiago. It should be noted that the 1-in-5-year heat storm adjustment may create a more conservative forecast.

Findings

Figure 4.2 provides a graphical representation of load growth in the Johanna and Santiago substation areas. These values show an approximate annual average load growth of ~27.5 MW for the two substation areas.

Figure 4.2: Forecasted Criteria Projected Load Growth — Johanna-Santiago Substation Area



d. Development of Johanna and Santiago Substations 2022 Load Shapes

In order to define the types of preferred resources required, it was necessary to understand the forecasted load shapes for Johanna and Santiago substation areas in 2022. These load shapes would enable the identification of the needs that could be met with PRs.

Inputs

- Distribution Criteria Projected Load (A-bank) forecasts for Johanna and Santiago areas through 2022.
- Historical substation-level hourly load data (average and peak) for Johanna and Santiago, based on SCADA system information for the period 2008-2014.
- Forecasted energy based on the average of the 2008-2014 load factor and the Criteria Projected Load.

Assumptions

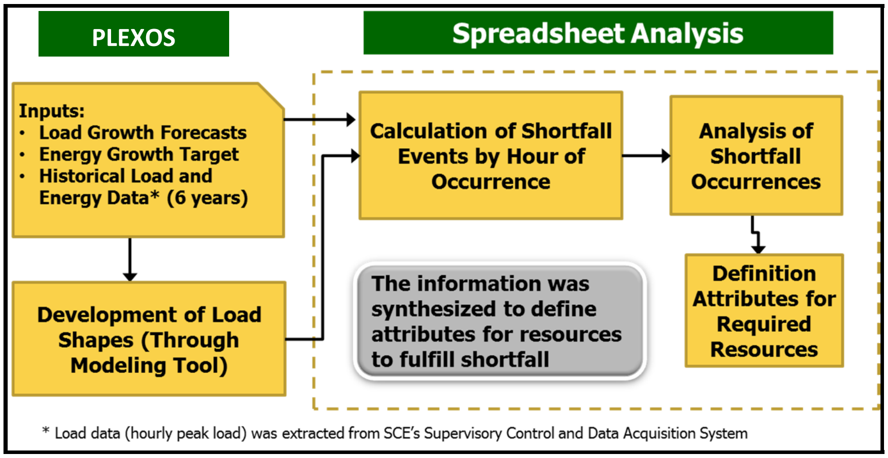
- For modeling purposes, sufficient resources exist to meet the Johanna and Santiago loads up to their respective historical peaks. Resources assumed included imports as well as local J-S supply and demand resources.
- Historical usage patterns and load shapes were used as the basis for developing forecasted future load shapes. However, this process may not capture the possible future impacts of several factors, such as EV usage patterns, DG generation, and ES production, which are not sufficiently understood at this point.
- To account for potential changes in future load shapes and patterns a "conservative" historical shape was used. The conservative shape was characterized as having the most events demonstrating resource need.

- Separate load shapes for Johanna and Santiago were developed (rather than a single "aggregated" J-S load shape), since at present there is limited ability to re-distribute load between the two substations. Using an aggregated load shape could result in misleading need and resource attribute information, due to the limited capability of the physical system to redirect load and to share supply resources effectively. For example, in a hypothetical situation where Johanna has a need and Santiago has a surplus, aggregated analysis would show no combined J-S need, while in reality, there would be an unmet need at Johanna.

Methodology

The input data was processed using the PLEXOS modeling tool to escalate the historical hourly loads to 2022 peak forecast levels. The energy usage growth rate (aka energy growth target) was derived based on the historical Johanna and Santiago loads. These factors were used to develop the hourly 2022 load shapes. Using an energy growth target in addition to peak load targets ensured that the forecast load shapes did not overestimate the total (yearly) energy. An evaluation of the resulting Johanna and Santiago load shapes resulted in the selection of the profile based on the 2008 historical shape, which was the most conservative since it resulted in the most “events” or number of times load exceeds the historical 2013 peak, in essence demonstrating a resource need. The entire process of defining forecasted load shapes and development of required attributes (described in the next section) can be seen in Figure 4.3.

Figure 4.3: Process Used for Development of Load Shapes and Resource Attributes



* Load data (hourly peak load) was extracted from SCE’s Supervisory Control and Data Acquisition System

Findings

The work performed in this step created the forecasted 2022 load shapes for Johanna and Santiago, shown in Figures 4.4 and 4.5 below. These load shapes were necessary to enable the next step in the process, which involved defining the expected 2022 needs and identifying the preferred resource attributes required to meet these needs.

Figure 4.4: 2022 Forecasted Load Shape for Johanna Area

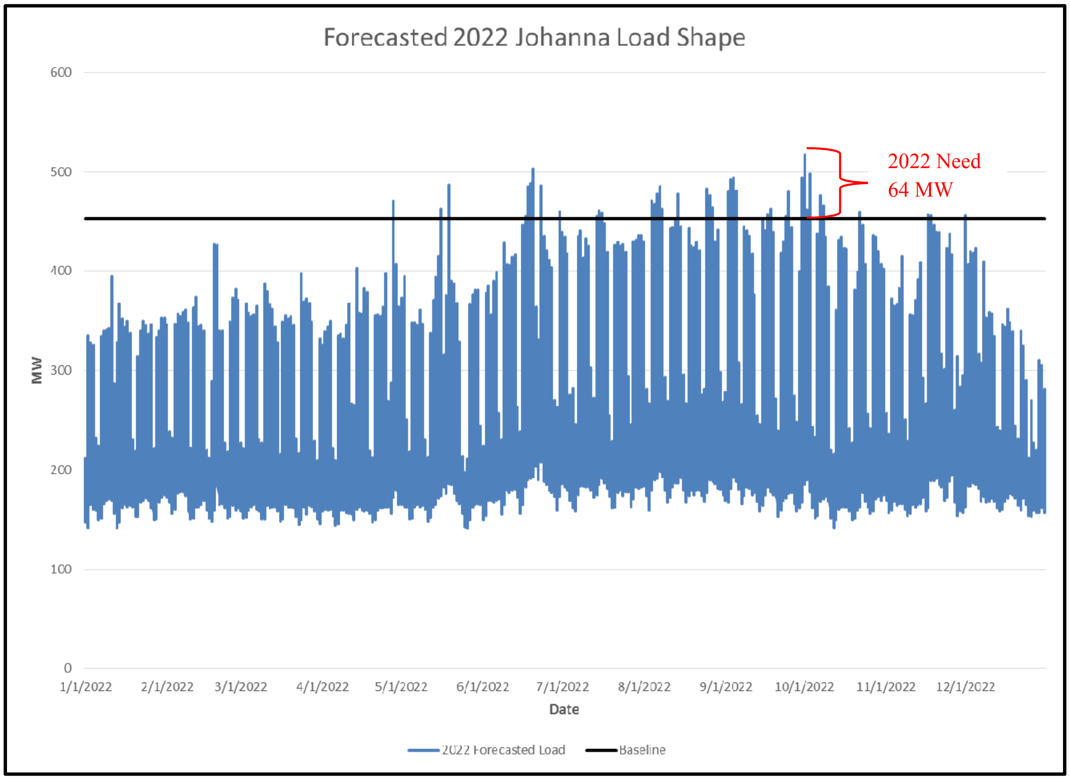
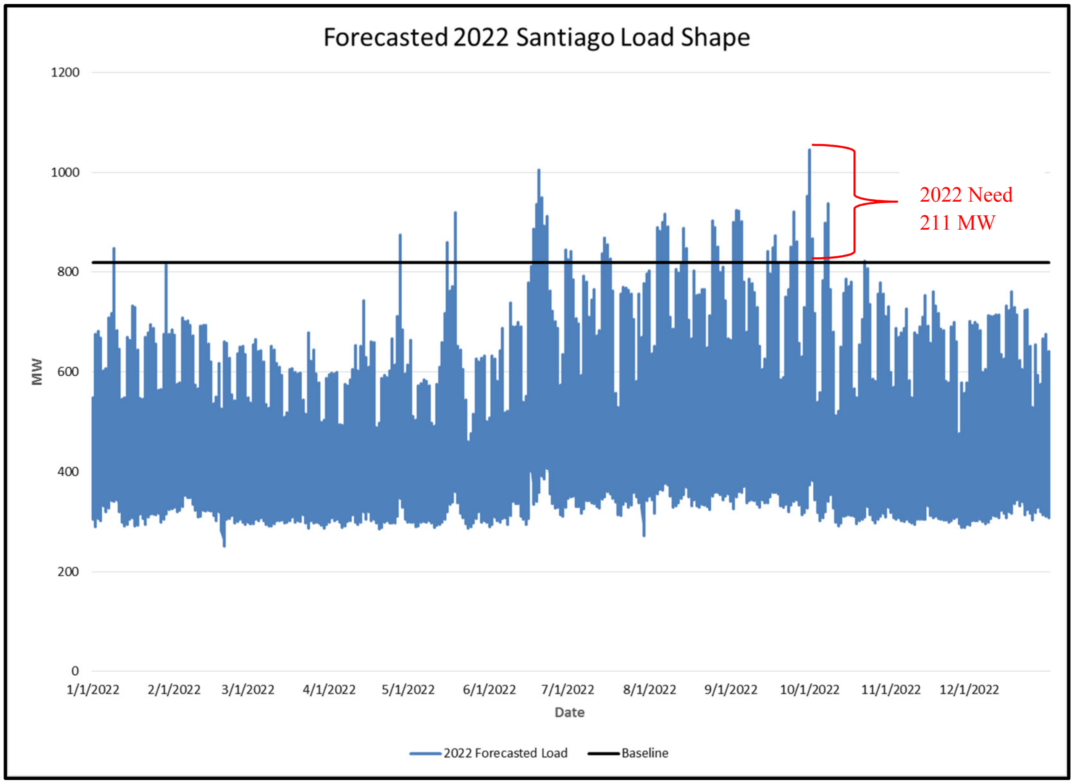


