FILED
3-25-16
04:59 PM

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE

STATE OF CALIFORNIA

Order Instituting Rulemaking to Oversee the Resource Adequacy Program, Consider Program Refinements, and Establish Annual Local and Flexible Procurement Obligations for the 2016 and 2017 Compliance Years.	Rulemaking 14-10-010 (Filed October 16, 2014)

SOUTHERN CALIFORNIA EDISON COMPANY'S (U 338-E) REVISED TRACK 1 PROPOSALS

WILLIAM V. WALSH
TRISTAN REYES CLOSE

Attorneys for
SOUTHERN CALIFORNIA EDISON COMPANY

2244 Walnut Grove Avenue
Post Office Box 800
Rosemead, California 91770
Telephone: (626) 302-2883
Facsimile: (626) 302-3990
E-mail: Tristan.ReyesClose@sce.com

Dated: **March 25, 2016**

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE

STATE OF CALIFORNIA

Order Instituting Rulemaking to Oversee the Resource Adequacy Program, Consider Program Refinements, and Establish Annual Local and Flexible Procurement Obligations for the 2016 and 2017 Compliance Years.	Rulemaking 14-10-010 (Filed October 16, 2014)

SOUTHERN CALIFORNIA EDISON COMPANY'S (U 338-E) REVISED TRACK 1 PROPOSALS

I.

INTRODUCTION

Pursuant to the schedule detailed in the December 23, 2015 Assigned Commissioner and Administrative Law Judge's Phase 2 Scoping Memo and Ruling ("Phase 2 Scoping Memo") issued in this proceeding, Southern California Edison Company ("SCE") hereby submits its revisions to the Track 1 proposals submitted on January 15, 2016, which was followed by a workshop on February 18, 2016. SCE offers the following revisions:

- Modify the California Independent System Operator's ("CAISO") proposal to require Demand Response ("DR") resources to respond in 20 minutes or less to allow DR resources to count for Local Resource Adequacy ("RA") credit based upon the portfolio's expected performance within 20 minutes; and
- Delay implementing Energy Division's Effective Load Carrying Capacity ("ELCC") methodology until the 2017 RA proceeding for further study, or alternatively, modify Energy Division's ELCC methodology to cap the monthly ELCC values at the Net Load Peak ELCC results.

II.

REVISED PROPOSALS

A. A Process Should Be Created to Give Local Capacity Value to Demand Response Resources with Response Times Greater than 20 Minutes

In their January 15, 2016 comments, CAISO requested that the Commission align its Local Resource Adequacy requirements with the CAISO's Local Capacity Technical study.[1] Under CAISO rules, DR resources located in local areas must be capable of responding within 20 minutes of a CAISO dispatch instruction or be available for sufficient pre-dispatches per month in order to be eligible to provide Local RA. As shown in the presentation SCE gave at the February 18, 2016 RA Workshop,[2] it is possible for DR Resources with nominal response times greater than 20 minutes to reliably provide energy reductions to the CAISO in a 20 minute time frame. In other words, a program requiring a full response within a longer than 20 minute time frame will have a "ramp rate" that can result in a significant portion of the program MW to be reliably delivered within the 20 minute timeframe. If the 20 minute requirement is adopted by Energy Division, SCE requests that the California Public Utilities Commission ("Commission" or "CPUC") create a process whereby scheduling coordinators for DR resources will get Local RA credit based on the expected performance within such a timeframe, even if the contractual response time is greater than 20 minutes.

B. Implementation of ELCC Should Be Delayed Until the 2017 RA Proceeding

SCE has reviewed the ELCC analysis and values published by Energy Division on January 15, 2016,[3] and recommends further study prior to implementation in the RA program.

---

[1] *See* CAISO Comments, dated January 15, 2016, at 2.
[2] *See* Attachment A, "Demand Response and Local RA Criteria Discussion."
[3] *See* "Effective Load Carrying Capability of Wind and Solar Resources in the CAISO Balancing Authority and Resetting the Reserve Margin for Resource Adequacy Obligations," submitted January 15, 2016 in the Administrative Law Judge's Ruling Presenting Energy Division's Track 1 Proposals.

As shown in the presentation SCE gave at the February 18, 2016 RA Workshop,[4] and in the tables below,[5] the published ELCC values have not been sufficiently vetted and may result in capacity values that overestimate resources' contributions to meeting load. For example, the published ELCC values result in periods of time where there are not enough RA resources to meet system load. This is especially apparent in the summer months where the solar ELCC values result in a potential gap between RA resources and system load of potentially 2,000 MW or more. Outside of the summer months this issue is potentially worse, where technologies will receive a positive ELCC value even when they do not produce energy during the same time as the load peak (*e.g.*, evening hours in the winter). Rather than implementing an ELCC methodology and results that are known to have concerns, SCE suggests the Commission delay ELCC implementation until the next RA proceeding while Energy Division's ELCC model and results are further vetted and refined.

