LGP Draft Resolution E-5296 Appendices – Table of Contents

Appendix A: Illustrative Figures of LGP Option and LGP Configurations........ A-1 to A-5

Appendix B: Rule 21 Tariff Changes .... B-1 to B-4

Appendix C: Large IOUs Proposal for Procedure and Steps for LGP Curtailment, with Modifications from Disposition #7 ....C-1 to C-2

Appendix D: Data Reporting Requirements Proposed in the Alternate Proposal with Large IOUs Responses.. D-1 to D-4

Appendix E: Ordered Data Monitoring and Reporting of LGP Facility Curtailments ..E-1

Appendix F: Large IOUs Process Proposal for Implementing LGP Option ....F-1 to F-5

Appendix G: Summary of Large IOUs Analyses of ICA-SG Criteria Violations in the Joint May LGP Advice Letters; Non-IOU Parties Protests; and Large IOUs Responses to Protests (for Resolution E-5230 Topic F).. G-1 to G-8

Appendix H: Energy Division Assessment of Three 24-Value LGP Configurations....H-1 to H-4

Appendix I: Proposal for Data Format of LGP Values to be Submitted by Customers..I-1

Appendix J: SCE Response to Energy Division Data Request Update #3 ....J-1 to J-32

Appendix K: PG&E Response to Energy Division Data Request Update #3....K-1 to K-36

Appendix L: IREC Slides from Workshop November 29, 2022 .... L-1 to L-2

Appendix A: Illustrative Figures of LGP Option and LGP Configurations

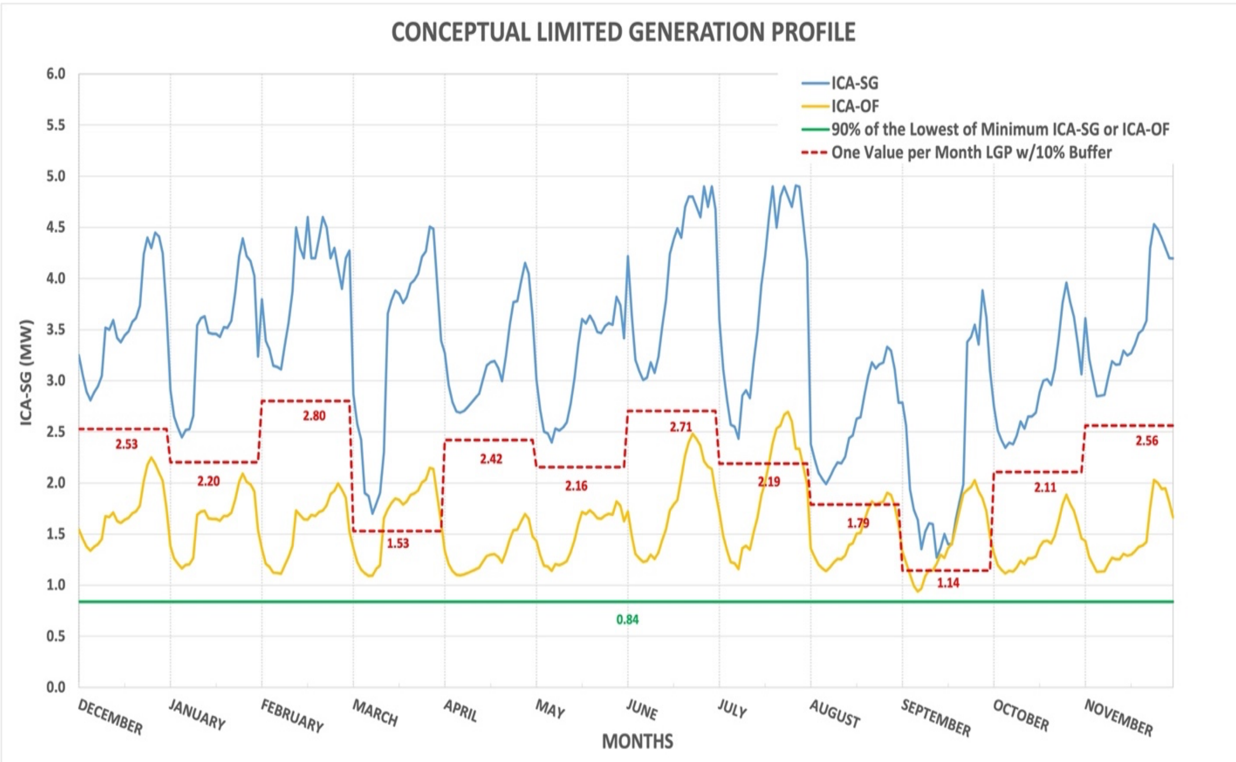

Figure 1. Conceptual illustration of a Limited Generation Profile using one unique value per month (12 values per year). The green solid line depicts the most limiting case for hosting capacity for Screen M, which is 90% of the lowest of minimum ICA-SG (ICA-Static Grid) or ICA-OF (ICA-Operational Flexibility) values across the entire year. The blue curve depicts the ICA-SG values that exist at the time of interconnection application. The yellow curve depicts the ICA-OF values that exist at the time of interconnection application. The red dashed line shows an exemplary LGP using monthly minimum ICA-SG values with the 10% buffer adopted in D.20-09-035. Source: adapted from Smart Inverter Working Group January 21, 2021 Large IOUs Presentation “Supporting Ordering Paragraphs 15 (Issue 9–Step 2) and 51.”

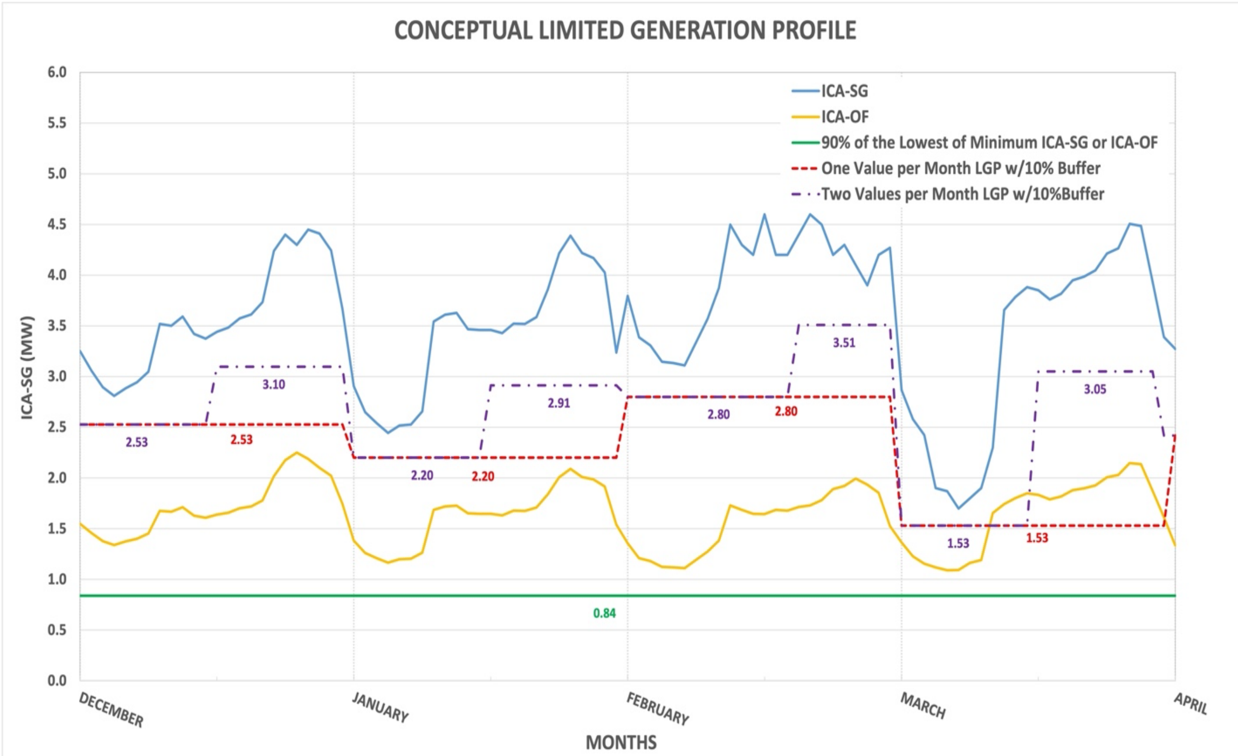

Figure 2: Conceptual illustration comparing an LGP with one value per month vs. an LGP with two values per month. Only four months are shown so the graph can better illustrate the differences. The Figure illustrates that the more granular the LGP becomes, the closer it will resemble the ICA-SG curve and the greater the allowed export power of the LGP facility. The two-value-per-month LGP follows the ICA-SG curve better than the one-value-per-month LGP; the two-value-per-month LGP allows for greater utilization of the available hosting capacity within a month, thereby increasing a facility generator's export power.

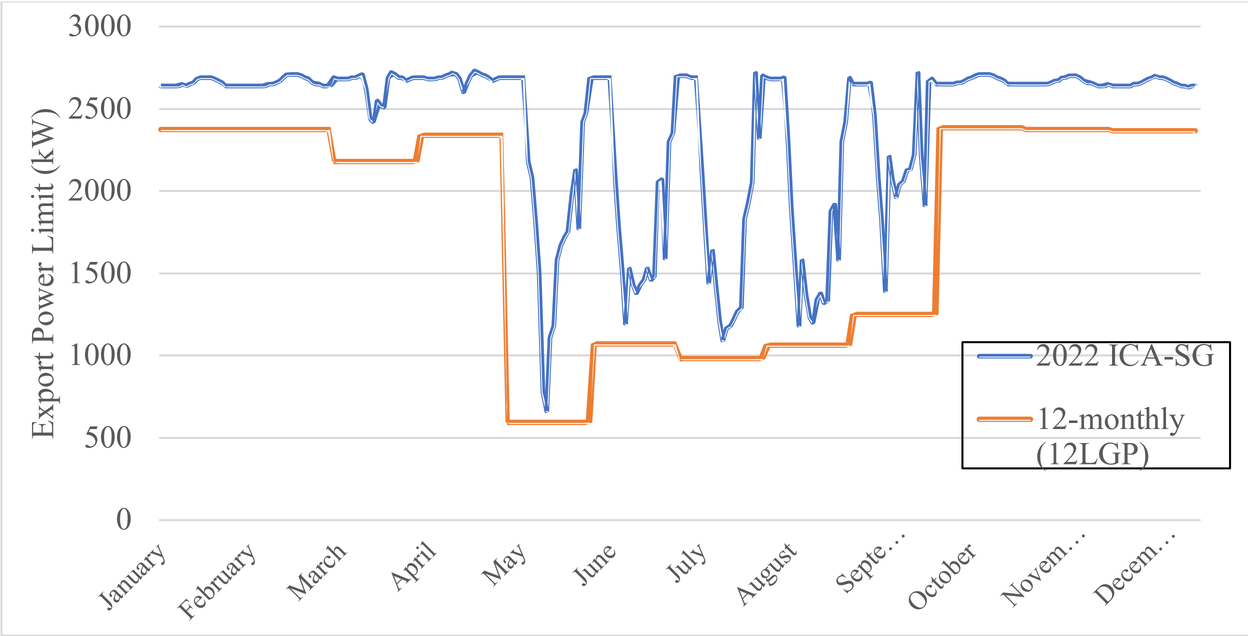

Figure 3. Illustration of 12-value monthly configuration ("12-LGP" or "12-monthly") using example of PG&E Line Section 4310786 from PG&E response to Energy Division Data Request. See discussion of E-5230 Topic F for more details.