Figure 4.5: 2022 Forecasted Load Shape for Santiago Area



e. Development of Preferred Resources Attributes

Once the 2022 forecasted load shapes for Johanna and Santiago were developed, the team began identifying the likely resource needs and/or shortfalls in 2022 and determining the resource attributes (quantity, duration, frequency, timeframe / season, and time of day) required to meet those locational needs.

Inputs

- 2022 forecasted load shapes for Johanna and Santiago, and
- Criteria Projected Load forecast based on 2015-2024 A-Bank Plan.

Assumptions

- Sufficient resources exist to meet the Johanna and Santiago loads up to their respective 2013 Criteria Projected Load peak. This includes imports as well as local J-S supply and demand resources.
- To account for potential changes in future load shapes and patterns, and the limitations in using only seven years of historical data, the historical shape causing the most shortfall events was used.
- Separate resource attributes for Johanna and Santiago were developed (rather than a single aggregated J-S set of attributes), since at the time of the analysis there was limited ability to re-distribute load between the two substations. Using an aggregated load shape could result in misleading need and resource attribute information due to the limited capability of the physical system to redirect load and to share supply resources effectively, as mentioned in Section 4.d, above.

Methodology

The analysis began with the 2022 forecasted load shapes for Johanna and Santiago, and subtracted the 2013 Criteria Projected Load for each respective substation. This process enabled isolation of that portion of each load shape that was above the substation’s peak load. This portion of each load shape above the peak load represented the gap that needed to be offset and/or managed through the addition of preferred resources. The process and the peak load line are depicted in Figures 4.4 and 4.5, above.

Once the need portions of the load shapes were identified, the primary attributes were deduced from these "isolated" portions of the graphs, including the following:

- Quantity: number of MWs of preferred resources required
- Duration: 2 hours, 4 hours, 6 hours, or 8 hours of preferred resources required
- Frequency: number of times or days resources are required
- Timeframe/season: preferred resources requirements in different months and/or seasons of the year, and
- Time of Day: specific times.

This analysis provided "indicative" results which have an inherent degree of uncertainty because the analysis was based on inputs that include 9-year-forward peak forecasts and a limited volume of historical load shapes, with the assumption that these are representative of future loads. However, with each reiteration, the resulting set of attributes will become more accurate.

Findings

Some of the key findings of the attribute analysis step have been summarized below:

- Overall, the estimated value of the Johanna substation area need was found to be 64 MW of preferred resources by 2022, while the estimated value of the Santiago area need was found to be 211 MW (as depicted in Figures 4.4 and 4.5, above).
- Table 4.4A identifies the MW, by duration, necessary to meet all forecasted need for 2022. Built from the bottom up, the MW required correlate to the duration of need, first for any need greater than 6 hours, then 4-6 hours, then 2-4 hours, and finally between 0-2 hours. The table also shows the number of events that correlate with the MW need. For instance, in Johanna, it's anticipated that 32 MW that can deliver for greater than 6 hours will be needed for minimally 13 days. A portfolio of preferred resources designed to meet the MWs required on Table 4.4A will also meet the expected load growth.
- Table 4.4B depicts the amount of MW required to meet any need in 2022 above the 2013 baseline — in other words, the expected load growth. SCE forecasts that in the year 2022 in the Johanna system there will be 39 days with a need of greater than -0- MW, 12 days with a need greater than 30 MW, 3 days with a need greater than 45 MW, and one day where the need is greater than 60 MW.
- Figures 4.7 and 4.8 depict the 2022 hourly MW need for the forecasted peak day by respective substation.

Table 4.4A: 2022 Forecasted Peak Resource Attributes

2022 Forecasted Capacity Resource Attributes				
	Johanna		Santiago	
Duration	Days	MW	Days	MW
0-2 Hours	5	5	2	8
2-4 Hours	6	17	8	51
4-6 Hour	15	11	13	49
> 6 Hours	13	32	17	103

Table 4.4B: Forecasted MWs Required to Meet Any Need in 2022

Forecasted MW Required to Meet Any 2022 Need			
Johanna		Santiago	
MW Required	Days	MW Required	Days
> 60 MW	1	> 200 MW	1
> 45 MW	3	> 150 MW	2
> 30 MW	12	> 100 MW	6
> 0 MW	39	> 0 MW	40

Figure 4.7: Johanna Substation Hour-Ending Forecasted MW Need

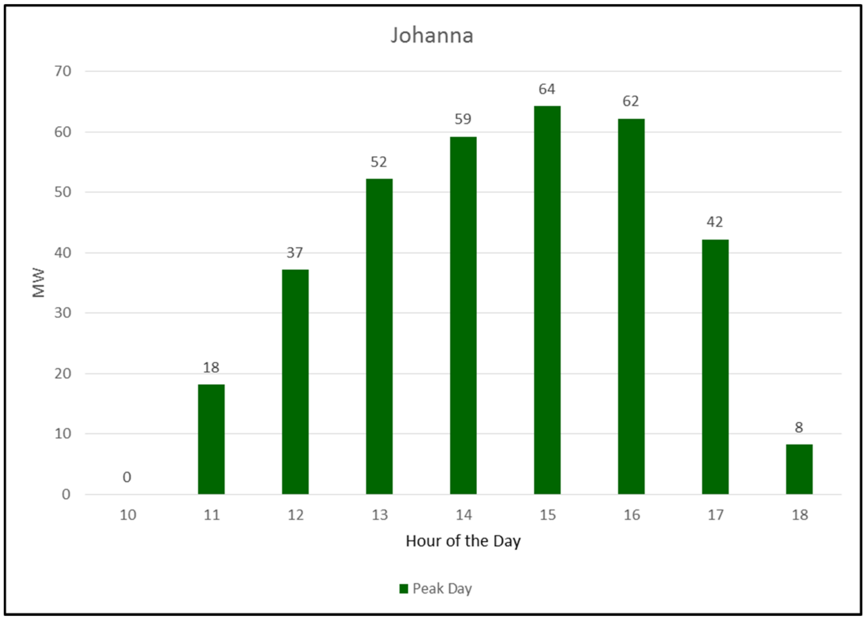
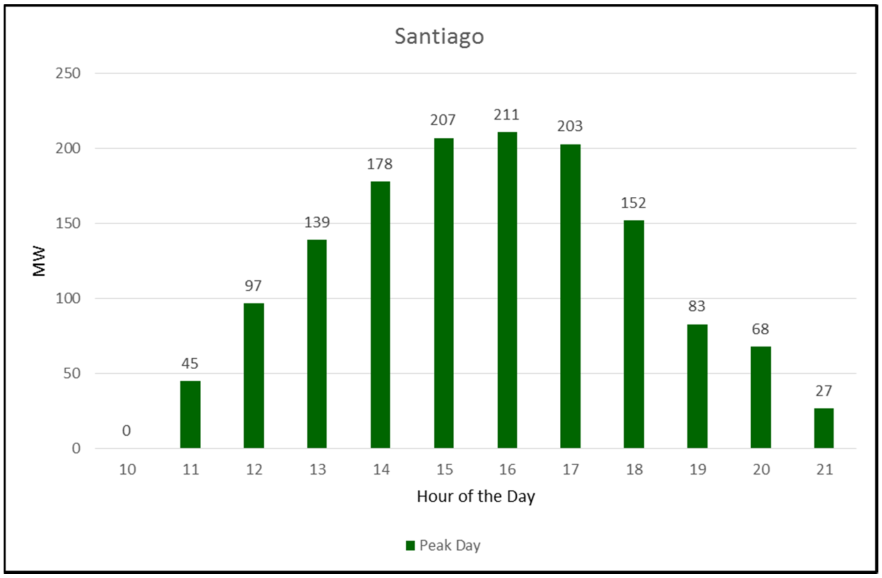