Energy Division Draft Solar ELCC Values and Resulting Shortage of RA Resources to Meet Load

Month	2017 Solar Weighted ELCC / Technology Composite	Solar Capacity Value (MW)	How much solar reduces peak net load need by (MW)	Resulting shortage in RA resources to meet load across month (MW)
1	19.22%	1,427	-	1,427
2	19.89%	1,477	-	1,477
3	23.17%	1,720	220	1,500
4	66.36%	4,927	-	4,927
5	67.88%	5,039	2,511	2,529
6	69.00%	5,123	2,320	2,802
7	64.66%	4,800	2,427	2,373
8	64.75%	4,807	2,910	1,897
9	65.55%	4,866	1,079	3,787
10	55.75%	4,139	1,031	3,108
11	19.15%	1,422	-	1,422
12	19.13%	1,420	-	1,420

[4] *See* Attachment B, "Net Load Peak ELCC."
[5] SCE will provide a copy of the calculations to parties upon request.

Energy Division Draft Wind ELCC Values and Resulting Shortage of RA Resources to Meet Load

Month	2017 Wind Weighted ELCC / Technology Composite	Wind Capacity Value (MW)	How much wind reduces peak net load need by (MW)	Resulting shortage in RA resources to meet load across month (MW)
1	3.80%	247	18	228
2	11.98%	778	945	-
3	19.86%	1,289	882	407
4	18.43%	1,196	1,201	-
5	31.05%	2,016	1,914	102
6	27.77%	1,803	2,411	-
7	17.29%	1,122	1,715	-
8	15.72%	1,021	1,225	-
9	10.68%	693	1,067	-
10	7.26%	471	149	323
11	3.23%	210	129	81
12	5.55%	360	102	259

C. If Implementation of ELCC Is Not Delayed, Energy Division's ELCC Results Should Be Capped by the Net Load Peak Based ELCC Results

If ELCC is implemented in the 2016 RA proceeding, SCE suggests the monthly ELCC values be capped using monthly Net Load Peak-based ELCC ("NLP-ELCC") Results. The NLP-ELCC analysis determines the highest ELCC values a technology or resource could have while still maintaining the requirement that there be enough resources to meet load in all hours of a month. In addition to intuitive values that result in maintained system reliability, the NLP-ELCC provides an analysis that can easily be made public to all parties, including the raw input data, calculations, analysis, and results.

The table below shows the NLP-ELCC values for solar and wind based on a CAISO forecast for load, wind, and solar in 2017.[6]

[6] *See* https://www.caiso.com/Documents/2017NetLoadDataFlexibleCapacityNeeds.xlsx.

Monthly Solar and Wind NLP-ELCC Values[7]

Month	Solar NLP-ELCC	Wind NLP-ELCC
1	0%	0%
2	0%	15%
3	3%	14%
4	0%	19%
5	34%	29%
6	31%	37%
7	33%	26%
8	39%	19%
9	15%	16%
10	14%	2%
11	0%	2%
12	0%	2%

A description of the NLP-ELCC analysis, including 2017 results, is attached to these comments.[8] The attached document describes the basic analysis as well as potential updates to account for reserve margin need and the predictability of wind and solar generation. SCE recommends these updates be included in the final NLP-ELCC values that are used to cap Energy Division's ELCC results. There is also a spreadsheet that calculates the 2017 NLP-ELCC values for solar and wind.[9] This spreadsheet can (1) be used by parties to review and understand the analysis performed by SCE, and (2) also be updated with new data if parties wish to identify NLP-ELCC results for different years or different forecasts for 2017.

If ELCC is implemented in the 2016 RA proceeding, SCE requests that Energy Division perform the NLP-ELCC analysis using its own forecast for load, wind, and solar generation and make the analysis public for parties to review. The NLP-ELCC analysis should then be used as a cap for each month's ELCC value.

---

[7] These values differ from the February 18, 2016 presentation because they account for the reserve margin and reliable generation from wind and solar.

[8] *See* Attachment C, "Effective Load Carrying Capability Using Net Load Peak."

[9] SCE will provide a copy of the spreadsheet to parties upon request.

III.

CONCLUSION

SCE respectfully requests the Commission adopt the revisions to the Track 1 proposals detailed herein.

Respectfully submitted,

WILLIAM V. WALSH
TRISTAN REYES CLOSE

/s/ Tristan Reyes Close
By: Tristan Reyes Close

Attorneys for
SOUTHERN CALIFORNIA EDISON COMPANY

2244 Walnut Grove Avenue
Post Office Box 800
Rosemead, California 91770
Telephone: (626) 302-2883
Facsimile: (626) 302-3990
E-mail: Tristan.ReyesClose@sce.com

March 25, 2016

Attachment A

Demand Response and Local RA Criteria Discussion

SOUTHERN CALIFORNIA EDISON®

An EDISON INTERNATIONAL® Company

Demand Response and Local RA Criteria Discussion

2016-02-18

There are methods for DR resources with response times greater than 20 minutes to meet local RA requirements

CAISO's Clarified Criteria for Local DR Eligibility:

A resource must be capable of (1) responding within 20 minutes or (2) being available for a sufficient number of pre-dispatches (i.e. starts per month) to count toward local capacity requirements.