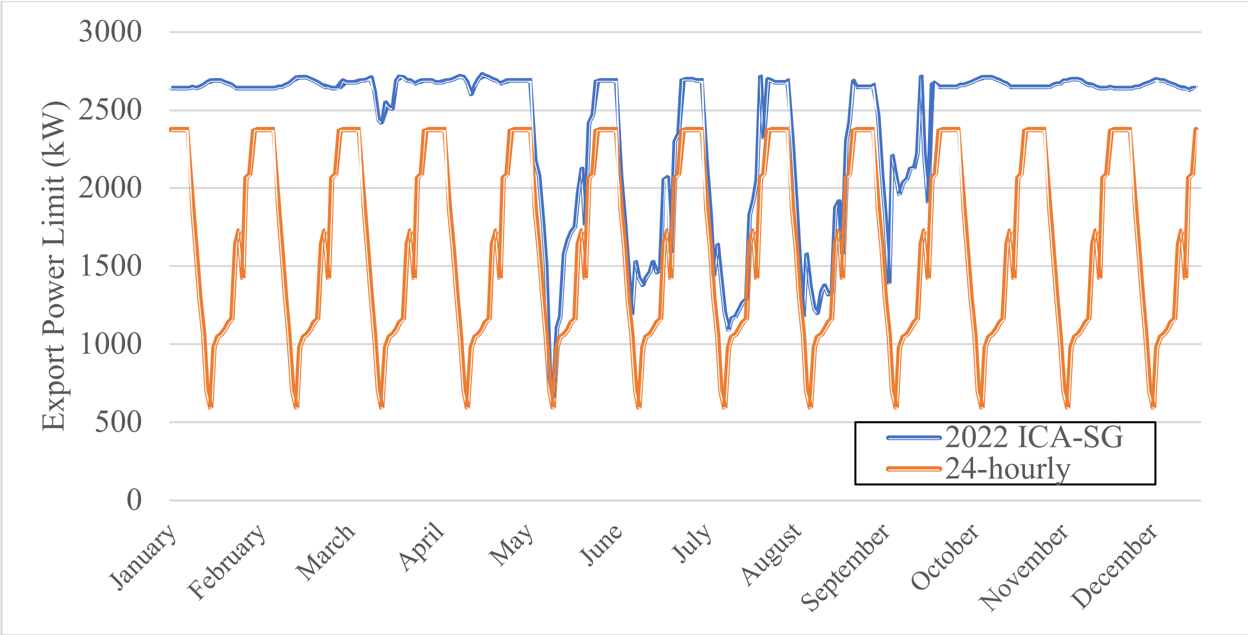

Figure 4. Illustration of 24-value hourly configuration ("24-hourly") using example of PG&E Line Section 4310786 from PG&E response to Energy Division Data Request. See discussion of E-5230 Topic F for more details.

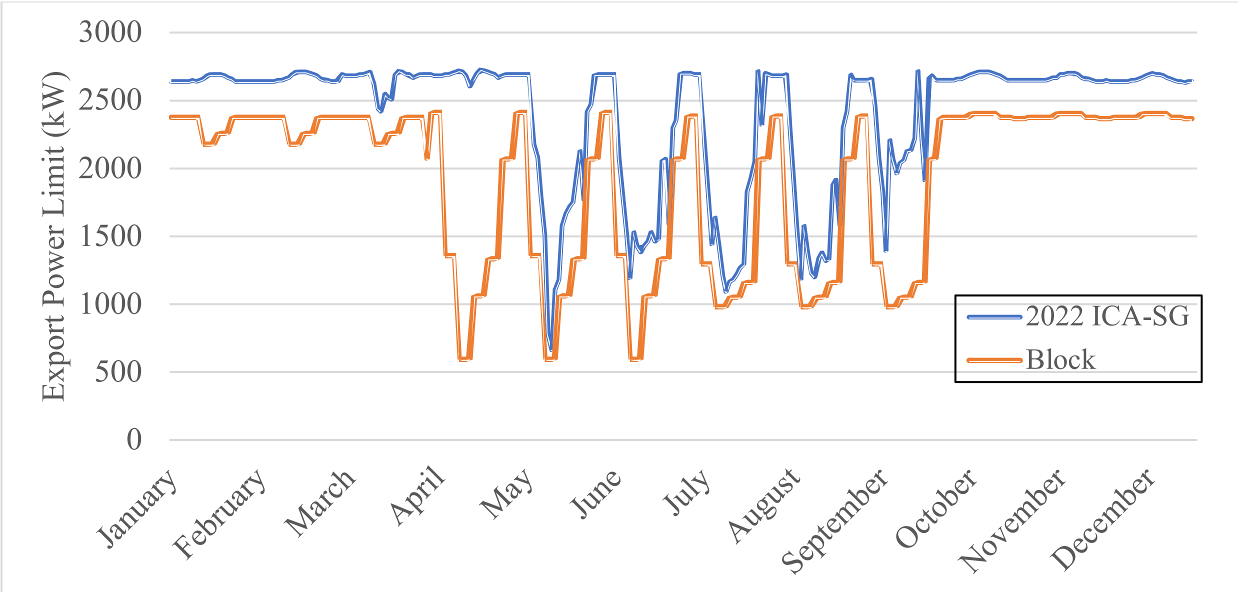

Figure 5. Illustration of 24-value “Block” configuration with 4 seasonal blocks (Jan-Mar, Apr-Jun, Jul-Sep, Oct-Dec) and 6 hourly blocks (5pm-9pm, 9pm-1am, 1am-5am, 5am-9am, 9am-1pm, 1pm-4pm) using example of PG&E Line Section 4310786 from PG&E response to Energy Division Data Request. Each of 24 values represents the combination of one seasonal block and one hourly block. See discussion of E-5230 Topic F for details.

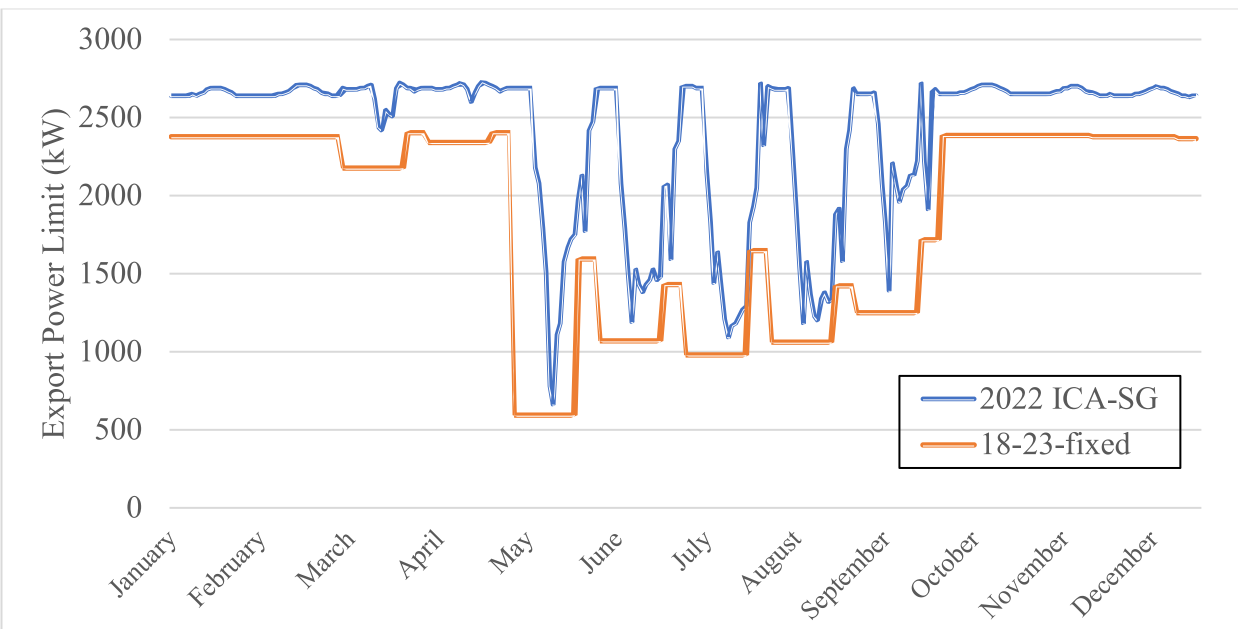

Figure 6. Illustration of 24-value “18-23-fixed” configuration (two hourly blocks 6pm-midnight and midnight-6pm for each of 12 months) using example of PG&E Line Section 4310786 from PG&E response to Energy Division Data Request. See discussion of E-5230 Topic F for details.

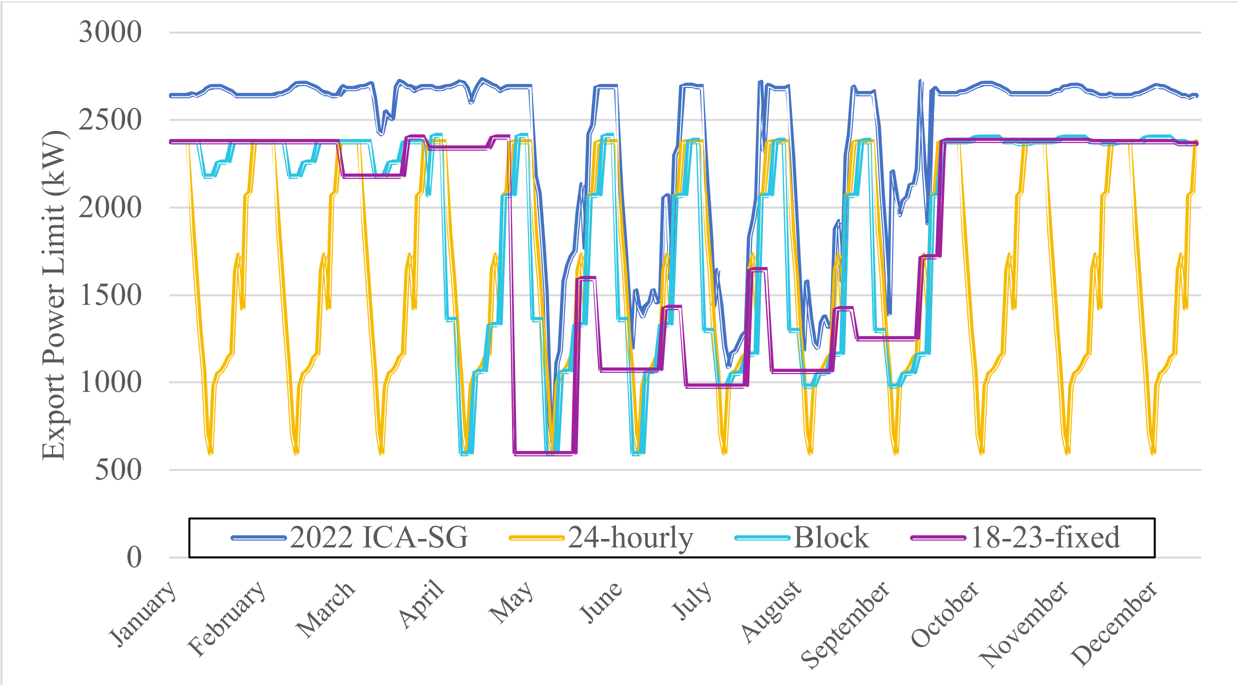

Figure 7. Superposition of the three 24-value configurations shown in Figures 4-6.

