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PG&E Comments on MD and HD EV Infrastructure Modeling HEVI-LOAD and WIRED

Additional submitted attachment is included below.

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November 21, 2022

California Energy Commission
Docket Unit, MS-4
Docket Number 19-AB-2127
715 P Street
Sacramento, CA 95814

Re: Pacific Gas and Electric Company Comments on Staff Workshop on Medium-and Heavy-duty and Ride-hailing Electric Vehicle Infrastructure Analysis (Docket Number 19-AB-2127)

Pacific Gas and Electric Company (PG&E) appreciates the California Energy Commission (CEC)'s time to host a workshop on November 9, 2022, to discuss updates to its Medium-and Heavy-duty Electric Vehicle Infrastructure Load, Operations, and Deployment (HEVI-LOAD) and Widespread Infrastructure for Ride-Hailing EV Deployment (WIRED) modeling analyses.

PG&E agrees with the inputs and assumptions presented during the workshop and understands the key differences from earlier versions of the analyses. PG&E provides the following feedback on the grid assessment piece covered in the Lawrence Berkeley National Laboratory (LNBL) HEVI-LOAD section of the workshop:

PG&E highlights the caveats of the utility Integration Capacity Analysis (ICA) maps

Load (ICA) results provide users with a directional understanding of where capacity for additional electric load may exist based on the current system configuration, and thus the map does not guarantee available capacity to host new load. There are multiple reasons associated with this. ICA methodology does not include future approved load projects, planned distribution system upgrades, planned network reconfiguration, forecasted distributed energy resources (DER) growth, and load forecast.

The lack of the above-mentioned data into the ICA methodology may result in divergence between PG&E's capacity planning studies and the automated ICA analysis. There's ongoing work to refine ICA methodology to include the outlined inputs and assumptions as ordered by the Administrative Law Judge (ALJ) September 9, 2021, Ruling[1]. The workplan for these refinements is submitted by PG&E on February 28, 2022. PG&E is planned to modify load ICA inputs and assumptions for this use case by the fourth quarter of 2025.[2]

[1] Administrative law judge's ruling ordering refinements to load integration capacity analysis, Rulemaking 14-08-013, September 9, 2021.
[2] PG&E ICA Refinements Report, Feb 28, 2022.

The loading data used for the analysis of the LNBL HEVI-LOAD section appears to come from the utility ICA maps. This is a helpful resource, however, there are some caveats worth noting:

1) The high/low circuit loading is regression based and represents the 10th and 90th percentile loading of the circuit respectively.
2) The load information is based on a one-year historical data.
3) The high/low circuit loading does not include additional load forecasts.
4) New business adjustments are not included.

Most of the analysis shared for the HEVI-LOAD analysis was laying charging demand on the low/10th percentile loading, which statistically represents the system at lightest loading conditions, and therefore it is a highly optimistic assumption.

To assess the available capacity to support the new business, the peak loading is typically used. A better engineering approach would be to use the high/90th percentile loading, which better represents the distribution system under stress and closer to its design margins. However, PG&E notes that even this does not consider active new business applications, which capacity is being reserved for, as well as future load forecast. PG&E believes these assumptions would result in study outcomes that underestimate capital expenditure needed to support future electrification.

PG&E recommends that the 90th percentile loading be utilized for loading analysis at the line section. To further improve the accuracy of the analysis, grid needs assessments (GNA) data from PG&E's Distribution Investment Deferral Framework (DIDF) maps can provide additional capacity detail on the feeders and banks upstream, where future load growth and load applications are also considered.

Further detail on this proposal is available in Appendix B of the attached joint investment-owned utilities (IOU) letter to the California Public Utilities Commission (CPUC) Uniform Load ICA Analysis Proposal.

PG&E appreciates the time and effort that the CEC took to organize the workshop, and the opportunity to provide feedback on the differences of this analysis from earlier versions. Please do not hesitate to contact me if you have any questions.