Figure 4.8: Santiago Substation Hour-Ending Forecasted MW Need



f. Identification of the Preferred Resources DSM Market Potential

After determining the preferred resource attributes, it was necessary to study the market potential for DSM preferred resources in the J-S area. The market potential for Demand Response (DR), and Energy Efficiency (EE) are discussed separately in this sub-section due to differences in approach. For purposes of this 2015 PRP Portfolio Design Report, only the EE market potential was updated, which resulted in a change from 65 MW to 66 MW of EE potential through 2021.

The market potential for any type of combined heat and power or fuel cell (CHP- or FC-powered from gas or renewable sources) has yet to be determined in sufficient detail. As a result, this version of the PRP Portfolio Design Report does **not** include data on CHP or FC.

The DR and EE market potential study results provided in this report address the period 2014 to 2021. The PRP DSM Potential and Targeting Analysis provided additional information on the process to develop the market potential for each component of DSM.

Demand Response (DR) Market Potential

Inputs

- Detailed customer usage and load data obtained from SCE's AMI system
- Customer rates
- System peak
- Historical DR participation records for J-S, and
- 2012 DR load impact results.

Assumptions

- Focus of the DR potential estimate was on the segments and customers that contribute most to peak load.
- Market potential is based on M&V measures. True value actual measurement may be different.

Methodology

The approach used began with the development of a set of targeting criteria to identify customer segments and individual customers that contribute the most to peak load, as well as segments with end uses that were weather-sensitive. This step involved selection of factors that were relevant to DR and could be used to quantify characteristics of segments, customer profile, and customer usage. The four selected factors were the following:

- J-S coincident peak factor
- DR eligible load
- Aggregate J-S coincident peak load
- Average J-S coincident peak load

Weights were assigned to these factors, based on their perceived level of importance, and the customer segments then received a composite score based on these factor weights. Once scored, the segments could be ranked and the team could focus on the highest-ranked segments to identify the customers offering the largest DR potential. Finally, the average 2012 DR load impact results for similar customers and customer segments were applied to the high-potential customers to determine the DR potential for each customer and each sector. Summing the DR potentials for these top target customers provided the aggregate DR potential for J-S.

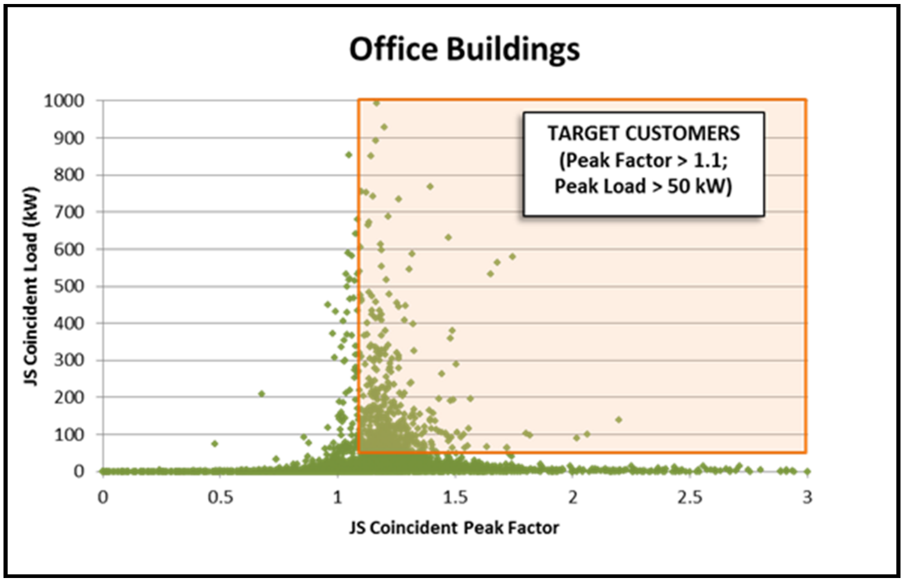
It should be noted that customer willingness or ability to participate was not factored into the DR potential analysis. As a result, the estimates provided represent the "technical" DR potential. Future refinements to include a criterion for estimating likelihood of customer participation would improve the accuracy of the DR potential estimate.

Table 4.5 below shows the top 10 DR priority segments, while Figure 4.9 provides an example of the methodology used to identify the top target customers within each segment.

Table 4.5: Top 10 Target Segments Based on DR Potential in J-S

Top 10 Target Segments for DR	
Segment	**Rank**
Office Buildings / Large & Small	1
Residential - Single Family	2
All Other Commercial	3
Hotels & Motels	4
Water Agencies	5
Food Stores / Refrigerated Warehouses	6
Retail Stores / Large & Small	7
Schools	8
Other Warehouses	9
Colleges & Universities	10

Figure 4.9: Example of Methodology Used to Identify Target Customers



Findings

The key findings from the DR potential study are summarized as follows:

- 81 MW in technical potential DR peak load reduction is estimated, based on 1,202 customers identified as "good candidate" DR participants.
- Many large commercial and industrial customers already participate in SCE's Base Interruptible Program (BIP).
- Targeting DR efforts on the top-ranked commercial and industrial segments is likely to be a cost-effective way to meet PRP goals, given that a relatively small number of these non-residential customers drive J-S peaks.

- Additional work is required to refine the DR potential by incorporating "propensity to participate" into the analysis.

Updated EE Market Potential

Inputs

- 2013 California Energy Efficiency Potential and Goals Study
- 2009 California Residential Appliance Saturation Study
- Numbers and types of commercial customers in J-S, and
- 2010-12 Commercial Saturation Survey / Commercial Market Share Tracking Survey (CSS/CMST).

Assumptions

- Only rooftop Heating, Ventilation, and Air Conditioning units (HVAC RTUs) were included in the EE potential study because they comprise the largest share of the commercial HVAC market, thus representing the commercial HVAC measure with the highest achievable potential in the target market
- Other measures selected for inclusion in the EE potential analysis, based on end-use saturation and EE potential, include commercial lighting, residential pool pumps, and residential HVAC, and
- Seasonality, EE potential, and average summer on-peak load were chosen as the most relevant factors for selecting top-priority customer segments for EE.

Methodology

The methodology used to derive the EE market potential was very similar to that described above for DR, involving identification of high-value target customer segments and end uses for peak demand reduction, selection of top weather-sensitive non-residential segments, and development of EE potential estimates based on target end uses and segments. This relied on information obtained from the studies and reports listed under "Inputs," above. In determining the EE potential for commercial HVAC and residential pool pump measures, the studies identified in the "Inputs" section were used to estimate the number of commercial RTUs and pool pumps in the target area and the estimated efficiency level of equipment stock. Market potential was developed by estimating the savings that would result from replacing less efficient HVAC and pool pump equipment with more efficient equipment. For commercial lighting, the results from the 2013 EE Potential and Goal study was used for Climate Zones 6 and 8. Table 4.6 below shows the top 10 EE segments.

Table 4.6: Top 10 Target Segments Based on EE Potential

Tier 1 - Top Target Segments for EE	
Segment	**Rank**
Office Buildings / Large & Small	1
Retail Stores / Large & Small	2
Restaurants	3
Schools	4
Other Warehouses	5
Hospitals / Medical Facilities	6
Colleges & Universities	7
Food Stores / Refrigerated Warehouses	8
Residential – Single-Family	9
Residential – Multifamily	10

Findings

The following conclusions were drawn from the EE potential study:

- 66 MW in technical potential EE peak demand reduction can be achieved through the identified top segments.
- 86% (57 MW) of the total EE potential is from lighting, HVAC and Combined measures
- Commercial office buildings continue to hold the greatest EE potential in the region –38 MW in above-code savings –through 2021
    - Commercial HVAC is the end-use with greatest potential
    - SCE's HVAC Early Replacement program targets this sector and end-use
    - Commercial lighting also remains a viable end-use for load reduction
- Residential pool pumps represent another viable end-use for peak load reduction.
- Residential HVAC is not a high-value target due to uncertainty of usage and the potentially high cost of reaching the large and diffuse customer base.

g. Identification of the Preferred Resources IFTM Solar PV Market Potential

A Solar Siting Survey was completed by the Clean Coalition[6] on behalf of SCE and provides an estimate of the technical solar PV generation potential in the PRP area for specific sites that can generate 500 kW (AC) of power up or greater.