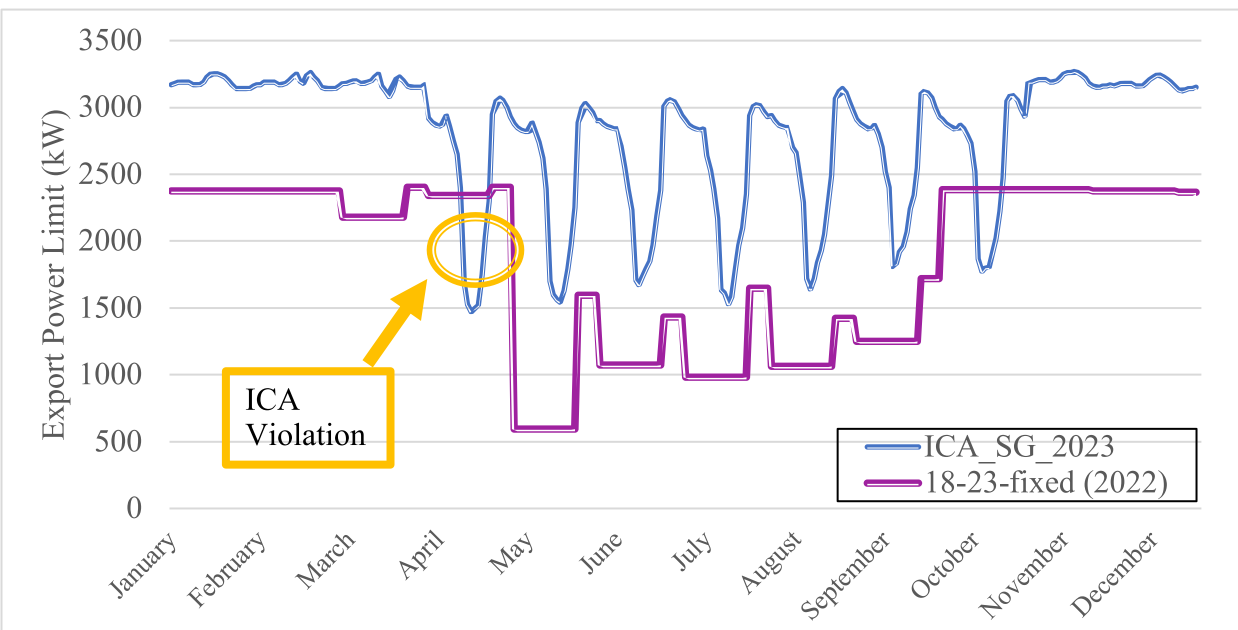

Figure 8. Illustration of a calculated ICA-SG violation when comparing ICA-SG values for a 12-month period "Year 2" (2023) with LGP values for the 18-23-fixed configuration for a 12-month period in "Year 1" (2022), using the example of PG&E Line Section 4310786 from PG&E response to Energy Division Data Request. See discussion of E-5230 Topic F for details.

Appendix B: Rule 21 Tariff Changes

A. Modify Section D.9 to read:

D.9.a. [No change to existing text of Section D.9, just renumbered]

D.9.b. For Generating Facilities approved to utilize Limited Generation Profiles, Producer acknowledges that if a Sustained Load Reduction should occur on the circuit to which an LGP facility is interconnected, such that the circuit's hosting capacity is reduced, that Distribution Provider may need to reduce generation to ensure safe and reliable service. Accordingly, if necessary to maintain safe and reliable operation of Distribution Provider's Distribution or Transmission System, Distribution Provider may temporarily reduce the approved Limited Generation Profile level to whatever level is required to ensure safety and reliability, or to the lowest ICA-SG value identified at the time of the Interconnection Application, whichever is greater. Distribution Provider will undertake any required mitigations or upgrades to allow the Limited Generation Profile level to be restored to the approved level in the facility's Generator Interconnection Agreement.

B. Under the definitions section, add a definition for "Sustained Load Reduction":

A Sustained Load Reduction on a circuit is a permanent decrease in the load (exclusive of the addition of any generation DERs) of one or more customers on that circuit resulting from business wind-downs, unanticipated addition of energy efficiency or other load management technologies, and/or other permanent circumstances that reduce the load of one or more customers on that circuit.

C. Add the following to Section J.5:

For Generating Facilities with a Limited Generation Profile attached to their Generator Interconnection Agreement, if AMI [Advanced Metering Infrastructure] is not available, or Customer opts out, telemetry at the point of common coupling will be required at the Producer's expense.

D. Add a new Section Mm5: Option 12 to Screen I:

Mm5: OPTION 12: Limited Export with Limited Generation Profile Utilizing Certified Power Control Systems

The following are minimum requirements for limited export systems that use certified power control systems (PCS) with an open loop response time (OLRT) no more than two seconds to maintain a level of export that is lower than the generator nameplate rating according to a set schedule. It should be noted that other factors relevant to the Interconnection Study process may necessitate additional technical requirements that are not explicitly noted here.

1. Use a PCS that passes the requirements of the 2019 Underwriters Laboratories (UL) Power Control Systems Certification Requirements Decision (CRD) test protocol. Limited export systems may use a PCS that passes later published revisions to the CRD test protocol or may use a PCS that is certified to the UL 3141 certification standard, if UL incorporates the test protocol for PCS into UL 3141 in the future. The Nationally Recognized Testing Lab (NRTL) evaluation must have determined that the PCS conforms to the export limiting functionality in accordance with the relevant CRD or UL published Standard.

2. Use a PCS that is certified with an OLRT of two seconds or less as provided in the PCS's specification data sheets.

3. The PCS must reduce export to the approved export limit, or less, within two seconds of exceeding the approved export limit. A PCS that is certified with an OLRT of two seconds or less, and a time to reach steady state of ten seconds or less, meets this requirement.

4. Set the PCS to not exceed the maximum allowed level of export specified in the LGP attached to the generator's interconnection agreement.

5. Use only UL 1741-listed grid-support non-Islanding inverters as approved by this tariff.

6. Maintain voltage fluctuations at the limits specified in Electric Rule 2.

If the Initial Review fails due to the LGP values requested by the Customer in its interconnection application exceeding 90% of ICA SG Profile for any hour, the project will fail Screen M /Initial Review. The Customer will be notified of Initial Review failure and offered an Optional Results Meeting. If modifications that can mitigate the Initial Review failure are identified during the Optional Results Meeting as per section F.2.b. of Rule 21, the Customer must provide updated LGP values within 5 business days:

- Reduction at each hour of the updated LGP values must comply with Rule 21 Table F.1. Each hour may not be reduced by more than 20% of the original request.
- If IOU determines that the ICA results are outdated and the project would fail Screen M based on the updated ICA results, the Customer will be allowed to update their proposed LGP values with no restrictions on the amount of reduction.
- Where reduction of LGP impacts other failed screens (such screen D), the cost and time for the restudy will be based on Rule 21 Table F.1.
- Increases in generator size, i.e., increases in generator nameplate or LGP values, are not allowed under Fast Track.

Updated LGP values must be provided 5 business days after Optional Initial Review Results Meeting. If the IOU's do not receive the updated LGP within 5 business days, and the project proceeds to Supplemental Review as per Rule 21, section F.2.c., the project would be studied using the generator nameplate capability for Screen N and applicable portions of Screens O and P.

<u>The Distribution Provider evaluating Generating Facilities requesting interconnection under this section shall:</u>

1. Utilize the Generating Facility's Gross Nameplate Rating for screens F, F1, G, and H.
2. Is the maximum steady state value greater than 1% of the PCS controlled nameplate (as provided in the NRTL testing reports)? If so:
    a. Screens D, J, K: Use the maximum LGP value plus the maximum steady state value of the PCS multiplied by the PCS controlled nameplate

b. Screen M: Use the requested LGP values plus the maximum steady state value of the PCS multiplied by the PCS controlled nameplate

c. Screen N: For LGP projects, Screen N (section G.2.a.i.) is considered a PASS if Screen M PASSED.

d. Screen O: Use the maximum LGP value plus the maximum steady state value of the PCS multiplied by the PCS controlled nameplate

e. Screen P: Use the Generating Facility's Gross Nameplate Rating for evaluations that use fault current calculations. For other evaluations under Screen P, use the maximum LGP value plus the maximum steady state value of the PCS multiplied by the PCS controlled nameplate

3. Is the maximum steady state value less than or equal to 1% of the PCS controlled nameplate (as provided in the NRTL testing reports)? If so:

   a. Screens D, J, K: Use the maximum LGP value

   b. Screen M: Use the requested LGP values

   c. Screen N: For LGP projects, Screen N (section G.2.a.i.) is considered a PASS if Screen M PASSED.

   d. Screen O: Use the maximum LGP value.

   e. Screen P: Use the Generating Facility's Gross Nameplate Rating for evaluations that use fault current calculations. For other evaluations under Screen P, use the maximum LGP value.

Appendix C: Large IOUs Proposal for Procedure and Steps for LGP Curtailment, with Modifications from Disposition #7

<u>Large IOUs Proposal in the Joint January LGP ALs:</u>

Step 1. For conditions that warrant urgent action, the Utility will take initial actions in accordance with good utility practice. (Note, the cause of the violation will typically be identified after the event.)

Step 2. Following Step 1, the Utilities will assess whether low-cost mitigation measures can be implemented to restore some or all of the LGP exports and output of non-LGP generating facilities

Step 3. If there is a continuing need to reduce an LGP customer's exports after considering any identified low-cost mitigation measures, the Utility will undertake a study to establish the updated LGP. "The study will incorporate the system conditions to determine current hosting capacity in order to determine the export levels at which safety and reliability concerns are addressed." There are two outcomes to consider based on the study results:

a) Reductions below the lowest ICA-SG level as set forth in the LGP customer's generator interconnection agreement would be required to address safety and reliability concerns—In this case, the Utility will identify upgrades to restore the LGP to at least the lowest ICA-SG level as set forth in the LGP customer's generator interconnection agreement. The upgrades will be conducted in accordance with the Large IOUs' standard practices and timelines for design, permitting, and construction and recover the costs of these upgrades from ratepayers--the utilities do not believe any further commission action is required for the utilities to pursue such upgrades or recover the costs from these upgrades from ratepayers. The Utility will provide the LGP customer with a non-binding estimate of when those upgrades will be in-service. Once the upgrades are operational, the Utility will provide the LGP customer with the original LGP in the interconnection agreement reflecting the hosting capacity made available by the upgrades. The updated LGP will be composed such that (i) the lowest values are not less than the minimum ICA-SG value set forth in the customer's generator interconnection agreement, nor (ii) greater than the LGP accepted at time of interconnection. "If the upgrade allows the project to export at or above the lowest ICA-SG value, but not at the values set forth in the interconnection agreement, the customer will have the option to pay for any additional upgrades required to restore the LGP."

b) Reductions of exports are needed to a level not below the lowest ICA-SG level—In this case, the Utility will notify the LGP customer of the continuing need for a reduction of the LGP customer's exports to the grid and the customer can choose to pay for upgrades required to restore the LGP exports to the level set forth in the interconnection agreement. The customer will also be notified of the updated LGP and the effective date.

Modified Version of Step 3 from Disposition #7

Step 3. If there is a continuing need to reduce an LGP customer's exports after considering any identified low-cost mitigation measures, the Utility will undertake a study to establish the updated LGP. The study will incorporate the system conditions to determine current hosting capacity in order to determine the export levels at which safety and reliability concerns are addressed. The Utility will identify upgrades to restore LGP values to those in the facility's interconnection agreement and also upgrades to restore LGP values to at least the lowest ICA-SG level as set forth in the LGP customer's generator interconnection agreement.

Upgrades shall be performed to restore LGP values to those in the facility's interconnection agreement, at ratepayer expense. The upgrades will be conducted in accordance with the Large IOUs' standard practices and timelines for design, permitting, and construction and recover the costs of these upgrades from ratepayers--the utilities do not believe any further commission action is required for the utilities to pursue such upgrades or recover the costs from these upgrades from ratepayers. The Utility will provide the LGP customer with a non-binding estimate of when those upgrades will be in-service. Once the upgrades are operational, the Utility will provide the LGP customer with the original LGP in the interconnection agreement reflecting the hosting capacity made available by the upgrades.

Appendix D: Data Reporting Requirements Proposed in the Alternate Proposal with Large IOUs Responses

The Alternate Proposal by IREC and other parties proposed a set of data reporting requirements as follows, provided along with point-by-point responses by the Large IOUs:[1]

- How the IOU identified the need for mitigations or modifications. This shall include both a record of how the IOU first became aware of the problematic conditions on the system, as well as how it determined that condition arose due to a reduction in load (including data to support this conclusion). This data should be tracked and reported for all mitigations or modifications that the IOU determines are due to loss of load.
    - Large IOUs' response—While the Joint Utilities expect to have a record of how they became aware of the condition, they do not currently report this data and would need to develop new reporting processes to compile this information.
- The cost of the mitigation or modification.
    - Large IOUs' response—[None given]
- How long it took from identification of the condition to implementation of the mitigation or modification.
    - Large IOUs' response—The Joint Utilities believe new tracking would be required to provide this data since outage data may not be tracked on a per-need basis (i.e., the Joint Utilities may not be able to tie a specific safety or reliability condition to a specific load reduction). The Joint Utilities also note that some system issues may not result in an actual outage, in which case an entirely new tracking system may be required.