Local Area Demand Response MW and Contractual Response Times

Local Area	Less than 20 Minute Response Time	30 Minute Response Time	Greater than 30 Minute Response Time	Day Ahead Dispatch
LA Basin	321	379	107	28
Big Creek / Ventura	154	57	27	4
Total MW	475	436	134	32

Approximately 600 MW of DR located in local areas would not be eligible for Local RA if only programs with a 20 minute response time were eligible. However, SCE is determining how much DR from other programs will be available to meet local RA criteria by studying:

- The number of pre-dispatches required for resources to count towards local RA (currently in progress)
- **The ability of DR resources with contractual response times greater than 20 minutes to realize energy reductions within 20 minutes (as load ramps down to meet the longer duration requirement).**

Historical BIP-30 dispatch shows that up to 281 MW could be obtained within 20-minutes from a 30-minute program

Base Interruptible 30-Minute Response Program (BIP-30)

Example Performance based on Historical Dispatch Data

Local Area	Total MW		Historical Dispatch 0-15 Minute Response	Historical Dispatch 15-30 Minute Response
LA Basin	379 MW		244 MW	322 MW
Big Creek Ventura	57 MW		37 MW	49 MW
Total Local Area	436 MW		**281 MW**	371 MW

Results are not final and are for discussion purposes only

- Using data from an actual dispatch, up to 65% of a 30-minute programs local capacity may be eligible to provide 20-minute response in local areas.
- This example is based on a single program's performance in one day, to find the actual amount of 20-minute response that can reliably be provided:
  - Analysis will need to be based on more than a single day's dispatch results
  - Analysis will need to take into account potential lag time between a CAISO dispatch and resource performance (e.g., time for SCE to notify DR participants to reduce load) and measurement period limitations.

Next Steps

- SCE is planning on submitting this proposal during the March 11th "Optional Revisions to Proposals" filing
- For questions and comments, please contact:

Martin Blagaich
Martin.Blagaich@sce.com

Attachment B

Net Load Peak ELCC

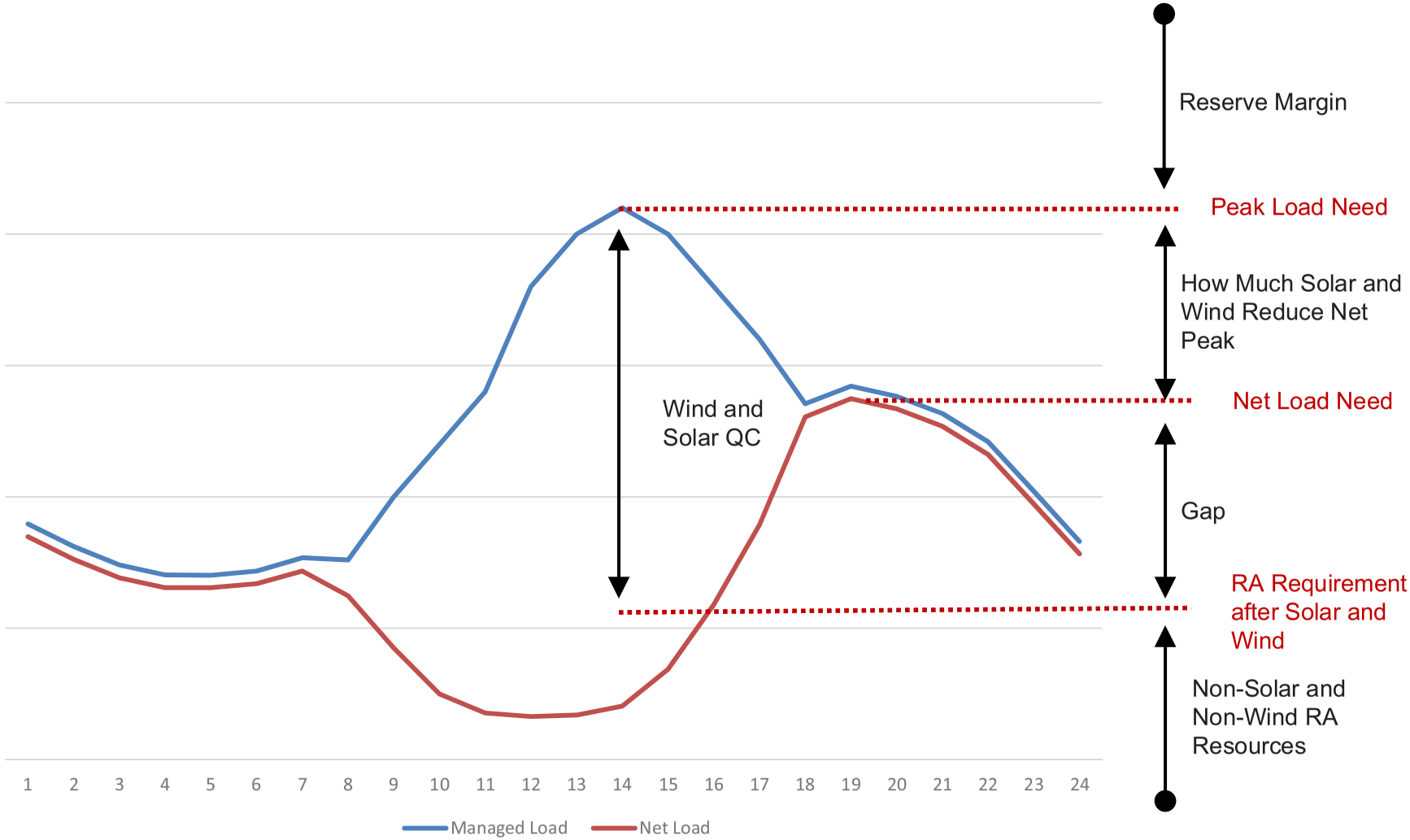
SOUTHERN CALIFORNIA EDISON®

An EDISON INTERNATIONAL® Company

Net Load Peak ELCC

2016-02-18

Exceedance Methodology Gap Problem



Using a single month of load/wind/solar data we can determine what ELCC of solar and wind is needed to eliminate the gap problem (i.e. make the gap 0).