Inputs

- Preferred Resources Pilot Map (.kmz) for PRP areas 24 and 59. NOTE: A version with transparency for the defined PRP areas was created to allow potential PV structures to be visible through the PRP area color.
- PRP RFO Interconnection Map (.kmz): substations, feeders. NOTE: The feeder information was extracted to find the amount of available capacity on each.

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[6] http://www.clean-coalition.org/resource/solar-siting-surveys/

Assumptions

1. Solar dimensions assumptions are summarized in Table 4.7.
2. Area calculated is normally corner-to-corner. Edge clearance setbacks and panel maintenance access are assumed in these numbers.
3. May have areas restricted, notched or cut off.
4. High density parking garage assumes no need for fire truck access between parking rows
5. For parking lots, only central areas that have double row (nose-to-nose) parking are included. Single row parking around perimeter omitted. Impact by trees & planter boxes not included.
6. Medium density assumes a requirement for fire truck access clearance between parking rows.
7. Brown field was initially considered but dropped after project started. One potential site was left in database for reference.

Table 4.7: Solar Dimension Assumptions

Structure	High Density	Medium Density	Low Density	Notes
Flat Roof	7 W/Sq. ft.	6 W/Sq. ft	5 W/Sq. ft	1, 2
Parking Garage	7 W/Sq. ft	N/A	N/A	1, 2, 3
Parking Lot	N/A	6 W/Sq. ft	N/A	2, 4, 5
Brown Field	7 W/Sq. ft	N/A	N/A	6

Methodology

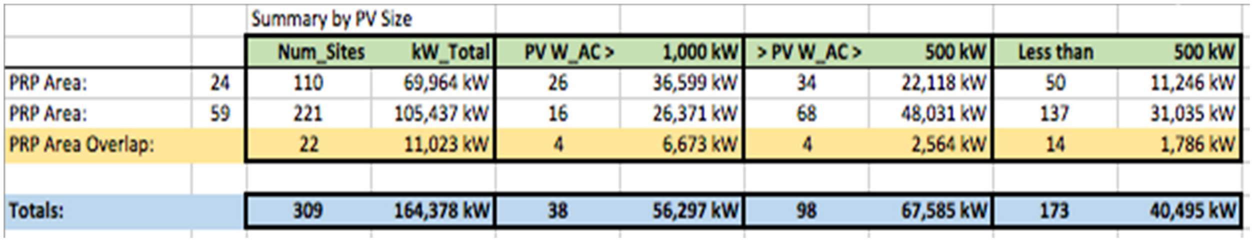
- Define realistic solar potential per site category. Tool/Source: local PV project developers.
  - Rooftops, Parking Lots, Parking Garages
  - High, Medium, Low PV density assessment based on contiguous space / amount of "clutter" per site
- Identify, categorize and quantify PV potential for sites. Tool/Source: Google Earth Pro, Google Maps.
  - Site sq. ft. and density assessment
  - Location
  - Distance to closest feeder(s)
- Survey full PRP Area. Tool/Source: Google Earth Pro, Google Maps, Web searches.
  - Identify target zones
  - Identify largest opportunities: 1MW+
  - Rescan for smaller size sites: 500 kw+
  - Rescan for groupings: business parks, shopping centers, etc.
- Generate .kmz and .xlsx files. Tool/Source: Google Earth Pro, MS Excel

Findings

The Clean Coalition identified over 160 MW of new solar PV potential in the PRP area. The technical solar potential may be closer to 300 MW when including sites in the 100kW – 400kW range, which is based on past experience and an educated assessment of the PRP grid area[7]. The two tables below provide additional summary details. The tables break down the totals into various categories, including each PRP area (24, 59) with 22 sites identified as "overlap" – sites that exist where areas 24 and 59 overlap according to the map data provided by SCE.

Table 4.8 below provides the summary by size of PV output: the totals per sites greater than 1 MW, sites greater than 500 kW but less than 1 MW, and sites less than 500 kW. The sites that are less than 500 kW are included as part of logical groupings such as office parks or shopping centers[8].

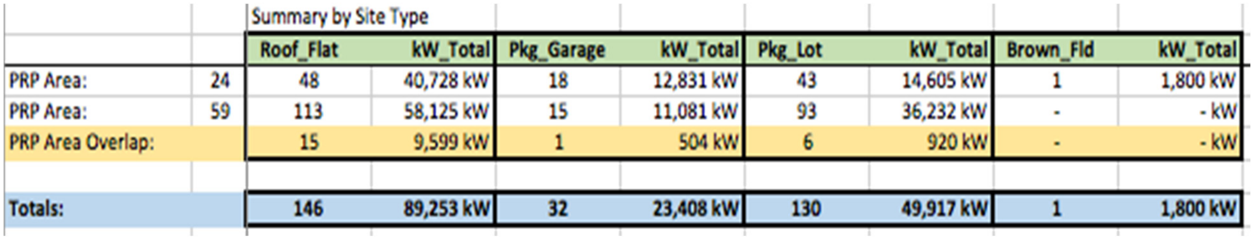
Table 4.8: PRP Solar Potential by PV size



		Summary by PV Size							
		Num_Sites	kW_Total	PV W_AC >	1,000 kW	> PV W_AC >	500 kW	Less than	500 kW
PRP Area:	24	110	69,964 kW	26	36,599 kW	34	22,118 kW	50	11,246 kW
PRP Area:	59	221	105,437 kW	16	26,371 kW	68	48,031 kW	137	31,035 kW
PRP Area Overlap:		22	11,023 kW	4	6,673 kW	4	2,564 kW	14	1,786 kW
Totals:		309	164,378 kW	38	56,297 kW	98	67,585 kW	173	40,495 kW

Table 4.9 below provides the summary broken down by site type: the totals for rooftops, parking garages (multi-story parking structures that would enable full cover canopy mounting), and parking lots (excluding aisles), and including one brown field.

Table 4.9: PRP Solar Potential by PV size



		Summary by Site Type							
		Roof_Flat	kW_Total	Pkg_Garage	kW_Total	Pkg_Lot	kW_Total	Brown_Fld	kW_Total
PRP Area:	24	48	40,728 kW	18	12,831 kW	43	14,605 kW	1	1,800 kW
PRP Area:	59	113	58,125 kW	15	11,081 kW	93	36,232 kW	-	- kW
PRP Area Overlap:		15	9,599 kW	1	504 kW	6	920 kW	-	- kW
Totals:		146	89,253 kW	32	23,408 kW	130	49,917 kW	1	1,800 kW

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[7] The Clean Coalition's experience is supported by studies in the LADWP service territory where 50-500kW siting opportunities had a total capacity of about 3x more than the 500kW+ siting opportunities.

[8] The grouped siting opportunities in the Solar Siting Survey are those that appeared to be within a single property AND that would aggregate to at least 500kW.

h. Determination of the Preferred Resources Selection for the PRP Portfolio

The final step in the portfolio design process involves a "best fit" selection of preferred resources. This step relied on the work performed up to this point to forecast load growth in J-S, define the required resource attributes, and estimate availability of at least some preferred resources through the market potential studies.

The findings described below represent the starting point for the acquisition of preferred resources. As preferred resources are added to the PRP region J-S substations and to our tracking and measurement process, the ability to acquire the resources, the delivery performance results, and the cost of the resource will inform future acquisitions.

The preferred resource portfolio is aligned with the Loading Order[9] and also supports the reduction of greenhouse gases. Since there is limited distributed generation in the PRP region, it may be difficult to acquire generation resources that will not contribute to greenhouse gas generation (GHG) when deployed. Initial preference is given to preferred resources that do not rely on natural gas (EE, DR, all PV, ES, R-CHP, R-FC), but other resources such as CHP and FC resources may be acquired to support the PRP objectives. Three alternative scenarios or "Cases" were developed on this final step: Recommended, Low EE and DR, and High EE and DR.