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[1] From Alternate Proposal (Appendix A of Joint January LGP AL) at 5-6; and Large IOUs Response to Alternate Proposal, "Joint Utilities' Reply to Cal Advocates Protest of Supplement to Joint Advice Letter Complying with Resolution E-5211 and Decision 20-09-035 Ordering Paragraph 16", at 5-7

- Details on all the projects interconnected to the circuit at the time the condition arose, including their nameplate capacity, export capacity, and fuel type.
    - Large IOUs' response —[None given]
- Where one of these conditions arises, and there is an LGP project interconnected to the circuit, the IOU shall also document:
    - 5.a: Whether curtailment of the LGP project down to the minimum ICA-SG would have avoided the need for the mitigation or modification and provide supporting data for that assertion.
        - Large IOUs' response—The Joint Utilities acknowledge that under the proposed implementation of LGP set forth in the Advice Letter, which permits permanent curtailment to 90% of the lowest ICA-SG value in effect at time of interconnection (consistent with the Decision), they would need to determine that such curtailment would address the system issue. However, the Alternate Proposal would not only require the Joint Utilities to implement upgrades at ratepayer expense to restore LGP customers to the LGP established at time of interconnection, it would also require the Joint Utilities to determine and track whether curtailment to 90% of the lowest ICA-SG in effect at time of interconnection would have addressed the issue absent the upgrade. A new internal tracking mechanism would likely be required to document and report on these hypothetical scenarios.
    - 5.b: Information on the LGP project, including the project's fuel source (i.e., solar, solar+storage, etc.), nameplate capacity, production profile and whether it is a front of the meter or behind the meter installation.
        - Large IOUs' response— Production profile information is not available because exports are tracked at the Point of Common Coupling, not production. The remaining requested information is typically available in the GIAs but would require new reporting processes to gather and provide.

- 5.c: Whether any other projects have interconnected to the circuit subsequent to the LGP project(s) (and if so, details about those projects and whether any upgrades were completed to facilitate their interconnection).
    - Large IOUs' response— The requested information is typically available (i.e., in the GIAs of the later-submitted projects) but would require new reporting processes to gather and provide.
- 5.d: The load profile in existence at the time the LGP project applied for interconnection and the load profile at the time the condition requiring mitigation or modification was identified.
    - Large IOUs' response— The Joint Utilities will utilize this circuit-level information at the time of interconnection but would need to develop new processes to record and report this data.

Additionally, the Alternate Proposal requires the Large IOUs "to track the following general information about interconnections to assist with understanding the impacts of LGP projects:"

- A summary of feeders by number of interconnections, including at least:
    - The number of feeders with LGP interconnections.
    - The number of feeders with non-LGP interconnections.
    - The number of feeders with both LGP interconnections and non-LGP interconnections.
    - Large IOUs' response—The requested information is available but would require new reporting processes to gather and provide.

And the Alternate Proposal would require the Large IOUs:

- To file the above identified information in this docket [presumably R.17-07-007 or a future interconnection rulemaking; this LGP proposal is submitted through the AL process, and therefore there is no docket associated with ALs] on a biennial basis beginning two years after LGP is incorporated into their Rule 21 tariffs.

- Large IOUs' response—[None given]

- In addition to biennial reporting, the IOUs should each track and tally the number of mitigations or modifications that it determines could have been avoided by curtailing an LGP project down to the lowest ICA-SG. Once any IOU has recorded ten such events, it shall file a notification, via Tier 1 advice letter [with all tracked data] within 90 days of the tenth event.
    - Large IOUs' response—[None given]
- If after 8 years of tracking and reporting, no IOU has identified ten or more of the mitigations or modifications described above, the reporting requirement shall be terminated and the trial period for the LGP considered complete.
    - Large IOUs' response—[None given]

Appendix E: Ordered Data Monitoring and Reporting of LGP Facility Curtailments

We adopt the following five data monitoring and reporting requirements, to apply only to each LGP interconnection customer whose LGP values have been curtailed due to the LGP-specific circumstance of Sustained Load Reduction on the circuit. These requirements shall apply to any such curtailment at any time after the Interconnection Agreement has been signed, regardless of how long the curtailment lasted and whether or not the curtailment remains in effect.

(1) How the Large IOUs identified the need for mitigations or modifications to a distribution circuit or substation that is associated with an actual LGP reduction. This shall include how the Large IOUs determined that condition arose due to a Sustained Load Reduction on the distribution system, and data to support this conclusion;

(2) The cost of any distribution system upgrades implemented to the electric system to restore the LGP profile values to the LGP values in the Interconnection Agreement;

(3) The length of time it took (1) from identification of the condition to implementation of the mitigation or upgrade to the system and (2) to partially or fully restore a customer's LGP at time of application or to the lowest ICA-SG value allowed;

(4) Once an LGP interconnection customer's LGP values have been fully or partially restored after any low-cost mitigations have been implemented, utilities shall report whether or not the LGP values have been restored to the full original values from that customer's Interconnection Agreement, and if not, the utility shall report the modified values after low-cost mitigation(s) are completed;

(5) The LGP from the Interconnection Agreement and the ICA-SG at that time, the reduced LGP assigned to the LGP interconnection customer due to safety or reliability constraints and the ICA-SG at that time, and the LGP after low-cost mitigations and/or upgrades are performed and the ICA-SG at that time.

Appendix F: Large IOUs Process Proposal for Implementing LGP Option

The following text is reproduced verbatim from "Appendix A: Revised IOU Proposal" in the Joint May LGP AL.

1. Customer Preparation Phase:

   a. In this phase, a Customer who intends o use this operational method downloads the Integration Capacity Analysis (ICA) profiles from Utility ICA maps (when ICA values are available) for the three-phase electrical node that will be used for the interconnection request. If the interconnection request is for a single-phase electrical connection, the Customer should use the electrically-closest three-phase electrical node.
   b. The Customer should examine the downloaded ICA-SG profile to identify the minimum ICA-SG values from the ICA-SG profile that correspond with each of the specific time periods associated with the Limited Generation Profile configuration the Customer seeks to utilize.
   c. The Customer shall determine the Limited Generation Profile values to not exceed 90% of the minimum ICA-SG values as determined in (b). The format for submitting the Limited Generation Profile values requires populating a profile that contains 24 values per month for each of the 12 months, totaling 288 data points. During operation of the Customer's generator, the Limited Generation Profile value for each hour will depend on the Limited Generation Profile configuration selected by the Customer.
   d. The Customer shall select a certified control system from an IOU-provided list of Underwriters Laboratories (UL)-certified Power Control Systems (PCS) that can control the exports at the PCC to not exceed the values determined in (c).
   e. The Customer shall capture the name or ID of the Distribution Feeder (circuit), the three-phase electrical node identifier (For SCE and SDG&E, specify the "Node ID". For PG&E, specify the "Line Section ID"), and the date when the data extraction took place. [Joint May LGP AL Footnote 19][1] The Customer will

[1] See ICA map & user-guide to understand how the term CSV Line Section is used. [from Joint May LGP AL Footnote 19]:
User Guide:
https://www.pge.com/eimp/?appname=GISMapping&resume=%2Fas%2FB7VUa%2Fresu me %2Fas%2Fauthorization.ping&spentity=null (*sic*);
ICA Map:
https://www.pge.com/eimp/?appname=GISMapping&resume=%2Fas%2FuKhwS%2Fresu me %2Fas%2Fauthorization.ping&spentity=null (*sic*)

submit information consistent with the format below as part of the Interconnection Request.

Table 6

Circuit Name/Feeder ID	
Node ID/Line Section ID	
Download Date	

Table 7

Month	Hour (0-23)	Monthly Minimum Uniform Generation ICA Static Grid (kW/MW)	90% of Monthly Minimum Uniform Generation ICA Static Grid (kW/MW)	Customer Determined LGP (Maximum Export at Point of Common Coupling) (kW/MW)

2. Interconnection Request Phase:

a. The Customer is to provide the information that is typical and general to all
    a. interconnection requests.
b. The Customer is to provide the Limited Generation Profile Values as
    a. determined in 1(c) and the information for 1(e) within [IOU]'s Interconnection Portal.

        i. In the event [IOU]'s Interconnection Portal is unable to accept the upload of a CSV file, the [IOU] will accept e-mailed CSV files as an alternative method to provide the Customer's proposed Limited Generation Profile values.

c. The Customer is to provide information on their certified control system within the [IOU]'s Customer Connect interconnection application portal.

3. Technical Evaluation Phase:

a. [IOU], consistent with applicable existing Rule 21 timelines, will apply all the applicable Initial Review Screens (A-L) based on the Nameplate capacity where applicable. Screen D, J, and K will use the maximum LGP value. Screen M will use the individual LGP values.
b. The published interconnection queue will reflect the nameplate capacity for all projects, including LGP projects.

c. [IOU] will verify that it has the most updated ICA-SG profile corresponding to the Customer provided three phase electrical node (Node ID/Line Section ID) from 1(e).

d. [IOU] will evaluate the most updated ICA-SG profile and determine if the requested export values are at or below 90% of the minimum ICA- SG value for each specific time period within the selected LGP configuration.

   i. If the export request for each specific time period is at or below 90% of the time period's minimum ICA-SG value, then the project can continue with its evaluation.

   ii. If all Initial Review screens (A-L) are met including 3(e)(i) (all requested values are below 90% of each specific time period's ICA values), then the project would pass Fast Track.

   iii. If the export request for one or more of the specific time periods is not at or below 90% of the specific time period's minimum ICA-SG value, the project will fail Initial Review. [IOU] will inform the Customer via e-mail to the customer and offer an optional review results meeting. Customer will have **5 Business Days (BD)** after the notification, or after the optional result reviews meeting to update their proposed limited generation profile such that all values for all specific time periods are at or below 90% of the ICA-SG values.

   iv. If the Customer responds with a conforming export request, the Customer's queue position will not change. The update to the LGP values should abide by the existing material modification criteria in section F.2.b of Rule 21, with the exception that when the project fails Screen M due to the [IOU] finding the ICA values are outdated then the LGP project is exempted from the 20% reduction limit.

   v. If the Customer does not respond within **5 BD** of the notification or the Optional Initial Review Results Meeting, [IOU] will proceed to evaluate the project using full nameplate, and the Customer will be responsible for the costs of any distribution upgrades necessary to allow interconnection at the generator's full nameplate value. The Customer's queue position will not change.

4. Interconnection Agreement/PTO Phase:

a. Execute Interconnection Agreements. The interconnection agreements should be updated to reflect the operational requirements of the Limited Generation Profile including:

i. Update Interconnection Agreements to ensure that the Generating Facility control systems meet the approved operating specification.

ii. Update Interconnection Agreement to (i) require prompt remedial action by the Customer if the Limited Generation Profile attached to the Customer's interconnection agreement is not followed, and (ii) clarify that if prompt remedial action is not taken or if multiple instances of not operating according to the Limited Generation Profile values occurs, [IOU] may terminate the interconnection agreement.

- For exports at the PCC which exceed the Limited Generation Profile values, but which do not immediately cause a safety and/or reliability concern, Customer will be notified by [IOU]. Customer will then be required to take remedial action within 15 business days of notification to conform to the Limited Generation Profile values. If remedial action is not taken within 15 business days from being notified, the Permission To Operate (PTO) will be revoked in accordance with the Customer's interconnection agreement and the generator must disconnect from the grid. [IOU] reserves the right to confirm that the generator has not reconnected.
- For exports at the PCC which exceed the Limited Generation Profile values, and which impose an immediate safety and reliability concern, [IOU] will take immediate action to disconnect the generator from the grid until remedial action is taken. If remedial actions are not taken within 15 business days from being notified (or being disconnected), the PTO will be revoked in accordance with the Customer's interconnection agreement. [IOU] reserves the right to confirm the generator has not reconnected.
- [IOU] will not impose additional requirements on a Customer whose PTO is revoked as a result of failure to take remedial action. As such, the Customer can request interconnection of generation under any CPUC approved procedure.

iii. Update the Interconnection Agreement to require that a Customer without Automated Metering Infrastructure must provide telemetry to the distribution operations control center designated by [IOU], where the telemetry monitors power flows at the Customer's PCC.

b. Conduct field performance verification

i. Prior to issuing a PTO, [IOU] may, at its sole discretion, conduct or witness field performance verification to ensure that equipment installed by the

Customer is configured and operating consistent with (i) the Limited Generation Profile values attached to the Customer's interconnection agreement, and (ii) the requirements of Rule 21. Where feasible, [IOU] may choose to conduct or witness field performance verification remotely.

ii. At the request of [IOU], Customer shall provide [IOU] with a written field performance verification procedure per Rule 21, Section L.5.a, 10 Business Days prior to the date of the field performance verification. [IOU] will coordinate the field performance verification procedure with the Customer.

c. PTO will be issued by [IOU] if (i) the field performance verification demonstrates compliance with the Limited Generation Profile values attached to the Customer's interconnection agreement, and (ii) all applicable agreements and documentation (such as a release from the Authority Having Jurisdiction (AHJ)) have been completed and copies provided to [IOU].