Sincerely,

Licha Lopez

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking Regarding Policies, Procedures and Rules for Development of Distribution Resources Plans Pursuant to Public Utilities Code Section 769.	R. 14-08-013 (Filed August 14, 2014)
And Related Matters.	A. 15-07-002 A. 15-07-003 A. 15-07-006

(NOT CONSOLIDATED)

In the Matter of the Application of PacifiCorp (U901E) Setting Forth its Distribution Resource Plan Pursuant to Public Utilities Code Section 769.	A. 15-07-005 (Filed July 1, 2015)
And Related Matters.	A. 15-07-007 A. 15-07-008

JOINT IOU UNIFORM LOAD INTEGRATION CAPACITY ANALYSIS PROPOSAL OF PACIFIC GAS AND ELECTRIC COMPANY (U 39 E), SOUTHERN CALIFORNIA EDISON COMPANY (U 338-E), AND SAN DIEGO GAS AND ELECTRIC COMPANY (U 902-E)

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Dated: May 28, 2021

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking Regarding Policies, Procedures and Rules for Development of Distribution Resources Plans Pursuant to Public Utilities Code Section 769.	R. 14-08-013 (Filed August 14, 2014)
And Related Matters.	A. 15-07-002 A. 15-07-003 A. 15-07-006

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JOINT IOU UNIFORM LOAD INTEGRATION CAPACITY ANALYSIS PROPOSAL OF PACIFIC GAS AND ELECTRIC COMPANY (U 39 E), SOUTHERN CALIFORNIA EDISON COMPANY (U 338-E), AND SAN DIEGO GAS AND ELECTRIC COMPANY (U 902-E)

Pursuant to the January 27, 2021, Administrative Law Judge's Ruling on Joint Parties' Motion for an Order Requiring Refinements to the Integration Capacity Analysis (ALJ Ruling), Pacific Gas and Electric Company (PG&E), Southern California Edison Company (SCE), and San Diego Gas & Electric Company (SDG&E) (collectively, the Joint IOUs) submit this Joint IOU Uniform Load Integration Capacity Analysis Proposal (Joint IOU Proposal). The Joint IOU Proposal is provided in Attachment A.

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Respectfully Submitted,

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By: */s/ Kristin D. Charipar*
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On behalf of PACIFIC GAS AND ELECTRIC COMPANY, SAN DIEGO GAS & ELECTRIC COMPANY, AND SOUTHERN CALIFORNIA EDISON COMPANY

Dated: May 28, 2021

Attachment A: Joint IOU Uniform Load Integration Capacity Analysis Proposal

Joint IOU Uniform Load Integration Capacity Analysis Proposal

Pacific Gas and Electric Company, San Diego Gas and Electric Company, and Southern California Edison Company ("the Joint IOUs") are supportive of the State's goals to accelerate the integration of electric vehicles and are committed to ensuring load integration capacity analysis ("ICA") results can assist customers in identifying locations for electric vehicle charging stations.

Load integration capacity analysis performs power flow analysis for 576 representative hours per year on three-phase circuit nodes to provide users with a directional understanding of where capacity for additional load may exist based on the current system configuration. The IOUs propose to make a few minor modifications to load ICA. The IOUs also propose that the ICA User Guides be updated to provide guidance on how users can combine the load ICA results with the data contained in the Grid Needs Assessment to identify locations with minimal cost and time to connect.[1]

Minor Modifications are Needed to Align with Planning Assumptions

The IOUs recommend the following modifications to load ICA to further improve its usefulness:

1. PG&E: Decrease the lower limit of the Steady State Voltage Criteria from 119 V to 118 V
2. SCE: Increase the lower limit of the Steady State Voltage Criteria from 114 V to 118 V
3. SDG&E: Integrate anticipated known loads at specific locations

In addition to the above modifications, the IOUs will submit Improved ICA Data Validation Plans that describe efforts they plan to take to enhance the overall data validation processes and procedures for load and generation ICA.

Data to Inform Project Siting is Already Public

While the outcome of requests for new or expanded load will be determined by the engineering evaluation, the Circuit and Substation data contained in the Grid Needs Assessment ("GNA") can be used in conjunction with the load ICA to allow users to roughly gauge how much additional capacity for load exists on each distribution circuit and substation or bank over the five-year forecast horizon. The combined data allows users to identify locations and capacity that are likely to be available to connect new load while minimizing the likelihood of triggering distribution infrastructure upgrades beyond what is already planned. The Distribution Deferral Opportunity Report ("DDOR") provides even more visibility by allowing users to understand where some planned distribution system upgrades are expected to increase available capacity for new load.

[1] The Joint IOUs note that distribution system locations with available capacity to connect new load may not exactly coincide with the locations where new load is most likely to occur. Accordingly, where a user has discretion as to where to submit requests to connect new load, the user may wish to overlay the load ICA results with the possible locations of the user's load additions to determine the most sensible locations at which to request the connection of new load.

Information provided by the Load ICA, GNA, and DDOR can reduce the potential complexity and timeline of a customer's request to interconnect new load.[2] As directed by the *Administrative Law Judge's Ruling on Joint Parties' Motion for an Order Requiring Refinements to the ICA*, dated January 27, 2021, the IOUs propose the modifications described above. With these modifications, the IOUs load ICA results, when combined with information from the GNA, are adequate to inform a DER developer's project design and siting for use in the interconnection process.