Inputs

- Required preferred resources by hour associated with the forecasted highest peak day in 2022, and
- Market potential for various resources.

Assumptions

- Energy efficiency assumes a delivery profile based on HVAC and lighting technologies. The Low Case assumes that market barriers limit the ability to acquire the EE market potential. The 66 MW market potential reflects selected EE programs specifically measured in the PRP. The contributions from the remaining EE programs are embedded into the load growth slope.
- DR is deployed in four-hour blocks and is used to reduce the peak. Based on the frequency of calls indicated by the attributes analysis, the DR product is expected to meet all of the 0-4 hour needs in the Recommended Case. All cases assume sufficient program changes to cause increased customer participation over the current stable DR program estimate of 32 MW.
- BTM PV is double the base line in the Low Case, triple in the Recommended Case, quadruple in the High Case. The base line for BTM PV is based on approximately 30MW of PV systems installed in the area prior to the start of the PRP.
- Energy Storage and IFTM PV, for the Recommended and High Cases, are assumed to fill the MW gap. In the Low Case IFTM PV assumes full technical potential of 164 MW for systems 500 KW and above is achieved.

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[9] See Footnote 1 above.

- A PV capacity factor or solar load shape for BTM and IFTM was developed using the output in terms of percent of nameplate capacity at 15 minute intervals for approximately 40 behind-the-meter solar systems in June through September 2014 and 2015 (see Appendix C). Using the standard deviation at each time interval, a 5th percentile curve was created (above which we would expect 95% of the data points to fall). The megawatts of PV procurement will be higher than the generation need to account for PV's capacity factor (and, therefore, the actual expected energy delivered to the grid rather than the nameplate capacity).
- Energy Storage assumes a 4-hour storage product that is dispatched incrementally in continuous 4-hour blocks. Energy storage is used to reduce the peak when DR is not available or used to fill small gaps.
- Given the lack of a market potential study for CHP and FC, these resources are not included in this analysis but may be considered in future iterations. CHP and FC that use eligible renewable resources are eligible to participate in ongoing PRP acquisition activities.
- Since the reliability need is in 2022, it will be recommended to acquire these resources over time. The first acquisition recommendation will be for the combined J-S region, and any constraints that require more resources in one substation over another are assumed to be minimal to non-existent.
- Three preferred resources availability scenarios were developed to determine potential portfolio options. The assumptions are summarized in Table 4.10.

Table 4.10: Preferred Resource Availability Scenarios

Resource Type	Low Case	Recommended Case	High Case
EE – 66 MW Market potential	50%	100%	150%
DR – 81 MW Market Potential	75%	100%	125%
BTM Solar – 30 MW installed prior to start of PRP	X2	X3	X4
IFTM Solar – 164 MW Market Potential (Nameplate)	Amount needed to fill gap	100 %	Amount needed to fill gap
Energy Storage	Amount needed to reduce the peak when DR is not available or used to fill small gaps		
CHP	*Next portfolio iteration – November 2016*		
FC	*Next portfolio iteration – November 2016*		

Methodology

The selection of best-fit preferred resources for the PRP portfolio was conducted by matching the required preferred resources by hour associated with the forecasted highest peak day in 2022. The selections for the three scenarios (Cases) were developed based on the assumption.

Findings

- All three scenarios summarized in Table 4.11 and depicted in Figures 4.10-4.12, below, result in a diverse portfolio of preferred resources that can meet expected load growth.
- The High Case requires a little more than half of the IFTM PV and about 1/3 of the Energy Storage resources when compared to the Low Case.
- In terms of GHG, the Low Case could result in the greatest GHG increase, given the increased reliance on Energy Storage (182 MW).
- The Recommended Case as a starting point for building a PRP portfolio has a moderate reliance on IFTM PV and Energy Storage. For solar PV, nameplate is used as a starting point. Since output is less than nameplate, more MW are required and reflected in the overall size of the portfolio options.

Table 4.11: PRP Portfolio Options for Meeting the 2022 Forecasted Peak Load

Resource Type	Low Case	Recommended Case	High Case
EE	33 MW	66MW	99 MW
DR	61 MW	81 MW	101 MW
BTM PV	30 MW	60 MW	90 MW
IFTM PV	164 MW	130 MW	90 MW
Energy Storage	182 MW	100 MW	64 MW