5. Operation Performance Phase:

a. The [IOU] will monitor compliance with the Limited Generation Profile attached to the Customer's interconnection agreement as follows:

i. For a limited Generation Profile project with generator nameplate under 1 MW, Automated Metering Infrastructure (AMI) data will be used to monitor export at the PCC, if AMI is available. If AMI is not available, telemetry monitoring export at the PCC will be required. The interconnection agreements should be updated to include the requirement that telemetry at the PCC will be required, at Customer's expense, if AMI is not available.

ii. For a Limited Generation Profile project with generator nameplate greater than or equal to 1 MW, telemetry is required. If telemetry is monitoring only the generator output, [IOU] has the ability to use AMI data, if available, to monitor export at the PCC. If AMI is not available, or Customer opts out, telemetry at the point of common coupling will be required at the Producer's expense.

Appendix G: Summary of Large IOUs Analyses of ICA-SG Criteria Violations in the Joint May LGP Advice Letters; Non-IOU Parties Protests; and Large IOUs Responses to Protests (for Resolution E-5230 Topic F)

The Joint May LGP Advice Letter summarizes the presentations of the IOUs during Workshops #2, #3, and #4, in which they presented analyses on ICA criteria violations resulting from LGP configurations of greater than 12 values, in comparison with violations for the Large-IOU-proposed 12-monthly (12 value) configuration.

- SCE presented an analysis showing the circuit load in a 12-month time period ("Time Period 2") was less than that of a previous 12-month time period ("Time Period 1") for 227 out of 288 hours (79%), SCE states this "is an indicator that if a generator were to have interconnected to this circuit based on the ICA results produced for Time Period 1, it could cause a criteria violation because the output of the generator coupled with the lower loads for Time Period 2 would result in circuit performance that violates thermal, steady state voltage or voltage variation criteria."

- SCE also presented a territory-wide circuit load configuration comparison, which identified that approximately 37% of SCE's distribution circuits analyzed experienced a decrease in coincident circuit load of 10% or more, further justification that allowing 288 unique LGP values is expected to expose more criteria violations on the system than allowing 12 unique LGP values.

- PG&E presented its preliminary studies on a random node in its distribution network. PG&E compares two ICA configurations from Period 1 (2021) to Period 2 (2022). PG&E observes that using a 288-hour configuration (rather than a single configuration value for each month) could create a condition where Period 2 hosting capacity falls below Period 1 hosting capacity for multiple hours. And states: "this drop in hosting capacity in Period 2 could result in grid impacts that were not considered during the interconnection application review. In comparison, for this example, no violations were observed in Period 2, using the 12 single-value monthly LGP."

- PG&E also presented a system-wide analysis of load changes. Feeder-level load information was collected for all of PG&E's feeders for 8760 hours for two consecutive year-long intervals. A histogram was presented in Workshop #2 [see

Figure H-1 at the bottom of this Appendix] that showed the percentage of the hourly load changes from the first year to the second year. This graph highlighted the possibility of load reduction in PG&E's territory that may lead to more protection, thermal or voltage violations when using a more granular LGP configuration.

- SDG&E presented a comparison of the circuit load configuration for one randomly selected circuit over two 12-month time periods: Time Period 1 and Time Period 2. The analysis showed that if the circuit load was compared on an hourly basis, the loading in Time Period 2 was less than that of Time Period 1 for 63% of the 288 hours, which is an indicator that if a generator were to have interconnected to this circuit based on the ICA results produced for Time Period 1, it could cause a criteria violation because the output of the generator coupled with the lower loads for Time Period 2, would result in circuit performance that violates thermal, steady state voltage or voltage variation criteria.

- SCE presented the results of an expanded LGP analysis during Workshop #4 after comments during Workshop #3 that analysis presented in LGP Workshop #2 was based on an insufficient sample size that would make it challenging to draw universal conclusions. In the expanded analysis, four out of the five nodes analyzed saw a higher risk of causing a criteria violation for all configurations with more than 12 LGP values. In all cases, the severity of violations increased as the number of LGP values increased. When considering nodes with one or more zero values in their ICA results, the analysis showed over 25 times increase in consequence when comparing 12 to 288 unique LGP values. When excluding nodes with one or more zero values in their ICA results, the analysis showed over two times increase in consequence when comparing 12 to 288 unique LGP values. In their Joint May LGP Advice Letter The Large IOUs asserted that the results of expanded analysis still support their recommendation to implement the LGP option using 12 unique values.

- PG&E also presented the results of its expanded analysis during Workshop #4. The analysis included a system-wide statistical analysis performed on around 10% of PG&E's circuits (339 circuits). The results showed that, with more granular LGP configurations, more energy could be exported to the grid. It was found that on a system-wide basis, approximately 10% more energy could be exported with 288LGP compared to 12LGP. And overall, approximately 40% more criteria violations were observed with 288 LGP compared to 12LGP. Moreover, about 30% increase was observed in average magnitude of violations for 288 LGP compared to 12LGP. Generally, the limiting criteria varied by node and granularity of LGP configuration, however, the most common causes of violations were voltage and thermal, respectively. Based on this analysis, PG&E claimed that the risk of violating power system safety design criteria (protection, thermal, and voltage) increased using more granular LGPs. In their Joint May LGP Advice Letter the IOUs asserted that this expanded analysis supports their recommendation to utilize a maximum of 12 unique values in the adopted configuration.

Cal Advocates also faulted the analyses provided by the Large IOUs as containing potential errors that could exaggerate the risks of violations. when comparing ICA values of one 12-month period with ICA values of a subsequent 12-month period in determining whether violations would occur. In analyzing SCE's year-to-year comparison of the Tropico circuit, CalAdvocates wrote:

> There are also several large downward spikes in the ICA data that appear to be erroneous. SCE was not able to confirm the cause of these spikes but suggested that they may be caused by non-convergence of SCE's ICA model (i.e., they reflect a model error). Similar spikes occurred in three of the five circuits that SCE analyzed. Therefore, most of SCE's analysis may contain errors…Because SCE based its analysis on the year-to-year variation in ICA, these erroneous data directly impact the results and conclusions of SCE's presentation by exaggerating the maximum magnitude of thermal events that may occur.

<u>Protests</u>

Cal Advocates protested that the benefits quantified by the Large IOUs are misleading. Cal Advocates wrote that it calculated a 10% increase in energy exports for PG&E, a 29% increase for SCE, and a 69% increase for SDG&E. However, only PG&E quantified this benefit in its analyses, which roughly matched Cal Advocates estimate. Cal Advocates argued that by omitting the energy-export benefits for SCE and SDG&E, which CalAdvocates believes from its own analysis are significantly higher than PG&E,

that the Large IOUs analytical results are misleading by only portraying the PG&E benefits.

Cal Advocates also asserted that PG&E's analysis showed there is at least one other LGP configuration – 24 hourly values – that would allow both increased benefits and decreased risks, compared to the configuration with 12 monthly values. And asserted that this refutes the Large IOUs position that any configuration other than 12 monthly values would increase risks. CalAdvocates concludes that:

> Because hourly values show the potential to increase benefit and decrease risk, the Commission should also allow interconnection using this option. Thus, the Commission should allow interconnection customers the choice between monthly values and hourly values.

IREC's protest pointed out some methodological shortcomings and considerations about the types of analyses being performed by the Large IOUs:

> While the utilities maintain that they do not wish to take on additional risk of ICA violations beyond a 12- monthly value LGP, their limited analysis and IREC's additional analysis show there could be benefit to allowing more than 12 values in the LGP while limiting additional risk. IREC's analysis also found that SCE's underlying data had problems and the manner in which they conducted their analysis was problematic and, as a result, the results exaggerated the potential number of violations from an LGP under the different scenarios.
>
> Although IREC offers some conclusions from these analyses, it is important to keep in mind that both IREC and the utilities' analyses are based on a miniscule data set when one considers the overall number of nodes on these systems. It is difficult to know whether this sample, which is far from statistically significant, is going to be representative of broader trends on the system. Furthermore, as will be explained below, while changes in an ICA calculation from year to year can stand as a reasonable proxy for "risks," it is important to recognize that this analysis did not look at any actual impacts on the system.
>
> The purpose of the utilities' analyses is to identify whether an LGP, based upon the ICA published at that time, could cause system impacts in later years as conditions (namely load) change on the feeders. It is not contested that load

> decreases will occur at times, either as an overall trend when customers permanently change their behavior, or due to unique demands that occur hour-by-hour in a year. However, as the analysis in the Commission's Electrification Impacts Study has shown, it is expected that load is going to double in the coming decade. It is vital that the Commission be aware that this effort did not make any attempt to capture those expected increases in load. Load growth due to electrification could significantly reduce any potential risks of LGP impacts, though a more sophisticated modeling exercise would be needed to determine the extent to which the load increases would minimize LGP impacts.

Second, IREC replicated the Large IOUs' analysis for the 288-value configuration to validate its analysis and then produced parallel results with the Large IOUs for the other configurations. IREC said its analyses confirms that the PG&E analysis "reflects a reasonable characterization of the number of potential ICA violations." However, IREC concurred with the Cal Advocates protest that errors in SCE's underlying ICA data exaggerate the maximum magnitude of violations in the SCE analysis. One such error is the same mentioned by Cal Advocates on possible spurious "zero ICA" values lasting only one hour. Another error is the way in which ICA values from one year to the next were treated relative to a buffer – that PG&E correctly attributed violations only to when the ICA values were exceeded, while SCE incorrectly attributed violations to any values reaching into the 10% buffer zone. And that technically speaking, values within the 10% buffer zone are not actual physical violations on the grid, only violations of the buffer.

Third, IREC presented its own analyses of three different configurations: a 288-value configuration, a 72-value configuration, and a 24-value configuration. IREC notes that the 24-value "Block" configuration was presented during Workshop #4. IREC reported the details of these analyses and how they coincide with or differ from the PG&E and SCE analyses. IREC found that its analysis showed roughly comparable energy production as PG&E but much higher than SCE. IREC also found fewer criteria violations than SCE. And IREC found mostly thermal violations on the PG&E circuits, but questioned whether those thermal violations were due to added DER capacity in the second year of analysis, which IREC says PG&E did not report. IREC also found that voltage violations are not necessarily limiting factors:

> IREC believes voltage variation may not be an actual limiting factor if analyzed more closely, especially for PV-only systems. This is because the voltage variation threshold is a 3% change, and is simulated in the ICA by changing the state of the DER from full output to fully off, or vice versa. However, PV plants do not see such changes in the course of normal operation so this is likely an overstatement of impacts. Additionally, voltage variation due to energy storage systems changing their power rapidly could likely be mitigated using ramp rates that can be adjusted through smart inverter settings.

<u>Responses</u>

The Large IOUs responded jointly to Cal Advocates, saying that benefits have not been quantified and thus the Cal Advocates claim that utilities are ignoring the benefit-risk balance is false:

> To date, none of the analysis, including the analysis presented by Cal Advocates, have shown that the "benefits" provided by an alternative to the Joint Utilities' proposal, would offset the consequences of the associated risks. Indeed, while there is a general expectation that increased exports will provide "benefits," no party has quantified the economic value of these benefits nor the share, if any, of this economic value that will accrue to ratepayers rather than to the owners of the interconnecting generators.