Each IOU's recommended approach is described in the following appendices. The IOUs propose to update their ICA User Guides with these appendices by July 30, 2021.

[2] While GNA/DDOR data is published annually, system planning is ongoing and therefore studied projects are subject to change.

Appendix A: SCE's Recommended Approach to Utilizing Load ICA and GNA Data

The following section describes SCE's recommended approach to combining the Circuit and Substation-level Planning Assumptions from the GNA with Load ICA results to identify potential locations for new or expanded load.

In late 2020, SCE identified an opportunity to support SCE's and the State's EV goals by calculating and publishing available capacities from information already contained in its annual GNA report. SCE performed the following calculations using parameters within the "Planning Assumptions_DistSub" and "Planning Assumptions_Feeder" tabs of the downloadable Circuit and Substation Planning Assumptions portion of the GNA. This file can be downloaded from the "Downloads" tab of the 'GNA – Circuits' layer within DRPEP. Each calculation is performed for each circuit and each substation for all five years.

$$Reserve\ Load\ \boldsymbol{Circuit}\ Capacity\ (MW) = Facility\ Loading\ Limit\ (MW) - Cumulative\ Demand\ (MW)$$

$$Reserve\ Load\ \boldsymbol{Substation}\ Capacity\ (MW) = Facility\ Loading\ Limit\ (MW) - Cumulative\ Demand\ (MW)$$

	A	B	AU	AV	AW	AX	AY	
1								2024
2	Facility	GNA ID	Base Demand (MW) [24]	Cumulative Demand (MW) [24]	Facility Loading (%) [24]	Facility Loading Limit (MW) [24]	Residential PV (MW) [24]	Non-PV
3	Abacus		0.4041	9.1813	76.79%	11.96	-0.3011	
4	Abana		0.0063	[redacted]	68.78%	[redacted]	-0.0819	
5	Abbey		0.1792	5.0323	48.23%	10.43	-0.0225	

Figure 1: 'Planning Assumptions_Feeder' tab of SCE's Downloadable GNA Circuit and Substation Planning Assumptions

	2020	2021	2022	2023	2024
BASE DEMAND - (MW)	0.0000	0.0000	0.0001	0.0040	0.0040
RES PV - (MW)	0.0000	0.0000	0.0000	-0.0011	-0.0011
NON RES PV - (MW)	0.0000	0.0000	0.0000	-0.0090	-0.0090
EE - (MW)	-0.0532	-0.1046	-0.1573	-0.2389	-0.3044
EV - (MW)	0.0054	0.0099	0.0148	0.0189	0.0232
LMDR - (MW)	0.0000	0.0000	0.0000	0.0000	0.0000
ES - (MW)	-0.0002	-0.0003	-0.0004	-0.0004	-0.0005
FACILITY LOADING - (%)	60.61	60.21	59.80	59.08	58.55
CUMULATIVE DEMAND - (MW)	7.2473	7.1991	7.1500	7.0640	7.0010
DEFICIENCY - (MW)	0.00	0.00	0.00	0.00	0.00
DEFICIENCY - (%)	0.00	0.00	0.00	0.00	0.00
RESERVE LOAD CIRCUIT CAPACITY - (MW)	4.7092	4.7574	4.8065	4.8925	4.9555
RESERVE LOAD SUBSTATION CAPACITY - (MW)	62.3322	56.1722	56.0822	56.2622	55.8722

Figure 2: Reserve Load Capacities on the 'GNA – Circuits' Layer of SCE's DRPEP

When evaluating locations for new or expanded load, including EV chargers, SCE recommends the following process be considered.

From the *GNA – Circuits* Layer within DRPEP:

1. Is the **reserve load circuit capacity** sufficient for all 5 years?
2. Is the **reserve load substation capacity** sufficient for all 5 years?

From the *ICA – Circuit Segments* Layer within DRPEP:

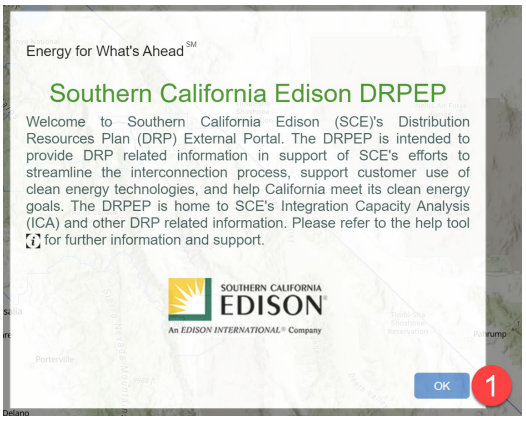
3. Is the **Uniform Load Integration Capacity** sufficient?
    a. If not, download the hourly uniform load ICA results for the circuit segment(s) adjacent to the proposed project site.
        i. Filter the downloaded results to the node ID obtained from the pop-up within DRPEP
        ii. Review the hourly uniform load ICA results for the node ID in question to determine if sufficient capacity is available.