Figure 4.10: Recommended Case PRP Portfolio

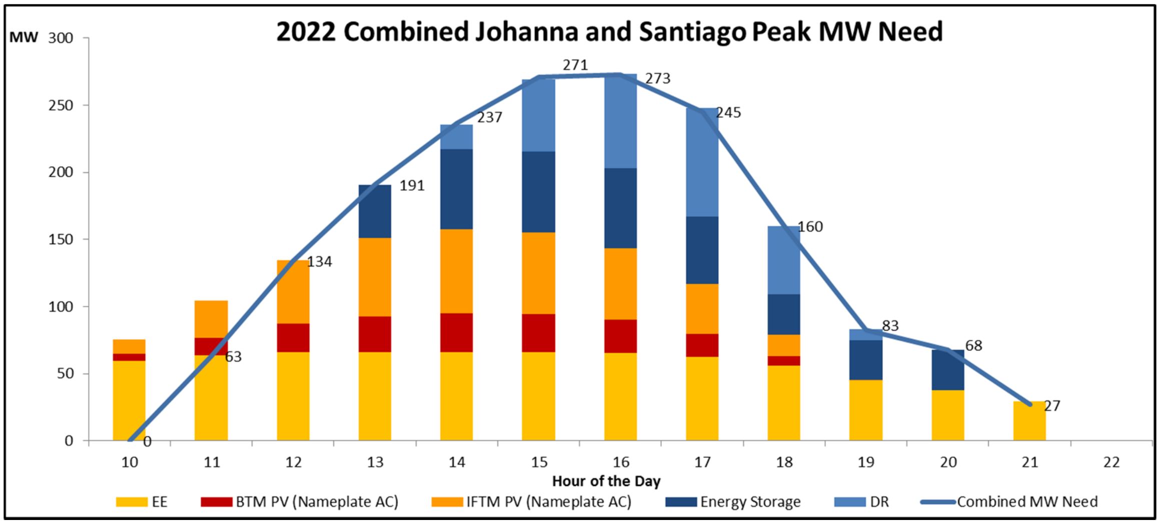


Figure 4.11: Low DSM Delivery Case PRP Portfolio

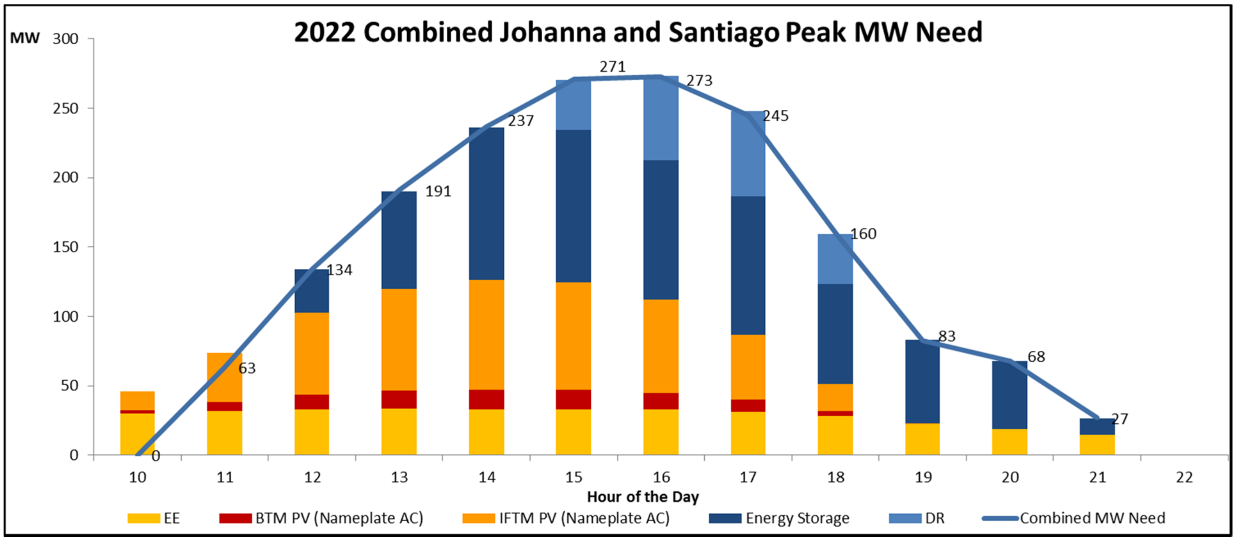
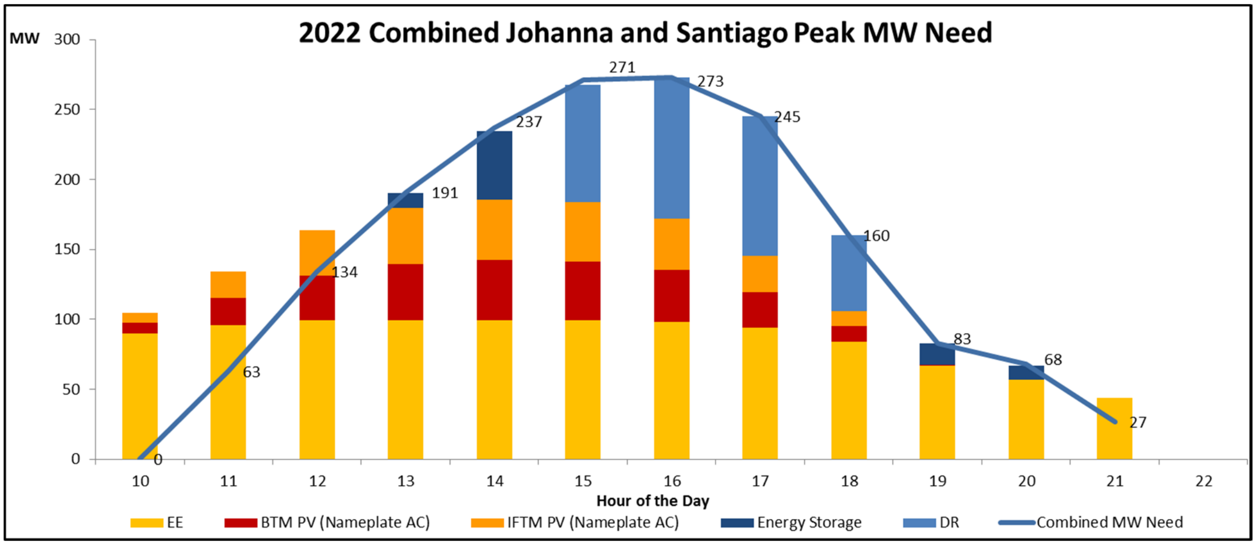


Figure 4.12: High DSM Delivery Case PRP Portfolio



Acquisition Recommendations

- Continue with a staged acquisition approach since it results in filling the resource gaps at the right time with the right resources while leveraging lessons learned from ongoing acquisition activities. The following is a recommended staged acquisition approach for the duration of the PRP program based on expected load growth:

Table 4.12: Recommended Pro Rata Procurement

	Procurement Periods (MW)			
	2013-2017	2018-2020	2021–2022	Total
Expected Incremental Load Growth	134	103	38	275
Expected Portfolio Need	175 (40% of Recommended Case)	131 (30% of Recommended Case)	131 (30% of Recommended Case)	437

- Acquire up to 175 MW (~40% of the Recommend Case portfolio) by the end of 2016 to provide an indication of SCE's progress toward meeting the region's 2022 load growth.
- Based on amount of acquired resources (Table 4.13) from the start of 2014 through December 310, 2015, there continues to be a need to demonstrate acquisition ability for IFTM distributed generation and energy storage.

Table 4.13: PRP Acquisition Status to Date

Preferred Resource Type	MW[10]
EE	34.56
DR (including permanent load shift)	25.6
Distributed Generation (BTM)	28.31
Distributed Generation (IFTM)	2.17
Energy Storage (behind the meter customer systems)	17
Energy Storage (IFTM systems)	3

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[10] The MW amounts reflect the preferred resources acquired through existing mechanisms as of December 31, 2015 for delivery through 2022.

5. Conclusion

The portfolio design processes and methodologies summarized in this report, including consideration of the operational constraints of the Preferred Resources (availability, duration, and intermittency), provide a sound approach for analyzing the type and quantity of Preferred Resources to be acquired to best meet the forecasted increase in J-S area local demand needs.

The forecasted load growth in the PRP area is approximately 275 MW. A portfolio size of about 437 MW – 470 MW, depending on the actual deployment of DSM resources and the delivery profile of each preferred resource type, is needed to manage load growth to net zero by 2022. As depicted in Table 4.12: Recommended Pro Rata Procurement, the PRP MW need is based on the expected incremental load growth. The portfolio cases account for certain preferred resources time of day delivery limitations. Therefore the amount of MWs to be acquired will be greater than the PRP MW need. Other key conclusions include:

- No single preferred resource can meet all local needs; however, energy efficiency and demand response should be pursued initially consistent with the State's preferred loading order.
- Implementing the achievable DSM potential leaves a resources gap in meeting the PRP's goal of managing load to zero net growth. This resource gap could be met by DG and energy storage.
- The forecast indicates there is one day where the peak need is 275 MW and two-three days where the resource need is expected to be greater than or equal to 258 MW, in such cases, the existing DR programs may be capable of shaving off the peak, assuming all other preferred resources contribute toward meeting the MW peak.
- Acquiring less than the expected DSM market potential may result in an increase in GHG emissions from the PRP portfolio of preferred resources because more energy storage is assumed to fill the resource need. In the development of the recommended mix of preferred resources, energy storage was shaped to meet the peak need and demand response was assumed to shave off the peak.

Managing load growth to net zero predominately through preferred resources is a first time approach for SCE. As this approach is implemented, new insights will emerge and get incorporated into this process, therefore changes to the portfolio design are to be expected. As detailed in this updated report, a key input, the load forecast, decreased — although increased load growth continues to be expected. The assumptions about the energy growth were updated to better match the expected load increase, which resulted in the Santiago need extending passed hour ending (HE)19 into HE21. This report also incorporates a deeper analysis of the load and load transfers. The solar production factors were also updated based on improved understanding about Solar PV from the measurement work stream reducing the amount of solar previously depended on. Lastly, the assumptions about EE were modified. Instead of assuming a flat EE delivery profile the delivery of EE was modified based on the attributes from lighting and HVAC measures resulting in an increase in resource need in HE19-21 compared to the previous report.

These key changes modified the expected load shape and resource attribute needs from the 2014 report resulting in an increase in the overall size of the Recommended Case portfolio of preferred resources. Future iterations of this report will continue to capture the year to year load variability, consider the performance of preference resources, and account for the outcomes from the preferred resources acquisition efforts ultimately improving SCE's understanding of preferred resources.

6. References

2013 California Energy Efficiency Potential and Goals Study – Revised Draft. California Public Utilities Commission, November 26, 2013.

2009 California Residential Appliance Saturation Study. California Energy Commission, October 2010.

Commercial Saturation Survey. California Public Utilities Commission, August 2014.