The Large IOUs also took issue with Cal Advocates claim of "erroneous" data (zero-value LGP on some nodes) in the SCE analyses, saying that even excluding from the analysis the specific nodes containing zero values, an increase in violation consequences was observed for configurations with more than 12 unique LGP values.

The Large IOUs refuted Cal Advocates claim that quantified increases in energy exports were missing from the SCE analysis, thus causing a misleading impression of energy benefits overall, as both energy exports and maximum instantaneous power were presented by SCE during Workshop #4.

The Large IOUs dismissed Cal Advocates assertion that that their proposal is "unjust and unreasonable", saying that this characterization is based on the fact that particular 24-value configurations on particular circuits show reduced risk compared to the 12-

value configuration, and that fact by no means invalidates the Large IOUs' conclusions or positions.

In conclusion, with respect to the issues raised by Cal Advocates, the Large IOUs jointly recommended that the Commission adopt 12 unique LGP values per year, one unique value for each month.

The Large IOUs responded jointly to the IREC protest, saying that some of the analyses performed by Large IOUs analyses do represent a large and statistically significant data sample:

> The Joint Utilities disagree with IREC that "both IREC and the utilities' analyses are based on a miniscule data set when one considers the overall number of nodes on these systems." PG&E performed analysis on more than 10% of PG&E circuits, around 339 circuits comprised of 155,000 line-sections. This equates to about 44 million line-section-hours, which is a statistically significant data sample.

The Large IOUs strongly opposed IREC's proposal to "allow applicants to propose LGPs, based upon the ICA at the point of interconnection, so long as it does not exceed 24 values." The Large IOUs wrote that there are an enormous number of possible LGPs under IREC's "free style" 24 LGP proposal, almost none of which have been assessed at a system-wide level. Absent analysis, at least as rigorous as PG&E's, each "free style" 24 unique value configurations would constitute "unquantified" risk.

The Large IOUs took issue with IREC's contention, from its own analysis of 24-value configurations, that at least some 24-value configurations do not increase risks. The Large IOUs said that IREC's analysis of one 24-value configuration shows increased risks and that one of the five nodes analyzed by SCE also shows increased criteria violations.

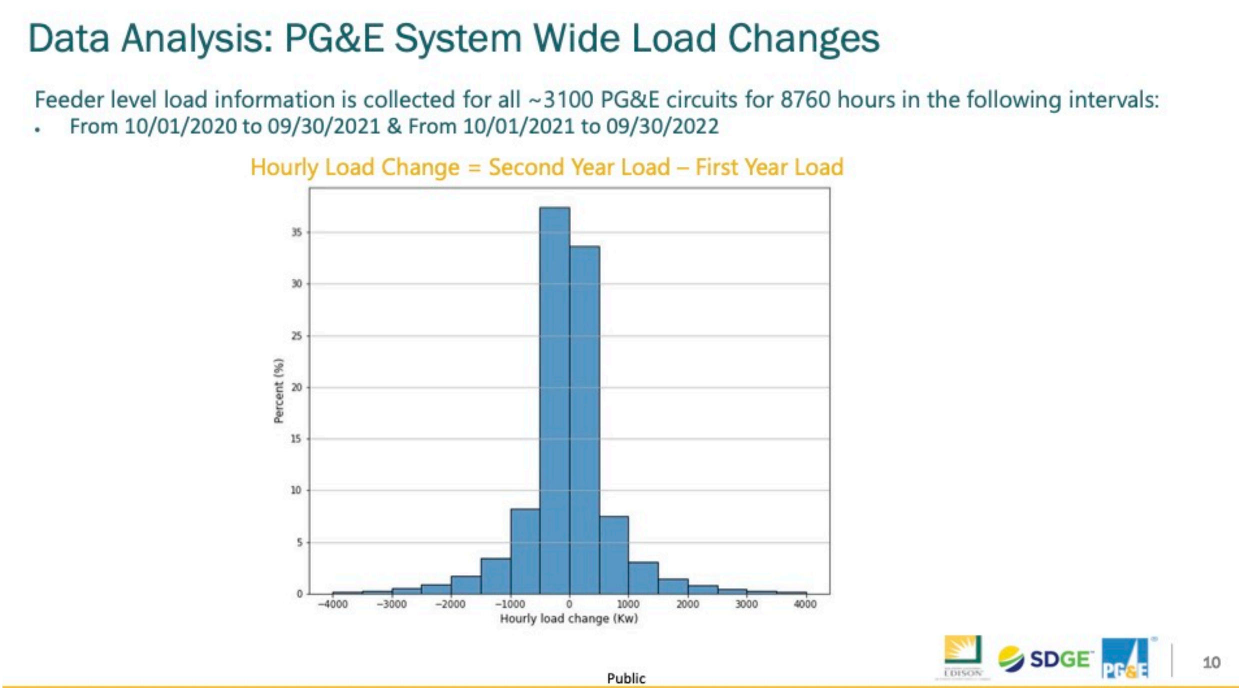
Finally, the Large IOUs disagreed with what they considered to be one premise underlying IREC's statements: that alternative ICA configurations can avoid reliability risks. The Large IOUs wrote:

> As IREC correctly points out, even the 12-value LGP (which was adopted by the Commission as an alternative to the Joint Utilities' initial seasonal proposal (four unique values per year)), presents increased risks when it comes the safety and

reliability of the distribution system. Nevertheless, the Joint Utilities believes the 12-value LGP option remains the most appropriate and straight-forward option with which to proceed. It strikes a reasonable balance between (i) safety and reliability risks, and (ii) learning opportunities that will allow further LGP granularity. At this time, the Commission should maintain its prior adoption of 12 unique LGP values per year and dismiss IREC's proposal to use a "free style" 24-unique value LGP option.

The Large IOUs conclude by saying the Commission should not change its standing approval to (i) use 12 unique LGP values per year, one unique value for each month, and (ii) allow 9 months to implement the LGP option following Commission approval of Rule 21 tariff changes.

Figure H-1: Histogram from Workshop #2



Appendix H: Energy Division Assessment of Three 24-Value LGP Configurations

Using the data provided by the Large IOUs in response to the Energy Division Data Request, Energy Division conducted an assessment of three 24-value LGP configurations: 24-hourly, Block, and 18-23-fixed. The assessment showed the following points:

1. On the basis of **number of overall violations**, these three configurations are roughly equivalent. The data provided in response to the Data Request shows the following points of analysis:

- PG&E's system-wide study[1] showed the number of section hours per type of violation to be roughly the same across all three configurations – ranging from 1.82 million to 1.90 million for thermal, 2.57 million to 2.99 million for voltage, and 0.096 to 0.097 million for protection. And although there were differences in total number of violations -- 7.4% more violations for 18-23-fixed compared to 12-monthly, 8.3% more violations for Block, and 2.7% fewer violations for 24-hourly compared to 12-LGP – the main difference for all three 24-value configurations was in the number of voltage violations. On the basis of thermal violations alone, all three 24-value configurations were no more than 5% higher than the number of 12-LGP configuration violations.

- PG&E's detailed study[2] of five selected feeders shows roughly the same number of violations when totaled across all five feeders, for each of the three configurations, with no one configuration performing markedly better or worse than the others on any given feeder, with the exception that 24-hourly showed lower maximum violation magnitudes on 3 of the 5 feeders.

- SCE's detailed study[3] of five selected feeders shows zero violations for all three 24-value LGP configurations on 4 of the 5 feeders. On the fifth feeder, Block had the lowest maximum magnitude of violations, while 18-23-fixed had the lowest number of violations but second-highest magnitude of violations. All violations

[1] Supplement A at 52-53

[2] Supplement A at 54-59

[3] Supplement B at 11-34

for the 24-value configurations are voltage violations and none are thermal or protection.

2. The **amount of energy** associated with each of the three 24-value configurations varies across the different studies and results, thereby making it difficult to distinguish any 24-value configuration that is higher than the others. In general, however, the Block configuration gives higher energy results in the greater number of cases. The data provided in response to the Data Request shows the following points of analysis:

- PG&E's system-wide study[4] showed 4.2% higher energy for Block compared to 12-monthly, while 18-23-fixed and 24-hourly were only 2.5% and 0.5% higher than the 12-monthly configuration, respectively.
- PG&E's detailed study[5] of five selected feeders shows roughly the same energy across all three 24-value configurations.
- SCE's detailed study[6] of five selected feeders showed 7.7% higher energy for 24-hourly compared to 12-monthly, 7.1% higher for Block, and 5.4% higher for 18-23-fixed.

3. The amount of **maximum power output** associated with each of the three 24-value configurations varies across the three 24-value configurations but that the 18-23-fixed configuration consistently provides higher maximum power values than 24-hourly or Block. The data provided in response to the Data Request shows the following points of analysis:

- PG&E's detailed study[7] of five selected feeders shows 18-23-fixed with 2% more average maximum power than 12-monthly, Block 1.1% more, and 24-hours 0.6% more.
- SCE's detailed study[8] of five selected feeders shows 18-23-fixed with 15.2% more average maximum power than 12-monthly, Block 7.2% more, and 24-hourly 6.7% more.

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[4] Supplement A at 52-53
[5] Supplement A at 54-59
[6] Supplement B at 11-34
[7] Supplement A at 54-59
[8] Supplement B at 11-34

4. On our criteria for low likelihood of **causing mitigations or upgrades** should there be a sustained load reduction following interconnection, all three 24-value configurations showed some risk. However, in the case of upgrades like line reconductoring or adding a line recloser, one 24-value configuration showed the same risk as the 12-monthly configuration. The data provided in response to the Data Request shows the following points of analysis:

- PG&E's screening analysis[9] studied the line sections with the maximum violation magnitudes on the five randomly selected feeders. Furthermore, the impacts were analyzed for the hour with the maximum violation magnitude created by 100% of the prior year's ICA-SG values. The interconnecting project was sized at 90% of ICA-SG Period 1 value of that particular hour, as if it was operating with the "288-LGP" configuration. This choice provided the worst-case situations to assess real grid impacts. For two of the five feeders across all configurations, a reconductoring was required due to thermal violations. For a third feeder, replacing a fuse with a line recloser was required. And for two feeders, no mitigations were required as a result of thermal violations.
    - The 18-23-fixed configuration presented slightly lower magnitude violations on the feeders where upgrades were required. It likely would have caused the same result.
    - This analysis showed that the 24-hourly configuration would not have caused an upgrade for one of the feeders that required reconductoring, as it did not present any violations on that feeder. For the other feeders that required an upgrade, the 24-hourly presented a lower maximum violation magnitude, but likely would still cause an upgrade. The same was true for the Block configuration, presenting a slightly lower maximum violation magnitude than the 18-23-fixed configuration for all three feeders on which upgrades were required.
    - The 18-23-fixed configuration performed at the same level as the 12-monthly configuration in all the PG&E studies where line reconductoring or adding a line recloser was required – again, for the line sections

[9] PG&E Response to CPUC Energy Division Data Request #1 on Joint Advice Letter (PG&E 6929-E, SCE 5025-E and SD&E 4215-E), September 26, 2023, at 5-35

intentionally selected by PG&E as having the highest violation magnitudes.

- SCE's screening analysis[10] showed both 18-23-fixed and Block passing all screens for the five selected feeders. However, the analysis was inconclusive for 24-hourly, showing that further study was necessary to determine if mitigations or upgrades would be required.

[10] SCE's Response to Update #3 to CPUC Energy Division Data Request #1 on Joint Advice Letter (SCE 5025-E, PG&E 6929-E and SD&E 4215-E), September 26, 2023, at 11-14.

Appendix I: Proposal for Data Format of LGP Values to be Submitted by Customers

The Large IOUs provide a proposal for the data format of LGP values to be submitted by customers along with their interconnection application.[1] The headers of the Large IOUs' proposed format for customer submittal of LGP values are listed below. Regardless of the maximum number of unique LGP values adopted by the Commission, the format for customer submission of LGP values would contain a header information section and 288 rows to represent the customer's proposed LGP. To the extent that the Large IOUs' terminology differs, the Large IOUs intend to implement a format that reflects their respective terminology and units of published ICA results.