Please note the following:

- The findings of the formal load interconnection process evaluated by a planning engineer will always supersede the values published to DRPEP.
- As permitted by the 15/15 Rule, SCE redacts select data from DRPEP to protect sensitive information. Some circuits may not contain all information for this reason.
- Reserve Load Capacities are updated concurrent with the annual publication of the Grid Needs Assessment. The next update is planned for August 30, 2021. Due to the dynamic nature of planning, it is strongly recommended to review the Reserve Load Capacities shortly after the GNA is updated to reduce the likelihood of obsolescence.
- Capacities shown do not reflect constraints that may be present at higher levels of SCE's system, e.g., sub-transmission and/or transmission systems.

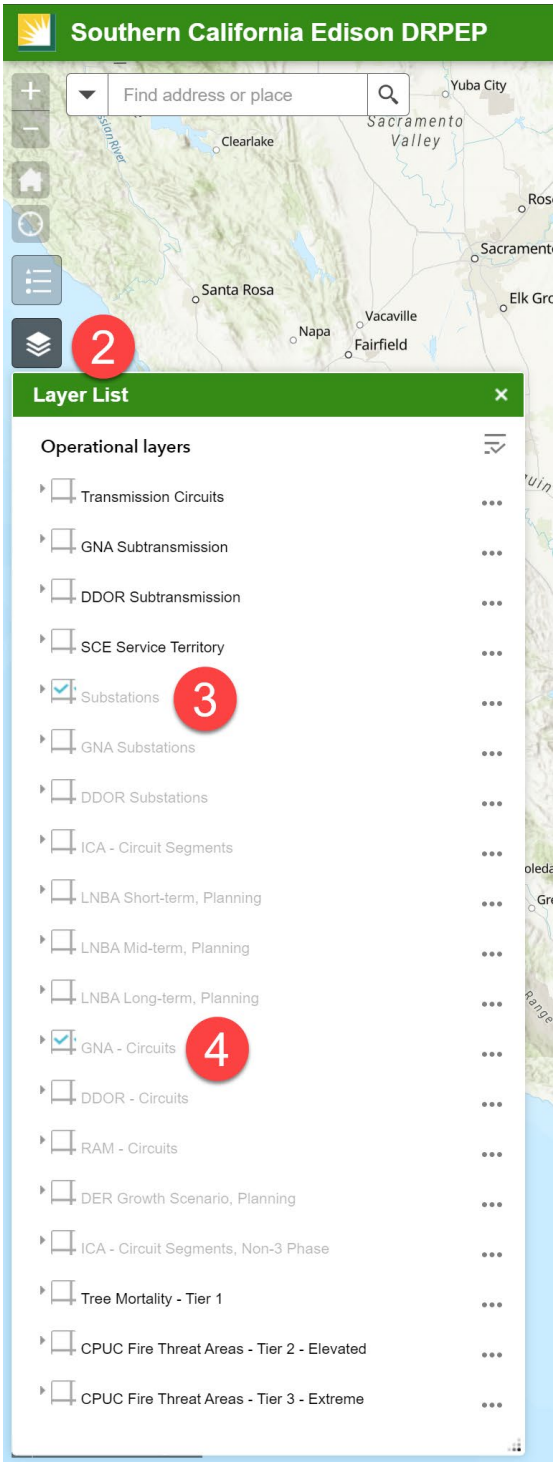
The following steps describe how to obtain and review the relevant parameters in DRPEP (https://ltmdrpep.sce.com/drpep/):