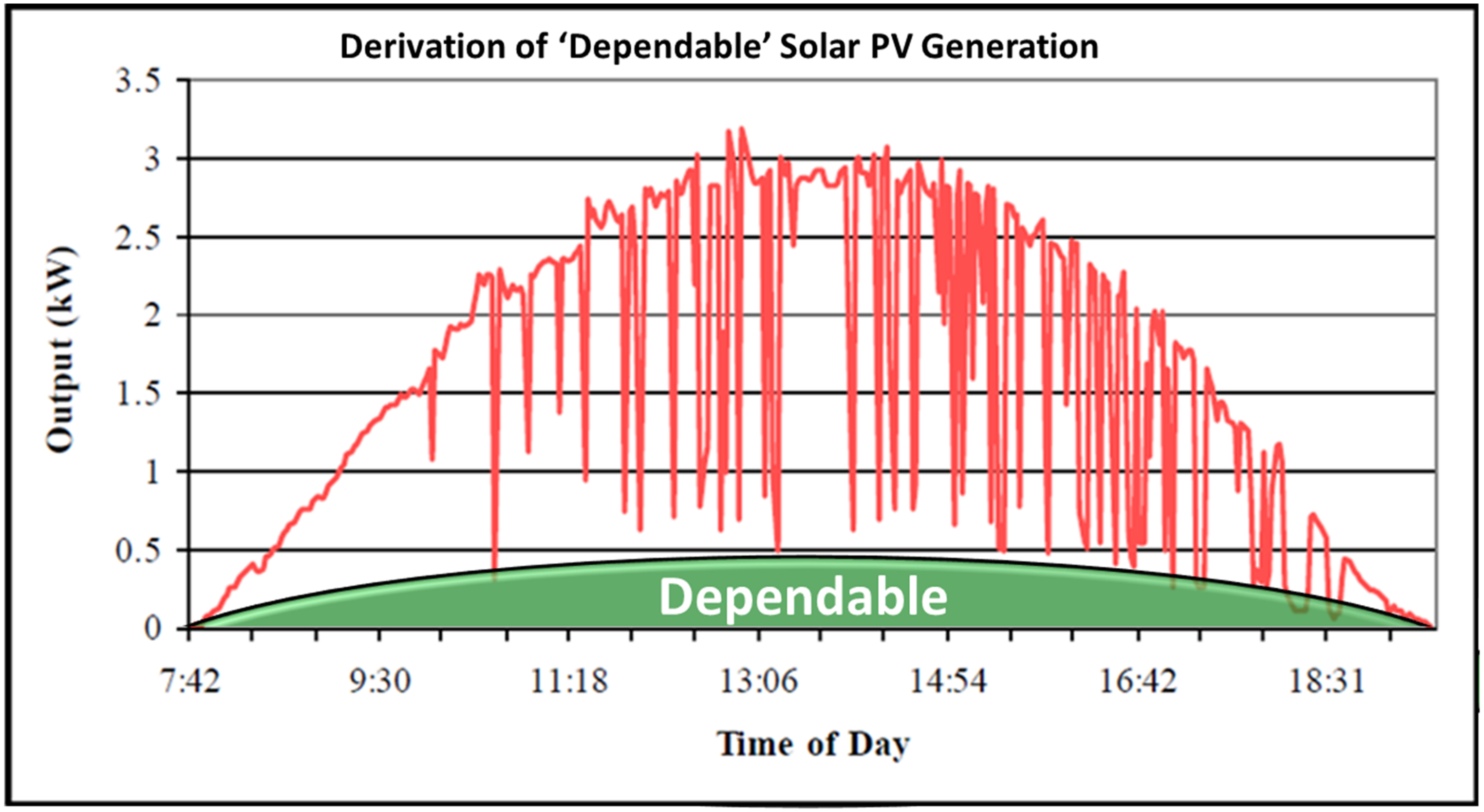
Commercial Market Share Tracking Survey (CSS/CMST). California Public Utilities Commission, July 20144

PRP DSM Potential and Targeting Analysis. Southern California Edison, March 5, 2014.

7. Appendices

Appendix A

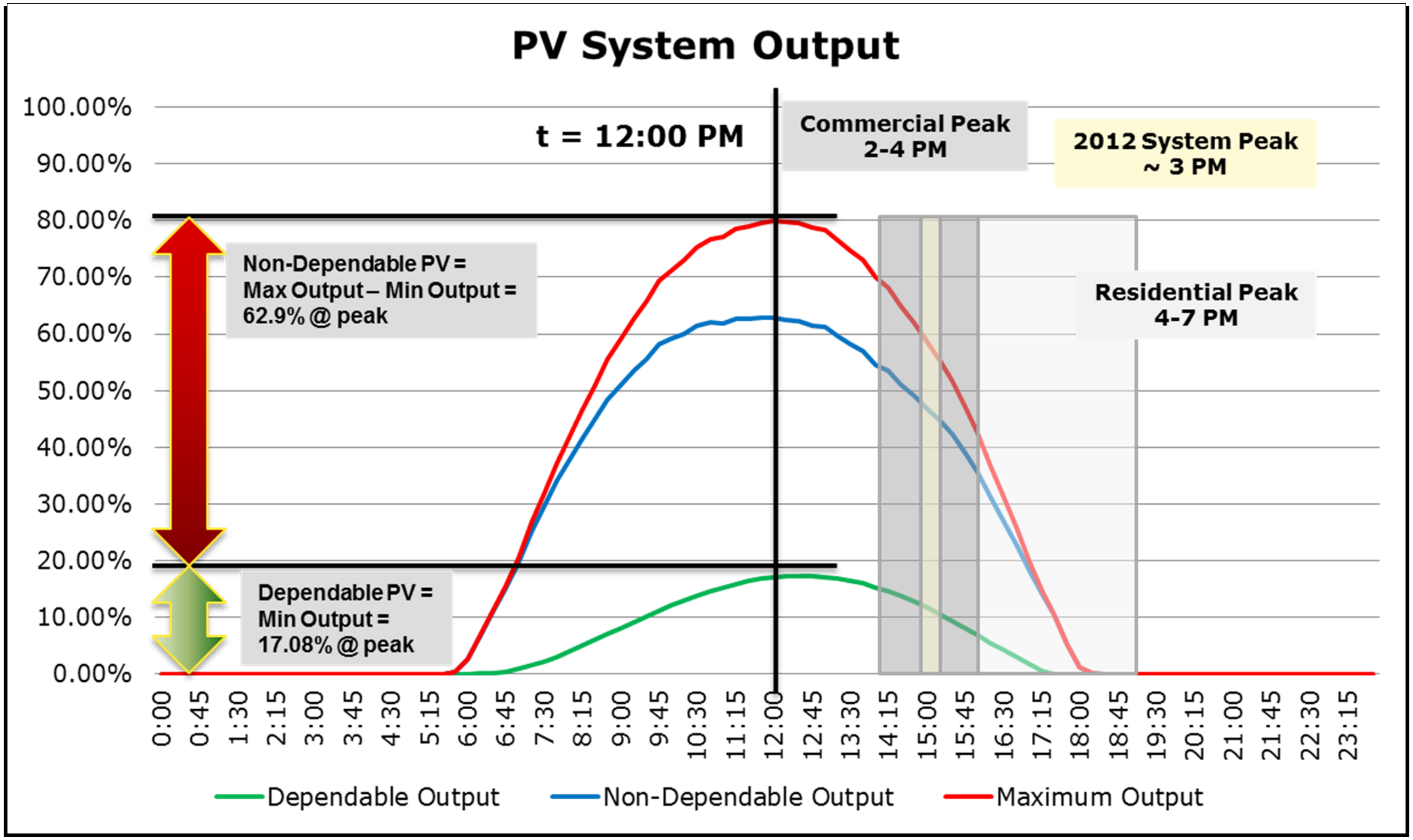
Results of SCE Distribution Engineering PV Study (continued on next page)