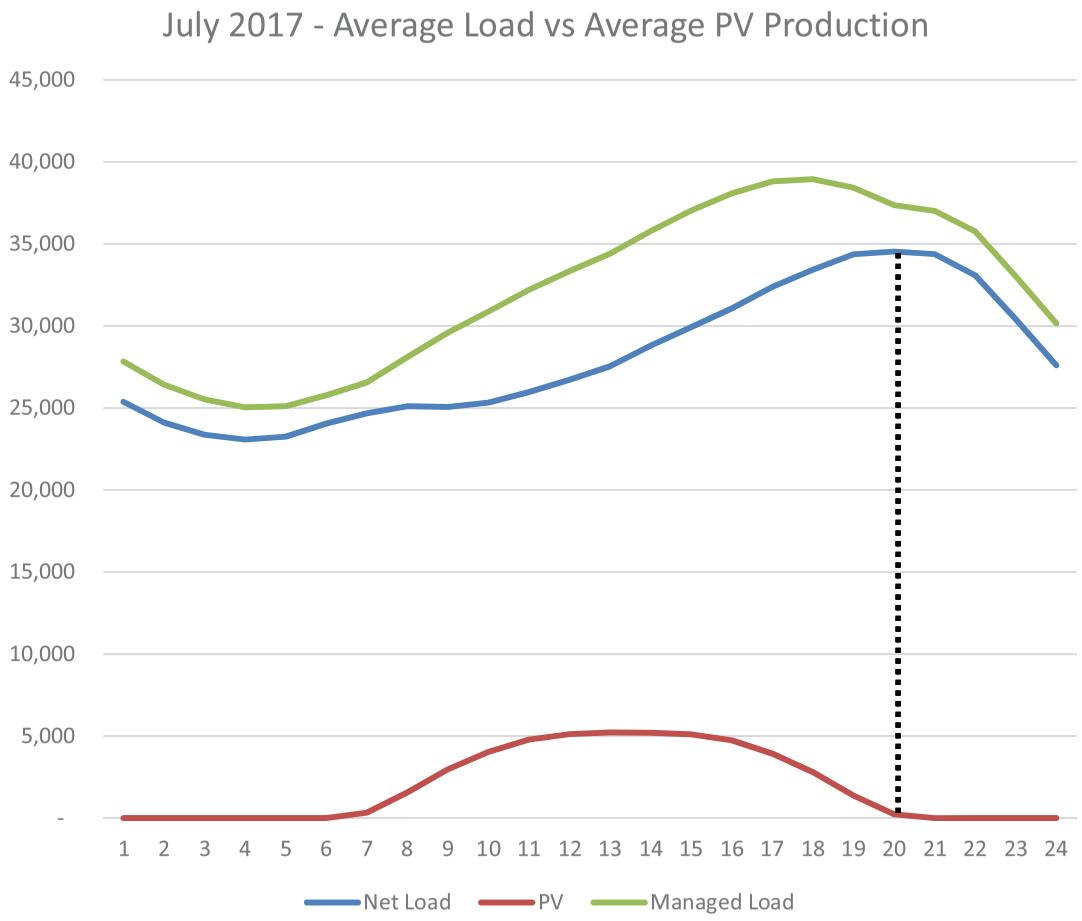
Net Load Peak based ELCC could provide a useful data point to help validate LOLE ELCC results

- Comparison of ELCC Methods
  - Loss of load event based ELCC analysis, such as that performed using SERV-M, calculates a resource's contribution towards reducing the frequency of loss of load events (LOLE-ELCC)
  - A Net Load Peak based ELCC calculates a resource's contributions towards reducing the net load peak (NLP-ELCC)

- A NLP-ELCC may not exactly match the results of a LOLE-ELCC, but SCE believes it provides intuitive results that will be useful data points when validating ELCC values of resources.

- SCE is interested in party feedback on the idea of using a NLP-ELCC to validate the efficacy of LOLE-ELCC results.