1. Acknowledge the DRPEP splash screen message by clicking 'OK'

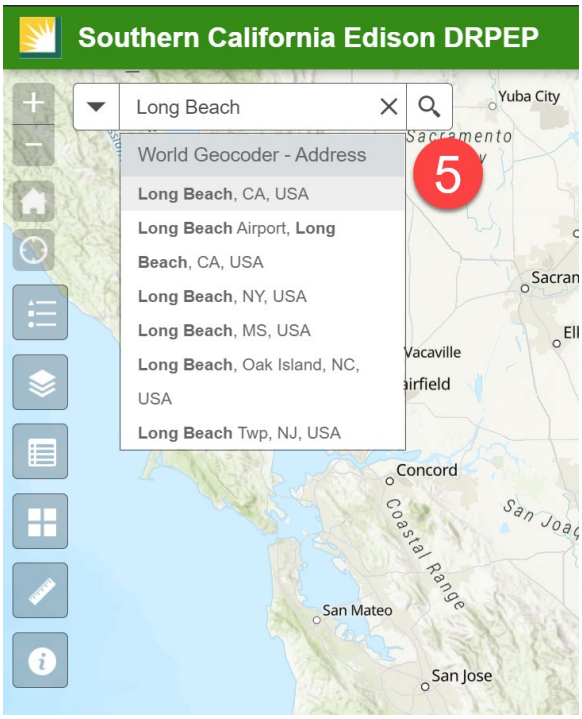


2. Click the layer list and turn off all default layers by unchecking the boxes
3. Enable the 'Substations' layer by checking the box

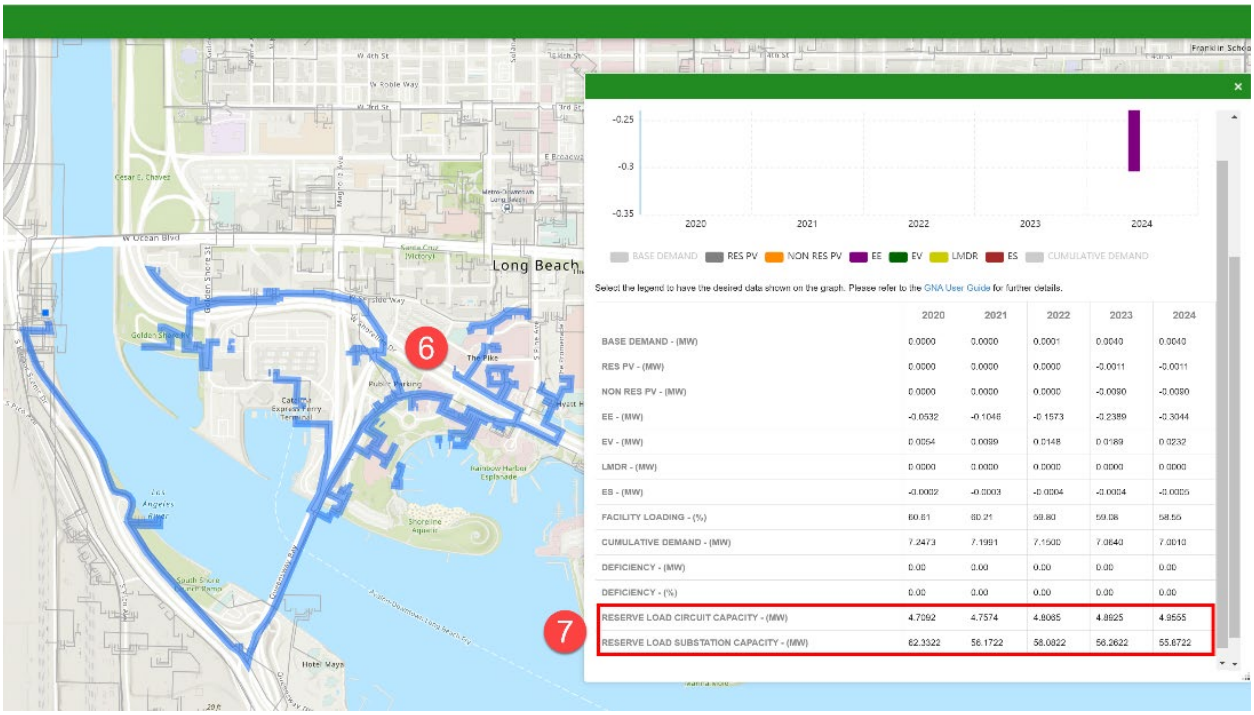
4. Enable the ‘GNA – Circuits’ layer by checking the box