Source: CPUC California Solar Initiative 2009 Impact Evaluation

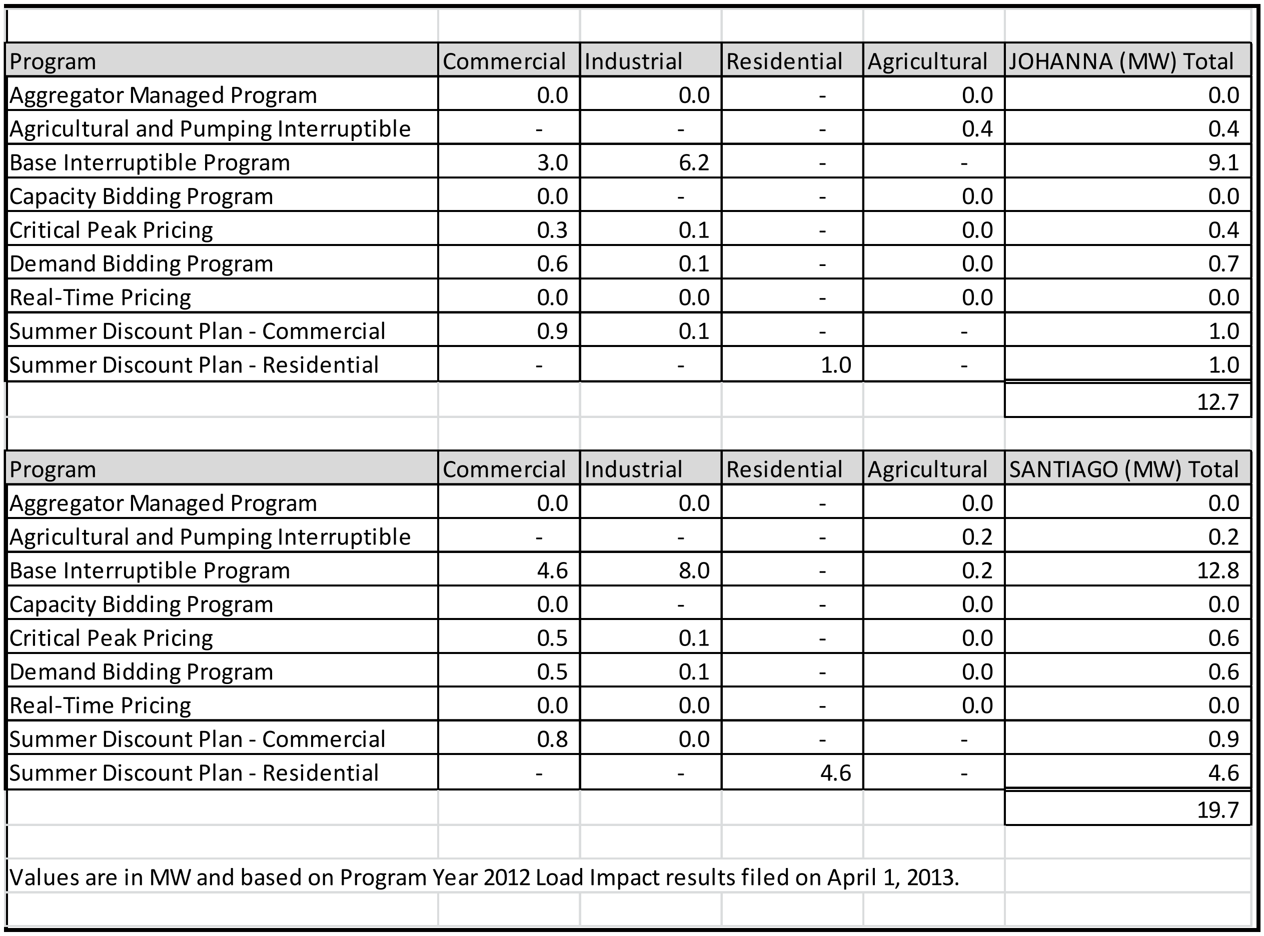
Appendix A

Results of SCE Distribution Engineering PV Study – (continued from previous page)



Appendix B

Estimated Available DR Load Reduction Capacity



Program	Commercial	Industrial	Residential	Agricultural	JOHANNA (MW) Total
Aggregator Managed Program	0.0	0.0	-	0.0	0.0
Agricultural and Pumping Interruptible	-	-	-	0.4	0.4
Base Interruptible Program	3.0	6.2	-	-	9.1
Capacity Bidding Program	0.0	-	-	0.0	0.0
Critical Peak Pricing	0.3	0.1	-	0.0	0.4
Demand Bidding Program	0.6	0.1	-	0.0	0.7
Real-Time Pricing	0.0	0.0	-	0.0	0.0
Summer Discount Plan - Commercial	0.9	0.1	-	-	1.0
Summer Discount Plan - Residential	-	-	1.0	-	1.0
					12.7

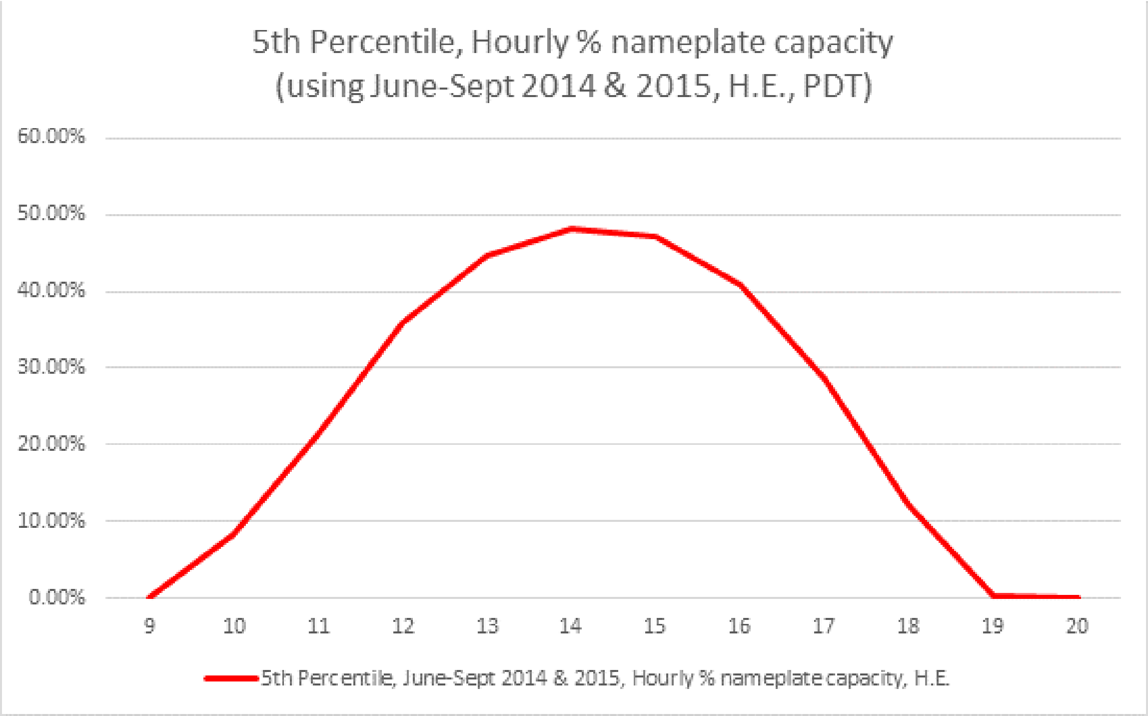
Program	Commercial	Industrial	Residential	Agricultural	SANTIAGO (MW) Total
Aggregator Managed Program	0.0	0.0	-	0.0	0.0
Agricultural and Pumping Interruptible	-	-	-	0.2	0.2
Base Interruptible Program	4.6	8.0	-	0.2	12.8
Capacity Bidding Program	0.0	-	-	0.0	0.0
Critical Peak Pricing	0.5	0.1	-	0.0	0.6
Demand Bidding Program	0.5	0.1	-	0.0	0.6
Real-Time Pricing	0.0	0.0	-	0.0	0.0
Summer Discount Plan - Commercial	0.8	0.0	-	-	0.9
Summer Discount Plan - Residential	-	-	4.6	-	4.6
					19.7

Values are in MW and based on Program Year 2012 Load Impact results filed on April 1, 2013.

Source: SCE DSM Forecasting & Cost Effectiveness

Appendix C

Results of solar PV measurement



Traditionally, utility system planning activities use conservative assumptions, due to limited access to the solar generation data, to determine the contribution of future behind the meter solar installations to the peak need. While customer solar projects are typically metered, there is no requirement to share this information with SCE. In order to improve the confidence in the future performance of solar, SCE completed a statistical analysis of historic solar generation data particular to the PRP area.

- SCE used two summers of “behind-the-meter” (customer-sited) solar data from a subset of customers that report generation data via a separate meter on the solar array.
- The abnormalities were removed from the data, which was then used to calculate a curve of capacity factors at each hour, above which 95% of the solar systems are typically generating, which is illustrated in the graph above.
- The PRP used the hourly capacity factors from this analysis (with a peak production of 48%) to shape the expected output of solar accounted for in this portfolio design report.

Improving the planning assumptions for solar resources will allow SCE to plan with statistical confidence and better account for contributions from solar in order to better plan for system and resource needs.

8. Acronyms

AMI	Advanced Metering Infrastructure
BIP	Base Interruptible Program
BTM	Behind the Meter
CEUS	California Commercial End Use Survey
CHP	Combined Heat and Power
CMST	Commercial Market Share Tracking Survey
CPUC	California Public Utilities Commission
CSI	California Solar Initiative
CSS	Commercial Saturation Survey
DR	Demand Response
DSM	Demand Side Management
ERR	Eligible Renewable Resource
EE	Energy Efficiency
ES	Energy Storage
EV	Electric Vehicle
FC	Fuel Cell
HVAC	Heating, Ventilation, and Air Conditioning
IFTM	In Front of the Meter
J-S	Areas Serviced by the Johanna and Santiago Substations
kVA	Kilo-volt-amperes
kWh	Kilowatt-hours
LCR	Local Capacity Requirement
MVA	Mega-volt-amperes
MW	Megawatts
NPV	Net Present Value
NREL	National Renewable Energy Laboratory
OTC	Once Through Cooling
PR	Preferred Resources
PRP	Preferred Resources Pilot

PV	Photovoltaic
RASS	Residential Appliance Saturation Survey report
RTU	Rooftop Unit
SCADA	Supervisory Control and Data Acquisition
SONGS	San Onofre Nuclear Generating Station
SPP	Starting Point Peak