1. Circuit Name/Feeder ID: Unique identifier of the circuit,
2. Node ID/Line Section ID: Unique identifier of the node or line section electrically closest to the Customer's proposed Point of Interconnection,
3. Download Date: Date on which the ICA results were downloaded from the IOU interconnection map,
4. Month: January through December,
5. Hour (0-23): Hour 0 through 23,
6. Monthly Minimum Uniform Generation ICA Static Grid (kW or MW): The minimum of the 24 hourly Uniform Generation ICA Static Grid results for each month (The same value will be repeated 24 times for each month),
7. 90% of Monthly Minimum Uniform Generation ICA Static Grid (kW or MW): 0.90 multiplied by the values in #6.,
8. Customer Determined LGP (Maximum Export at Point of Common Coupling) (kW/MW): The Customer's proposed hourly export at the Point of Common Coupling. Note that these values must be less than or equal to the values in #7 for every hour.

[1] Joint May LGP AL at 20.

SCE's Response to Update #3 to CPUC Energy Division Data Request #1 on Joint Advice Letter (SCE 5025-E, PG&E 6929-E and SD&E 4215-E--Joint Proposed Modifications to Implement Limited Generation Profiles Pursuant to Ordering Paragraph 3 of Resolution E-5230) filed May 1, 2023 (dated September 20, 2023) (Data Request)

Table of Contents

I. Executive Summary 2
A. Overall Findings 2
B. Geographic Diversity of Nodes Analyzed 2
C. Definition of Two Time Periods and LGP Configurations 3
D. ICA Limiting Criteria 3
II. Analysis of Five LGP Configurations Across Five Nodes 4
A. Peso 12 kV, TERM_16664551 4
B. Citrow 12 kV, TERM_40720736 5
C. Cottonmouth 16 kV, TERM_20483148 8
D. Sevaine 12 kV, TERM_51057677 9
E. Tarpon 12 kV, TERM_60437615 10
III. Comments on the Exclusion of Voltage Variation Violations 10
IV. Fast Track Screening of Each LGP Configuration 11
V. Load Flow Analysis and Mitigation Measures 11
VI. Further Statistics 14
VII. Comments on Implementation Effort 14
APPENDIX A: ICA REULTS AND CIRCUIT LOAD PROFILES 15
APPENDIX B: SUSPECTED OUTLIERS IN ICA-SG RESULTS 20
APPENDIX C: Update #3 to CPUC Energy Division Data Request #1 on Joint Advice Letter (SCE 5025-E, PG&E 6929-E and SD&E 4215-E--Joint Proposed Modifications to Implement Limited Generation Profiles Pursuant to Ordering Paragraph 3 of Resolution E-5230) filed May 1, 2023 (dated September 20, 2023) 32

I. Executive Summary

A. Overall Findings

The overall findings and key takeaways from this data request are summarized below:

- SCE's analysis in response to this data request identified **24Hour_fixed** to be the LGP configuration with the **lowest risk** and **highest energy** production for **3 out of the 5** nodes.
- Conversely, the **24Hour_fixed** LGP configuration had the **highest risk** of all LGP configurations studied for the Citrow 12 kV node. In this case, the **12LGP** configuration had the lowest risk and highest energy production.
- For **all 5 nodes**, the **12LGP** configuration resulted in **zero instances** where the LGP value exceeded the coincident Period 2 ICA-SG result, while also offering considerable energy exports over the course of the LGP. This supports the IOUs' recommendation to proceed with the 12 LGP configuration.
- While geographically diverse, the results of this analysis represent only a small fraction of SCE's service territory.

Table 1: Lowest Risk, Highest Energy LGP Configuration by Node

Region	Circuit & Voltage	Node ID	LGP Configuration with Lowest Risk and Highest Energy
Rurals	Peso 12 kV	TERM_16664551	24Hour_fixed
Desert	Citrow 12 kV	TERM_40720736	12
North Coast	Cottonmouth 16 kV	TERM_20483148	24Hour_fixed
Metro East	Sevaine 12 kV	TERM_51057677	24Hour_fixed
Orange	Tarpon 12 kV	TERM_60437615	16_21hourly

B. Geographic Diversity of Nodes Analyzed

SCE's 50,000 square mile service territory is divided into eight planning regions:

1. Desert
2. Metro East
3. Metro West
4. North Coast
5. Orange
6. Rurals
7. San Jacinto Valley
8. San Joaquin

To satisfy the geographic diversity requirements and minimize input data gaps, SCE selected one node from five of the eight planning regions as indicated in Table 1.

C. Definition of Two Time Periods and LGP Configurations

Using the most recent, complete ICA-SG data, SCE defined Periods 1 and 2 as follows:

- **Period 1:** June 2021 through May 2022
- **Period 2:** June 2022 through May 2023

The following 5 LGP configurations were developed using 90% of the ICA-SG results from Period 1 for each node:

- **12LGP**: Uses the monthly minimum of ICA-SG to generate a 12-value profile.
- **Block**: Divides the year into blocks of 3 months and each day into blocks of 4 hours and uses 90% of the minimum ICA-SG value for each block (24 values in a year). Construct the schedule around blocks from July-September and 5pm-9pm. For more information, refer to IREC's presentation in Workshop 4.
- **24Hour_fixed**: Takes 90% of the minimum ICA-SG values for each hour across the 12 months (24 values in a year).
- **16_21hourly**: Uses 90% of ICA-SG for 4PM-9PM, uses 90% of the monthly minimum of ICA-SG for 10PM-3PM for these hours (equivalent to SCE's 84-value profile from Workshop 4 and Joint AL 5025-E, page 24).
- **18_23fixed**: Uses 90% of minimum ICA-SG value for 6PM-11PM for these hours for each month, uses 90% of minimum ICA-SG value for 12AM-5PM for these hours for each month (24 values in a year).

The tabular data for these LGP configurations is being provided in a separate attachment.

D. ICA Limiting Criteria

A partial list of ICA limiting criteria and associated definitions are below:

- **Steady State Voltage (SSV):** Amount of generation that can be installed without violating Rule 2 (+/- 5% of nominal: Acceptable voltage is 114-126 V on a 120 V base)
- **Voltage Variation (VV):** Amount of generation that can be installed without causing 3% variation in Voltage
- **Thermal (TH):** Amount of generation that can be installed without causing thermal overloads anywhere in the system

II. Analysis of Five LGP Configurations Across Five Nodes

A. Peso 12 kV, TERM_16664551

Table 2: Peso 12 kV Count of Violations, Energy, and Power Export

PROFILE	Count of LGP Values Exceeding Coincident Period 2 ICA-SG	LGP Energy (kWH)	% change from 12 LGP	Max LGP Value (kW)	% change from 12 LGP
16_21hourly	5	149500.17	144%	1758.51	37%
Block	0	172376.748	181%	1591.11	24%
24Hour_fixed	0	174012.948	183%	1398.96	9%
18_23fixed	0	153060.732	149%	1673.388	31%
12LGP	0	61388.064	0%	1279.98	0%

Table 3: Peso 12 kV Magnitude of ICA Violations

LGP Profile	MONTH	HOUR	LGP Value (kW)	Period 2 ICA-SG (kW)	Difference (kW)	Cause
16_21hourly	10	20	1669.635	1457.51	212.125	VV
16_21hourly	10	19	1630.683	1428.1	202.583	VV
16_21hourly	10	21	1694.826	1499.19	195.636	VV
16_21hourly	10	18	1608.39	1429.04	179.35	VV
16_21hourly	4	21	1687.77	1664.26	23.51	VV

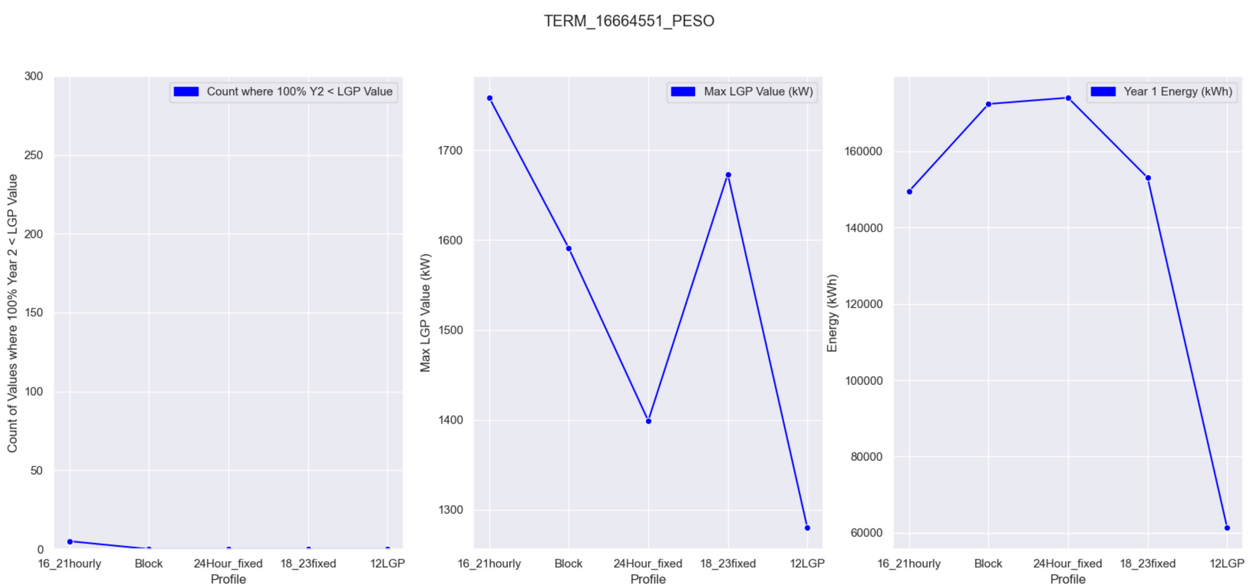


Figure 1: Peso 12 kV Risk, Maximum Instantaneous Power, and Cumulative Energy by LGP Configuration

B. Citrow 12 kV, TERM_40720736

Table 4: Citrow 12 kV Count of Violations, Energy, and Power Export

PROFILE	Count of LGP Values Exceeding Coincident Period 2 ICA-SG	LGP Energy (kWH)	% change from 12 LGP	Max LGP Value (kW)	% change from 12 LGP
16_21hourly	15	1412442.27	27%	9328.716	47%
Block	14	1431713.88	28%	7908.615	25%
24Hour_fixed	16	1482964.092	33%	8032.905	26%
18_23fixed	8	1333270.098	19%	8887.968	40%
12LGP	0	1116410.688	0%	6350.292	0%

Table 5: Citrow 12 kV Magnitude of ICA Violations

LGP Profile	MONTH	HOUR	LGP Value (kW)	Period 2 ICA-SG (kW)	Difference (kW)	Cause
16_21Hourly	9	20	6576.498	6276.52	299.978	SSV
16_21Hourly	3	16	8674.398	8008.4	665.998	SSV
16_21Hourly	7	21	8309.619	7287.34	1022.279	VV
16_21Hourly	7	18	7048.971	6001.16	1047.811	SSV
16_21Hourly	8	16	7157.169	5956.47	1200.699	SSV
16_21Hourly	6	21	8028.981	6617.39	1411.591	VV
16_21Hourly	9	18	8054.577	5942.09	2112.487	VV
16_21Hourly	8	17	8251.272	5946.88	2304.392	VV
16_21Hourly	9	19	8001.891	5495.11	2506.781	VV
16_21Hourly	7	20	8935.92	6030.41	2905.51	VV
16_21Hourly	6	20	8183.673	4821.73	3361.943	VV
16_21Hourly	8	21	9328.716	5933.76	3394.956	VV
16_21Hourly	7	17	8278.749	4742.1	3536.649	VV
16_21Hourly	9	21	8341.524	3826.73	4514.794	SSV
16_21Hourly	8	18	8207.109	3445.1	4762.009	VV
18_23fixed	9	20	6576.498	6276.52	299.978	SSV
18_23fixed	9	18	6576.498	5942.09	634.408	SSV
18_23fixed	7	20	6709.617	6030.41	679.207	SSV
18_23fixed	7	18	6709.617	6001.16	708.457	SSV
18_23fixed	9	19	6576.498	5495.11	1081.388	SSV
18_23fixed	6	20	6006.6	4821.73	1184.87	SSV
18_23fixed	9	22	6576.498	5003.53	1572.968	SSV
18_23fixed	9	21	6576.498	3826.73	2749.768	SSV
24Hour_Fixed	9	20	6576.498	6276.52	299.978	SSV
24Hour_Fixed	4	22	7678.215	7376.85	301.365	SSV
24Hour_Fixed	7	17	5201.226	4742.1	459.126	VV