5. Search for a location of interest by typing an address, city, zip code, etc. in the search box

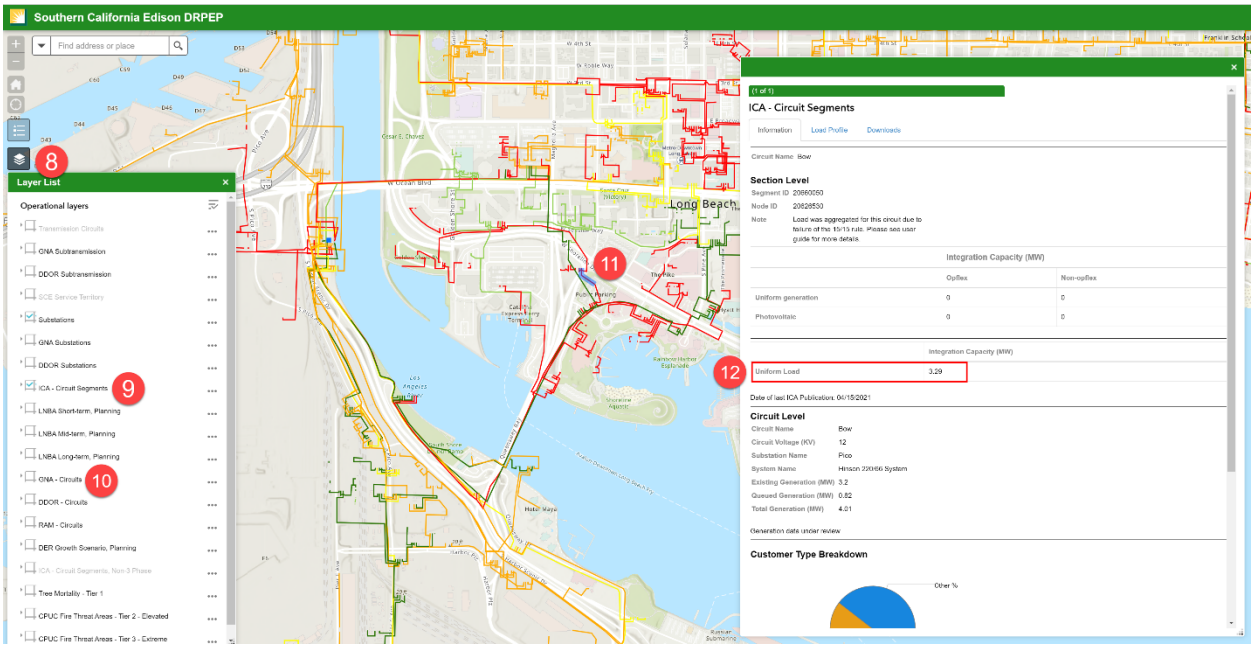


6. Click on a circuit of interest, it will highlight blue
7. Scroll down to the bottom of the pop-up widget to review the **'Reserve Load Substation Capacity (MW)'** and **'Reserve Load Circuit Capacity (MW)'**



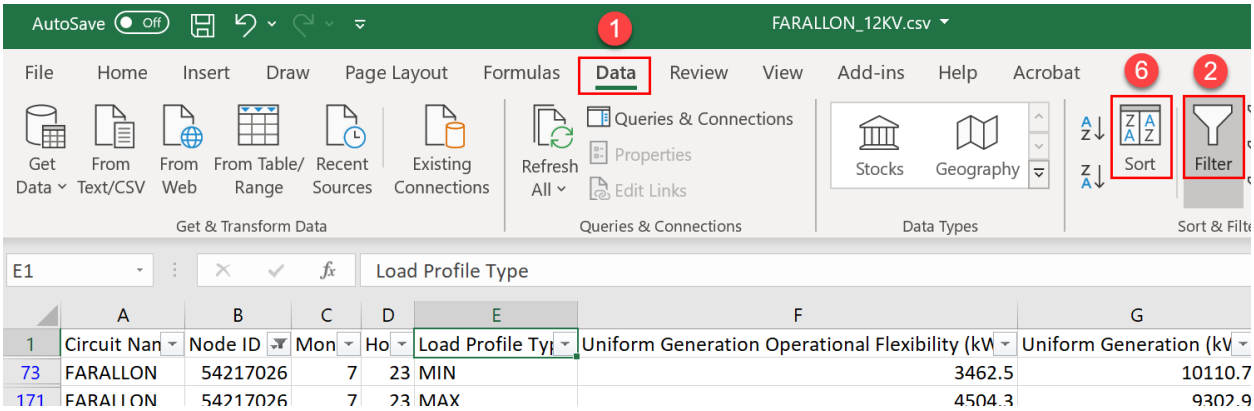
8. Click the layer list
9. Enable the 'ICA – Circuit Segments' layer by checking the box
10. Disable the 'GNA – Circuits' layer by unchecking the box

11. Click on a circuit segment of interest, it will highlight blue
12. Review the **'Uniform Load Integration Capacity (MW)'** in the pop-up widget
13. (Not Illustrated) Click the Downloads tab at the top of the pop-up widget. Follow the prompts to download the ICA Results in tabular format.