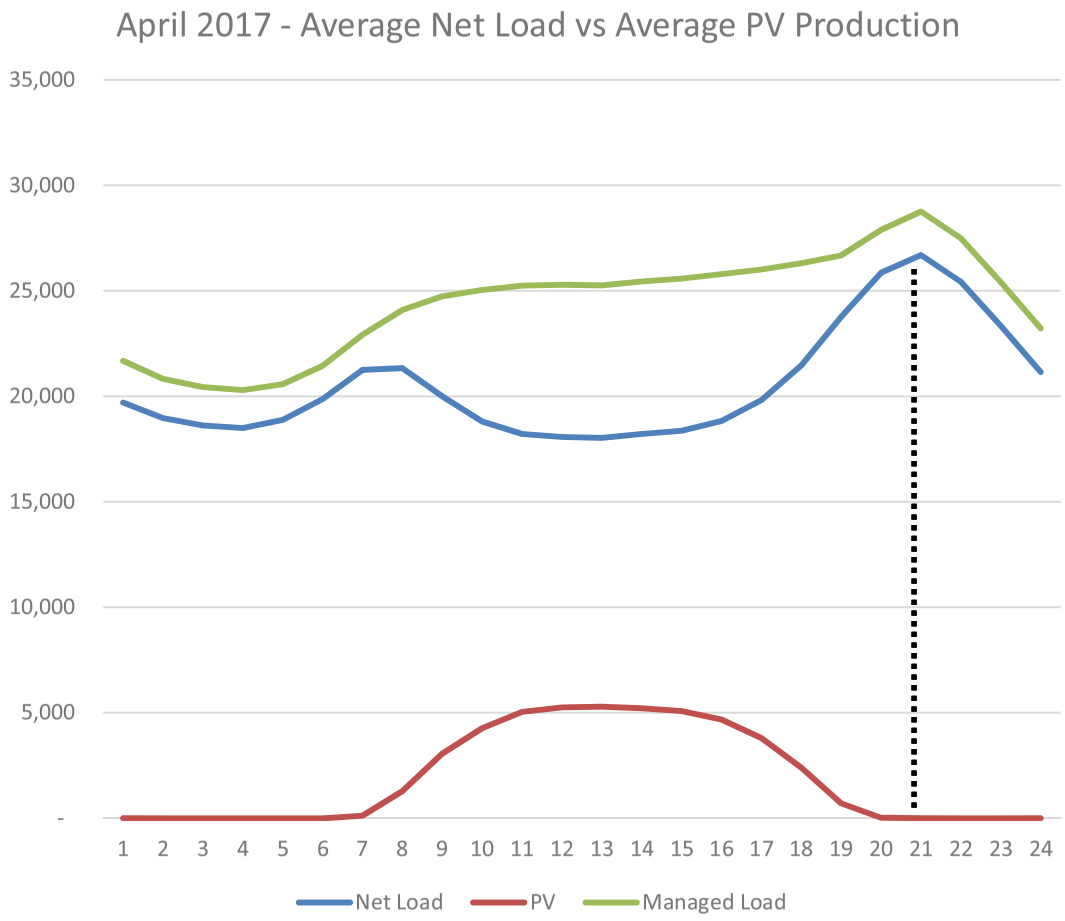
July 2017 Solar Results Comparison



Energy Division ELCC Results: 57.8%
Gap Created: 2,000 MW

ELCC to Eliminate Gap: 31.2%

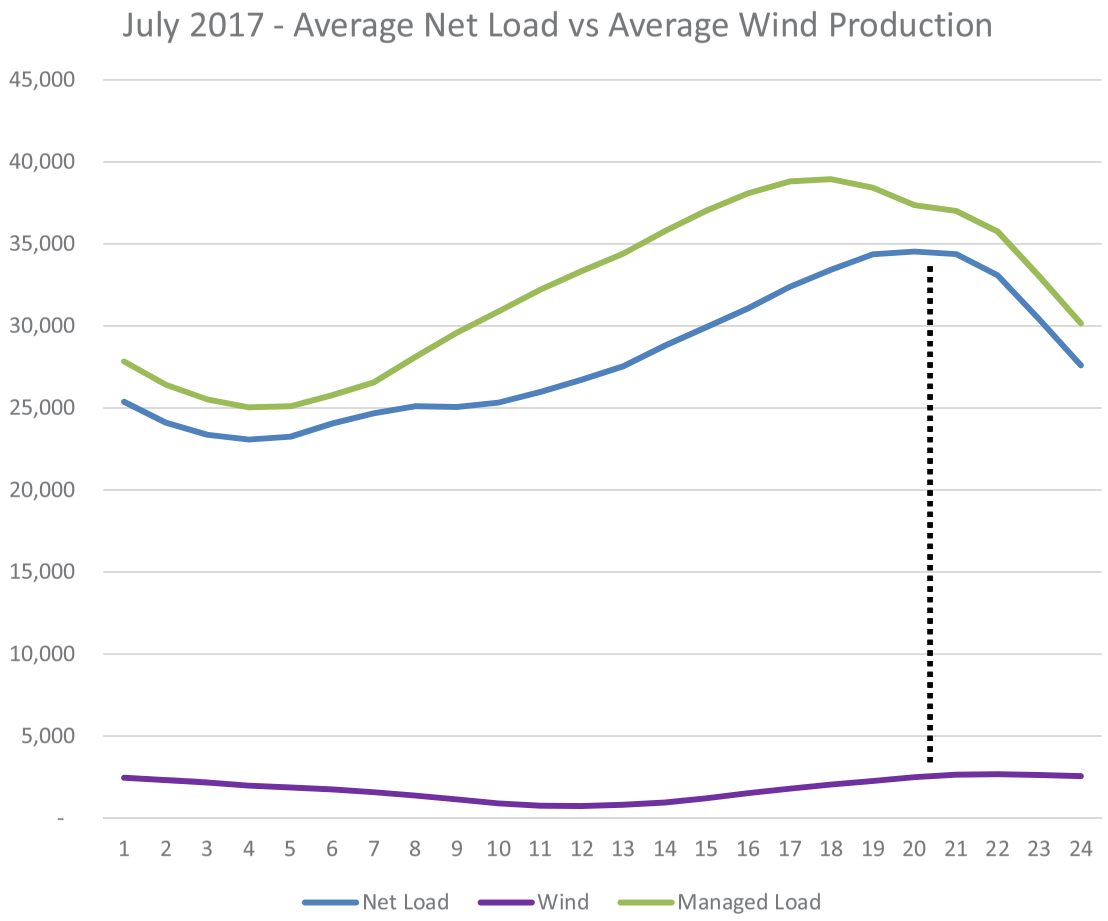
April 2017 Solar Results Comparison



Energy Division ELCC Results: 57.8%
Gap Created: 4,000 MW

ELCC to Eliminate Gap: 0%

July 2017 Wind Results Comparison



Energy Division ELCC Results: 12.6%
Gap Created: 0 MW

ELCC to Eliminate Gap: 25.0%

Solar ELCC Results Comparison

Month	2017 Weighted ELCC / Technology Composite	2018 Weighted ELCC / Technology Composite	Annual ELCC Result		2017 Net Load Peak ELCC
1	19%	38%	58%		0%
2	20%	39%	58%		0%
3	23%	40%	58%		0%
4	66%	62%	58%		0%
5	68%	63%	58%		34%
6	69%	63%	58%		35%
7	65%	61%	58%		31%
8	65%	61%	58%		41%
9	66%	61%	58%		14%
10	56%	56%	58%		16%
11	19%	38%	58%		0%
12	19%	38%	58%		0%

Wind ELCC Results Comparison

Month	2017 Weighted ELCC / Technology Composite	2018 Weighted ELCC / Technology Composite	Annual ELCC Result		2017 Net Load Peak ELCC
1	7%	10%	13%		8%
2	12%	12%	13%		20%
3	17%	15%	13%		7%
4	16%	14%	13%		1%
5	25%	19%	13%		11%
6	22%	17%	13%		20%
7	16%	14%	13%		25%
8	15%	14%	13%		17%
9	11%	12%	13%		27%
10	9%	11%	13%		2%
11	6%	9%	13%		2%
12	8%	10%	13%		3%

Next Steps

- SCE is interested in party feedback on the idea of using a NLP-ELCC to validate the efficacy of LOLE-ELCC results.
- SCE is planning on submitting this proposal during the March 11th "Optional Revisions to Proposals" filing
- For questions and comments, please contact:

Martin Blagaich
Martin.Blagaich@sce.com

Attachment C

Effective Load Carrying Capability Using Net Load Peak

Effective Load Carrying Capability using Net Load Peak

Summary