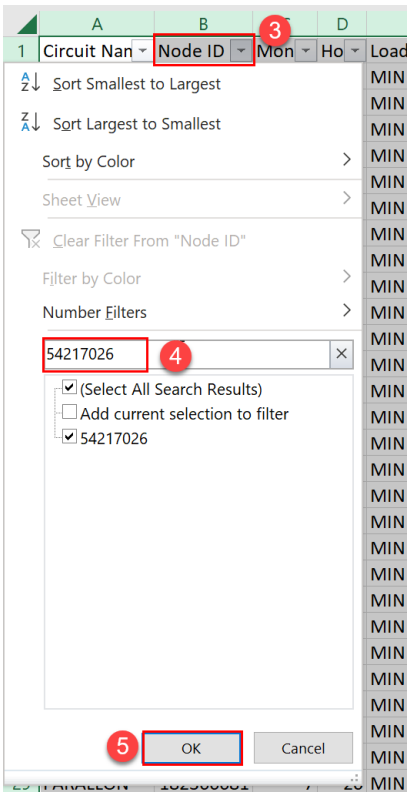


From the downloadable ICA results file (using Microsoft Excel):

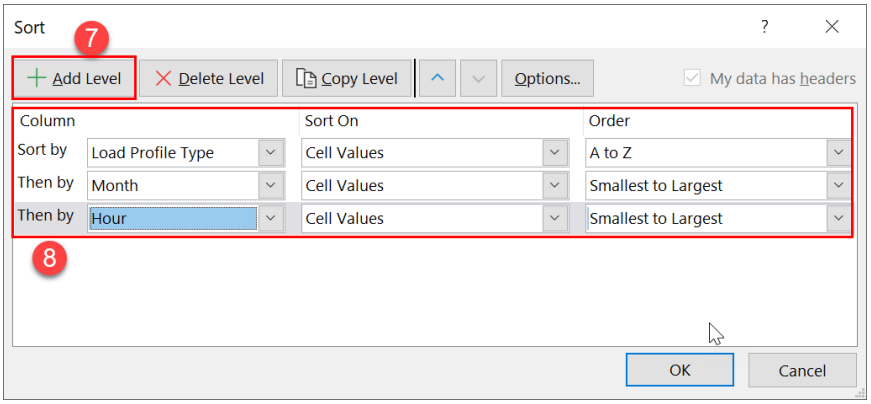
1. Click the 'Data' tab
2. Click 'Filter'



3. Click the drop down next to 'Node ID' in Column B
4. Type the Node ID in question to filter to only the ICA results for that node. The node ID is obtained from the pop-up widget of the 'ICA – Circuit Segments' layer.
5. Click 'OK'



6. From the 'Data' tab, click 'Sort'
7. Click 'Add Level' twice
8. Configure the sort levels as illustrated. Click 'OK' to review the **'Uniform Load (kW)'** results in Column O.



Appendix B: PG&E's Load ICA Guide

This section outlines PG&E's proposed method to evaluate locations to connect new load. The user should download PG&E's GNA Public datasets from PG&E DIDF map[3]. Note that PG&E publishes one excel file for GNA data that includes both Circuit and Bank information required to perform the calculations. This information can be accessed as follows:

1- Login to the PG&E DIDF Map[4]
2- Click on "Download Data" on the top-right corner of the screen.
3- Open the PG&E GNA Public excel file
4- Click on the "GNA Capacity_Bank and Feeder" tab

After accessing the GNA information, the following steps are proposed to evaluate the locations to connect new load:

Step A: Does the <u>feeder</u> serving this location have adequate capacity over the five-year forecast horizon?

1. Find the Feeder ID or Feeder Name in the GNA dataset
2. Calculate the feeder's available load capacity for each of the five years from GNA data:

$$Feeder\ Available\ Load\ Capacity\ (MW) = Facility\ Rating(MW) - Facility\ Loading(MW)$$

3. Does the feeder serving this location have available load capacities greater than or equal to your project's peak capacity for all five years? If so, proceed to Step B.

Step B: Do the <u>Banks</u> associated with the Substation have adequate capacity over the five-year forecast horizon?

4. Find the Bank IDs or Bank Names in the GNA dataset associated with the Feeder ID
    a. Take the first 5 digits of the Feeder ID[5].
    b. Filter all banks that have an ID starting with the same 5 digits identified above. These are the Banks associated with the Substation.
5. For each Bank ID identified above, calculate the Bank's available load capacity for each of the five years from the GNA data:

[3] https://www.pge.com/en_US/for-our-business-partners/distribution-resource-planning/distribution-resource-planning-data-portal.page
[4] Please review the user guide to learn more about PG&E maps.
[5] PG&E's Feeder IDs contain 9 digits, with the first 5 digits representing the substation associated with a specific feeder. The Bank IDs are assigned with the 5-digit Substation ID, followed by the specific bank number (01, 02, 03, etc.…). For example, Feeder 014302108 is associated with Substation 01430. This substation has three banks: 0143001, 0143002, and 0143003.

$$Substation\ Bank\ Available\ Load\ Capacity\ (MW) = Facility\ Rating\ (MW) - Facility\ Loading\ (MW)$$

6. Obtain the minimum capacity among all Banks for each year.
7. Is the minimum Bank capacity calculated above greater than or equal to your project's peak capacity for all five years? If so, proceed to Step C.

Step C: Does the <u>three-phase node</u> serving or expected to serve this location have adequate capacity based on its current configuration today?

8. Login to PG&E's ICA map.
9. Find the location of your project on the map.
10. Review the pop-up window of "Load Hosting Capacity (kW)" ICA values.
11. If insufficient capacity and the shape of the new load curve is known, download the hourly uniform load ICA results for the circuit segment(s) adjacent to your proposed project site.
    a. Filter the downloaded results to the line section in question, if applicable
12. Review the hourly uniform load ICA results for the Line Section ID in question to determine if sufficient indicative capacity is available to support your project. If so, proceed with project submittal to determine the outcome of the engineering study.

Where all parameters above are found to be greater than or equal to your project's capacity there is an improved likelihood of a successful project outcome.

Please note the following:

- The findings of the formal load interconnection process evaluated by a planning engineer will always supersede the values published in the PG&E public map.
- As permitted, PG&E redacts select data from public map to protect sensitive information. Some circuits may not contain all information for this reason.
- Available Load Capacities are updated concurrent with the annual publication of the Grid Needs Assessment. The next update of the PG&E DIDF Map is planned for August 30, 2021.
- Capacities shown do not reflect constraints that may be present at higher levels of PG&E's system, e.g., transmission system.

Appendix C: SDG&E's Load ICA Guide

Information provided through the use of the Load ICA, GNA, and DDOR can reduce the potential complexity and timeline of a customer's request to interconnect new load[6]. SDG&E recommend the following be considered when evaluating locations to connect new load:

Step A: Does the circuit serving this location have adequate capacity over the five-year forecast horizon?

1. Download GNA datasets from DRP Data Portal[7] and review the "Cir-Bank Capacity" tab
2. Calculate the **circuit's available load capacity** for each of the five years from IOU GNA data:

$$Circuit\ Available\ Load\ Capacity = \frac{Forecasted\ Demand\ (MW)}{Facility\ Loading\ (\%)} - Forecasted\ Demand\ (MW)$$

3. Does the circuit serving this location have available load capacities greater than or equal to your project's peak capacity for all five years? If so, proceed to Step B.

Step B: Do the substation banks serving this location have adequate capacity over the five-year forecast horizon?

4. Calculate the substation bank available load capacity for each of the five years from IOU GNA data:

$$Substation\ Bank\ Available\ Load\ Capacity = \frac{Forecasted\ Demand\ (MW)}{Facility\ Loading\ (\%)} - Forecasted\ Demand\ (MW)$$

5. Do the substation banks serving this location have available load capacities greater than or equal to your project's peak capacity for all five years? If so, proceed to Step C.

Step C: Does the three-phase node serving or expected to serve this location have adequate capacity based on its current configuration today?

6. Review pop-up window of Uniform Load ICA values.
7. If insufficient capacity, download the hourly uniform load ICA results for the circuit segment(s) adjacent to your proposed project site.
8. Review the hourly uniform load ICA results to determine if sufficient indicative capacity is available to support your project.

Please note the following:

[6] While GNA/DDOR data is published annually, system planning is ongoing and therefore studied projects are subject to change.
[7] https://www.sdge.com/more-information/customer-generation/enhanced-integration-capacity-analysis-ica

- The findings of the formal load interconnection process evaluated by a planning engineer will always supersede the values published in the SDG&E public map.
- As permitted, SDG&E redacts select data from public map to protect sensitive information. Some circuits may not contain all information for this reason.
- Available Load Capacities are updated concurrent with the annual publication of the Grid Needs Assessment. The next update is planned for August 30, 2021.
- Capacities shown do not reflect constraints that may be present at higher levels of SDG&E's system, e.g., transmission system.