In this paper, Southern California Edison (SCE) describes a Net Load Peak based Effective Load Carrying Capability analysis (NLP-ELCC). The ELCC values created from this analysis can be either implemented directly or compared against ELCC values from more complex models where the intuition behind results is not easily understood. The NLP-ELCC is performed by calculating the ELCC values needed for technologies such that the system is never short capacity to meet load in any hour.

Background on the Exceedance Methodology and the Gap Issue

Exceedance methodology calculates an intermittent resource's capacity value by measuring how much it reliably generates during a span of hours, currently set at the time of peak load need. While this methodology makes sense for a limited quantity of intermittent resources, it can become misleading if the time horizon of the net load peak[1] begins to shift away from the load peak hours. When this happens, it is possible that intermittent resources will have their capacity values determined during a time when capacity needs on the system are not constrained. Furthermore, such a determination could overstate intermittent resources contribution at the time the system is constrained.

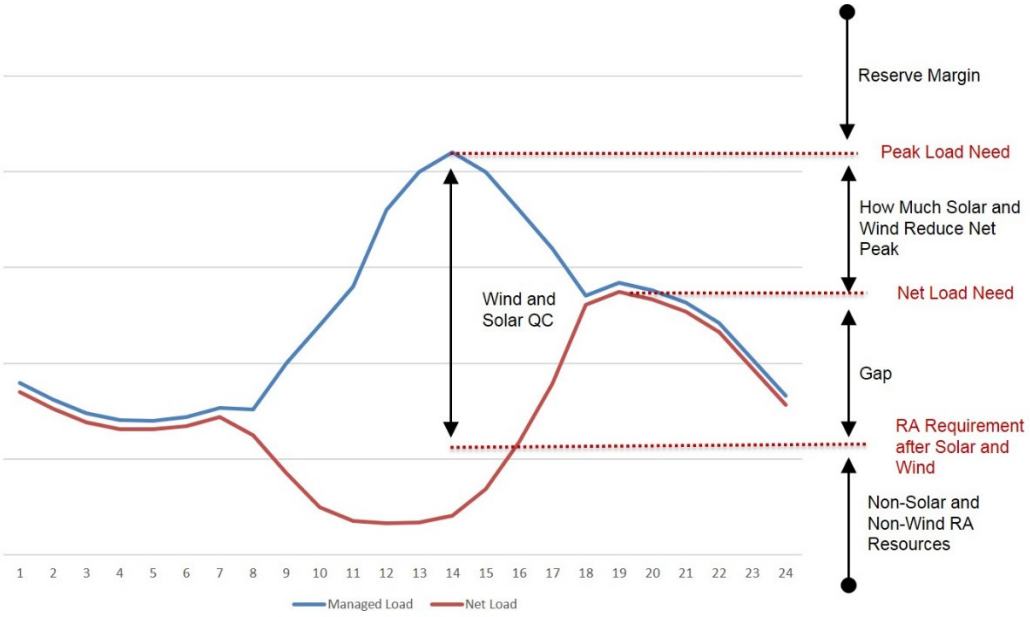
Utilizing the exceedance methodology when the peak load needs and net load peak needs occur in different time windows creates a gap issue. The gap issue, which is illustrated in the chart below, represents the load and net load needs of the system that cannot be met with system resources.[2] An Effective Load Carrying Capacity analysis is meant to address this by calculating effective capacity values for resources based on how they contribute to system reliability both during and outside of typical peak load hours.

---

1 For this paper, net load peak is defined as load minus solar and wind generation.

2 It is assumed that the resources should be able to meet system load at all time with a 15% - 17% reserve margin above peak load.

Illustrative Example of the Exceedance Methodology Gap Issue



Typically ELCC analysis is performed using a Loss of Load Event based model (LOLE-ELCC). To do this, a resource or technology is studied based on how well it can reduce the frequency of loss of load events.[3] If intermittent resources push the net load peak away from the load peak hours, it is expected that the loss of load events will shift to where the net load peak occurs. As a result, ELCC analysis should begin to give higher capacity values to resources that can generate during the net load peak while giving lower values to resources that cannot.

The NLP-ELCC is similar to the LOLE-ELCC except it studies a resource based on how well it can reduce the net load peak instead of the frequency of loss of load events. This simplification has several advantages when compared against a LOLE-ELCC analysis. For example, NLP-ELCC analysis only requires annual load data and annual production data for resources or technologies that need an ELCC value. A LOLE-ELCC requires a buildout of an entire system, including all generation resources, transmission constraints, hydro conditions, weather conditions, etc. Additionally, NLP-ELCC can be done using stochastic analysis but it is not required. LOLE-ELCC requires stochastic analysis since LOLE is a stochastic based result. Other benefits of stochastic analysis, such as accounting for outage rates, load forecast changes, weather variability, reliable generation from intermittent resources, and other factors, can be accounted for in a deterministic analysis using the reserve margin and other techniques described below. Finally, because NLP-ELCC uses Net Load Peaks and not Loss of Load Events as the metric to measure performance against, NLP-ELCC values can be calculated on a monthly granularity. LOLE-ELCC relies on LOLE which are typically only found in a few high load summer months. As a result, LOLE-ELCC analysis typically produces an annual ELCC value that may not be useful for monthly applications.

[3] A standard method is to 1) calculate the LOLE of a system; 2) add X MW of a resource to the system; and 3) increment the load until the system is brought back to the same LOLE level. The load increment, divided by the MW of the added resource gives the ELCC % for that resource.

NLP-ELCC Methodology

This section describes the steps to calculate a NLP-ELCC for wind and solar resources. It uses a deterministic analysis and illustrative examples. The end of this section contains actual results using public data sources for 2017.

The NLP-ELCC analysis can be performed to calculate both marginal and average ELCC values. The examples below calculate an average ELCC value. The NLP-ELCC can also be used to calculate ELCC values for an entire technology or a single resource. The values below show calculations for an entire technology.

At a high level, the steps to calculate a NLP-ELCC are

1. Calculate how much a technology individually reduces the net load peak needs
2. Calculate the over-lapping benefits for all ELCC resources and how they reduce the net load peak needs and allocate those benefits to each technology
3. Calculate the NLP-ELCC value based on the Technology Peak Reduction and Installed Capacity

Step 1: Calculating Peak Reduction of an Individual Resource/Technology

The first step in the NLP-ELCC methodology is to calculate the net load peak (NLP) reduction from an individual technology. To do this, the peak load of the system is compared with and without the technology being studied. The difference between the two represents the Individual NLP Reduction for the technology

Example: Individual Peak Reduction for Solar

Hour	14	15	16
Load	100	150	120
Solar	0	60	0
Net Load	100	90	120

In this example the peak load is 150 MW and the net load peak after taking into account solar is 120 MW. The Individual NLP Reduction for Solar is 30 MW (150 MW – 120 MW = 30 MW).

Example: Individual Peak Reduction for Wind

Hour	14	15	16
Load	100	150	120
Wind	20	20	30
Net Load	80	130	90

In this example the peak load is 150 MW and the net load peak after taking into account wind is 130 MW. The Individual NLP Reduction for Wind is 20 MW (150 MW – 130 MW = 20 MW).

Step 2: Calculating Over-Lapping Benefits between Resources/Technologies

The second step is to calculate the over-lapping benefits of technologies. It is possible that two or more combined technologies will reduce the net load peak by an amount different from the resources individually when added together.

Example: Combined Peak Reduction for Solar and Wind

Hour	14	15	16
Load	100	150	120
Solar	0	60	0
Wind	20	20	30
Net Load	80	70	90

In this example the peak load is 150 MW and the net load peak after taking into account both solar and wind is 90 MW. The Combined Peak Reduction for solar and wind is 60 MW which is different from the two individual peak reductions for wind and solar added together (30 MW from solar and 20 MW from wind).

The combined net load peak reduction can then be split into the individual technologies using weighting factors:

$$Technology\ NLP\ Reduction = \frac{Individual\ Net\ Load\ Peak\ Reduction\ for\ Technology}{Sum\ of\ Individual\ NLP\ Reduction\ for\ ALL\ Technology} * Combined\ NLP\ Reduction$$

Example: NLP Reduction for Technologies

Using the data from the examples above, the Solar NLP Reduction is:

$$Solar\ NLP\ Reduction = \frac{30\ MW}{30\ MW + 20\ MW} * 60\ MW = 36\ MW$$

Therefore, when accounting for combined benefits, the NLP Reduction for Solar is 36 MW. Using the same formula above but for Wind, the Wind NLP Reduction can be calculated to be 24 MW.

Calculating Technology Average ELCC Value

The final step is to calculate the Average ELCC value for the technology using the equation:

$$Average\ ELCC = \frac{Technology\ NLP\ Reduction}{Technology\ Installed\ Capacity}$$

Example: Average ELCC for Solar and Wind

Assume there is 100 MW of Solar Installed Capacity and 200 MW of Wind Installed Capacity

$$Average\ Solar\ ELCC = \frac{36\ MW}{100\ MW} = 36\%$$

$$Average\ Wind\ ELCC = \frac{24\ MW}{200\ MW} = 12\%$$

Applying the ELCC Results

When applied, the Average ELCC results will verify that there is enough resources to meet load in all hours of the day/month/year. It is assumed that all other resources providing capacity will be able to meet load needs in all hours. If this assumption creates additional Gap issues, then those resources would also need to obtain an ELCC value.[4]

Example: Applying Wind and Solar ELCC Values

Using the previous example numbers

Peak Load Need = 150 MW

Resource Adequacy (RA) Requirement[5] = 150 MW

*Qualifying Capacity of Solar = 100 MW * 36% = 36 MW*

*Qualifying Capacity of Wind = 200 MW * 12% = 24 MW*

RA Requirement AFTER Solar and Wind = 150 MW - 36 MW – 24 MW = 90 MW

The net load peak after accounting for wind and solar was 90 MW and the Average ELCC values result in a RA requirement of 90 MW after accounting for solar and wind, verifying that there will be enough resources to meet load in all hours of this example.

Sample Results

The following NLP-ELCC values are calculated using the California Independent System Operators 2017 forecast of load, wind, and solar.[6] Average ELCC values are calculated for both solar and wind at a monthly granularity.

---

4 For the CPUC's Resource Adequacy program, this issue is alleviated through the use of MCC buckets.

5 The reserve margin is not included here for simplicity, but is discussed later.

6 https://www.caiso.com/Documents/2017NetLoadDataFlexibleCapacityNeeds.xlsx - Data published at a 1-minute granularity but was converted to hourly granularity before performing calculations. Installed capacity is taken from Energy Divisions draft ELCC Results report.

Month	Solar Average ELCC	Wind Average ELCC
1	0%	8%
2	0%	20%
3	0%	7%
4	0%	1%
5	34%	11%
6	35%	20%
7	31%	25%
8	41%	17%
9	14%	27%
10	16%	2%
11	0%	2%
12	0%	3%

Potential Modifications to the NLP-ELCC Methodology

Accounting for the Reserve Margin

When calculating ELCC values, it is important to realize that a technology's generation contributes towards meeting system reserve margins. Even if the technology is not directly providing the reserve margin capacity (capacity not generating but that could be generating in a short time frame if called), it may be safe to assume that a technology's generation is freeing up other resources that can reserve their capacity to meet reserve requirements.

The reserve margin for a month is set to be 15% - 17% of the monthly peak gross load. However, even though the requirements are only calculated based on peak load, the reserve requirements are needed in all hours. To account for this, the NLP-ELCC analysis can add a reserve margin to all hours of the analysis.

Example: NLP-ELCC Analysis with Reserve Margin

Hour	14	15	16
Load	100	150	120
Load w/ Reserve Margin	115	172.5	138
Solar	0	60	0
Net Load w/ Reserve Margin	115	112.5	138

In this example, when accounting for the reserve margin, the peak load is 172.5 MW and the net load peak after taking into account solar is 138 MW. The Individual NLP Reduction for Solar, in this example, would be 34.5 MW. Without the reserve margin the Individual NLP reduction was 30 MW.

Accounting for Reliable Generation

One of the disadvantages of performing a deterministic analysis is that outlier data points within a day or hour could drive ELCC results. This disadvantage could result in misleading results or results that change every year as outlier data changes. While it is possible to perform a stochastic NLP-ELCC analysis, it is not necessary to account for the disadvantages described. Rather than using the hourly actual forecast data for technology generation, a reliable generation number can be calculated. For the

purpose of the results in the next section, reliable generation for wind and solar is assumed to be the 30th percentile generation for each hour within a month.

Sample Results

The following NLP-ELCC values are calculated using the California Independent System Operators 2017 forecast of load, wind, and solar.[7] Average ELCC values are calculated for both solar and wind at a monthly granularity while accounting for the reserve margin and reliable generation.

NLP-ELCC Results for Solar and Wind with Reserve Margin and Reliable Generation Accounting

Month	Solar NLP-ELCC	Wind NLP-ELCC
1	0%	0%
2	0%	15%
3	3%	14%
4	0%	19%
5	34%	29%
6	31%	37%
7	33%	26%
8	39%	19%
9	15%	16%
10	14%	2%
11	0%	2%
12	0%	2%

Recommendations and Next Steps

SCE believes the NLP-ELCC is a useful tool for determining intermittent resource capacity values. It provides a simple, intuitive analysis that directly accounts for the shortcomings in the current exceedance methodology.

As this is a new technique, SCE is interested in party feedback regarding the methodology, implementation, results, or any other area. Please submit all questions and comments to:

Martin Blagaich
Martin.Blagaich@sce.com

[7] https://www.caiso.com/Documents/2017NetLoadDataFlexibleCapacityNeeds.xlsx - Data published at a 1-minute granularity but was converted to hourly granularity before performing calculations. Installed capacity is taken from Energy Divisions draft ELCC Results report.