24Hour_Fixed	9	9	6205.734	5727.61	478.124	VV
24Hour_Fixed	9	8	3894.633	3387.22	507.413	VV
24Hour_Fixed	9	19	6006.6	5495.11	511.49	VV
24Hour_Fixed	7	20	6576.498	6030.41	546.088	VV
24Hour_Fixed	7	21	8028.981	7287.34	741.641	VV
24Hour_Fixed	7	22	7678.215	6837.78	840.435	VV
24Hour_Fixed	7	15	6514.227	5204.03	1310.197	VV
24Hour_Fixed	6	21	8028.981	6617.39	1411.591	VV
24Hour_Fixed	6	20	6576.498	4821.73	1754.768	VV
24Hour_Fixed	8	21	8028.981	5933.76	2095.221	VV
24Hour_Fixed	8	18	5616.135	3445.1	2171.035	VV
24Hour_Fixed	9	22	7678.215	5003.53	2674.685	VV
24Hour_Fixed	9	21	8028.981	3826.73	4202.251	SSV
Block	9	20	6576.498	6276.52	299.978	SSV
Block	4	22	7678.215	7376.85	301.365	SSV
Block	6	20	5201.226	4821.73	379.496	VV
Block	7	20	6576.498	6030.41	546.088	VV
Block	9	10	7807.275	7234.1	573.175	VV
Block	7	18	6576.498	6001.16	575.338	SSV
Block	8	17	6576.498	5946.88	629.618	VV
Block	9	18	6576.498	5942.09	634.408	VV
Block	6	21	7678.215	6617.39	1060.825	VV
Block	9	19	6576.498	5495.11	1081.388	VV
Block	6	13	6441.318	5097.62	1343.698	VV
Block	7	17	6576.498	4742.1	1834.398	VV
Block	9	9	7807.275	5727.61	2079.665	VV
Block	8	18	6576.498	3445.1	3131.398	VV

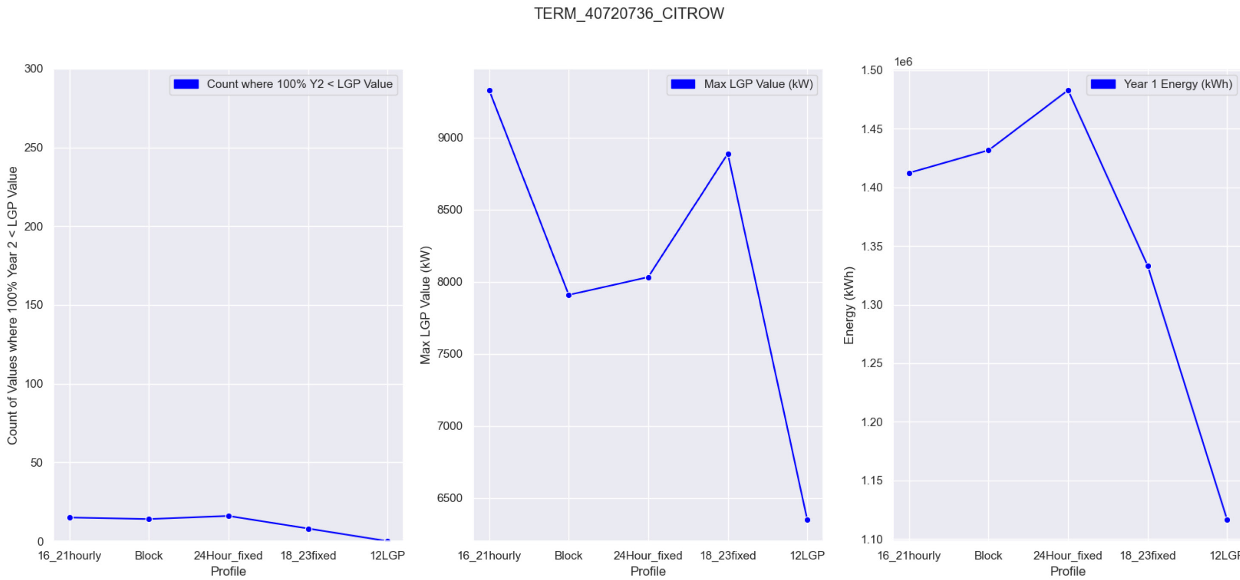


Figure 2: Citrow 12 kV Risk, Maximum Instantaneous Power, and Cumulative Energy by LGP Configuration

C. Cottonmouth 16 kV, TERM_20483148

Table 6: Cottonmouth 16 kV Count of Violations, Energy, and Power Export

PROFILE	Count of LGP Values Exceeding Coincident Period 2 ICA-SG	LGP Energy (kWH)	% change from 12 LGP	Max LGP Value (kW)	% change from 12 LGP
16_21hourly	0	4698668.493	2%	20099.565	21%
Block	0	4721170.212	3%	17036.568	2%
24Hour_fixed	0	4753935.468	3%	17267.22	4%
18_23fixed	0	4691792.97	2%	18103.554	9%
12LGP	0	4605756.984	0%	16665.156	0%

Note: A table of violation magnitudes is not included since no violations were identified for any of the LGP configurations.

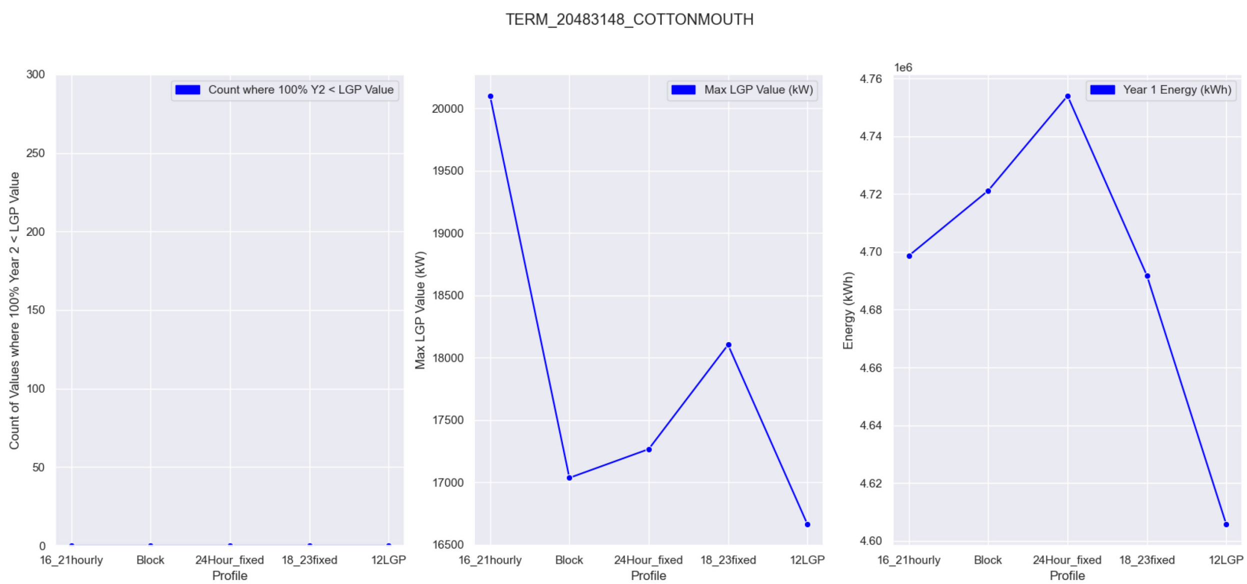


Figure 3: Cottonmouth 16 kV Risk, Maximum Instantaneous Power, and Cumulative Energy by LGP Configuration

D. Sevaine 12 kV, TERM_51057677

Table 7: Sevaine 12 kV Count of Violations, Energy, and Power Export

PROFILE	Count of LGP Values Exceeding Coincident Period 2 ICA-SG	LGP Energy (kWH)	% change from 12 LGP	Max LGP Value (kW)	% change from 12 LGP
16_21hourly	0	1013691.87	15%	6131.502	35%
Block	0	1023032.16	16%	4727.565	4%
24Hour_fixed	0	1028289.06	17%	4782.015	5%
18_23fixed	0	1001377.728	14%	5603.985	23%
12LGP	0	881135.712	0%	4550.814	0%

Note: A table of violation magnitudes is not included since no violations were identified for any of the LGP configurations.

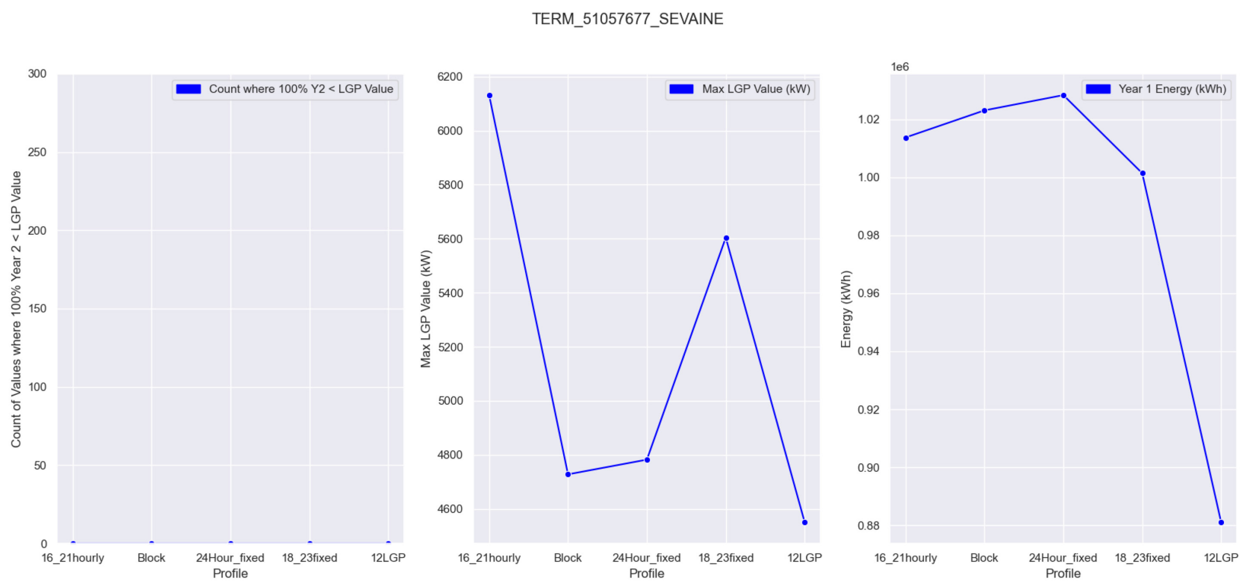


Figure 4: Sevaine 12 kV Risk, Maximum Instantaneous Power, and Cumulative Energy by LGP Configuration

E. Tarpon 12 kV, TERM_60437615

Table 8: Tarpon 12 kV Count of Violations, Energy, and Power Export

PROFILE	Count of LGP Values Exceeding Coincident Period 2 ICA-SG	LGP Energy (kWH)	% change from 12 LGP	Max LGP Value (kW)	% change from 12 LGP
16_21hourly	0	4201629.831	2%	16922.502	13%
Block	0	4186393.416	2%	15703.119	5%
24Hour_fixed	0	4165946.316	1%	15254.082	2%
18_23fixed	0	4172066.568	2%	16181.712	8%
12LGP	0	4106365.416	0%	14961.096	0%

Note: A table of violation magnitudes is not included since no violations were identified for any of the LGP configurations.

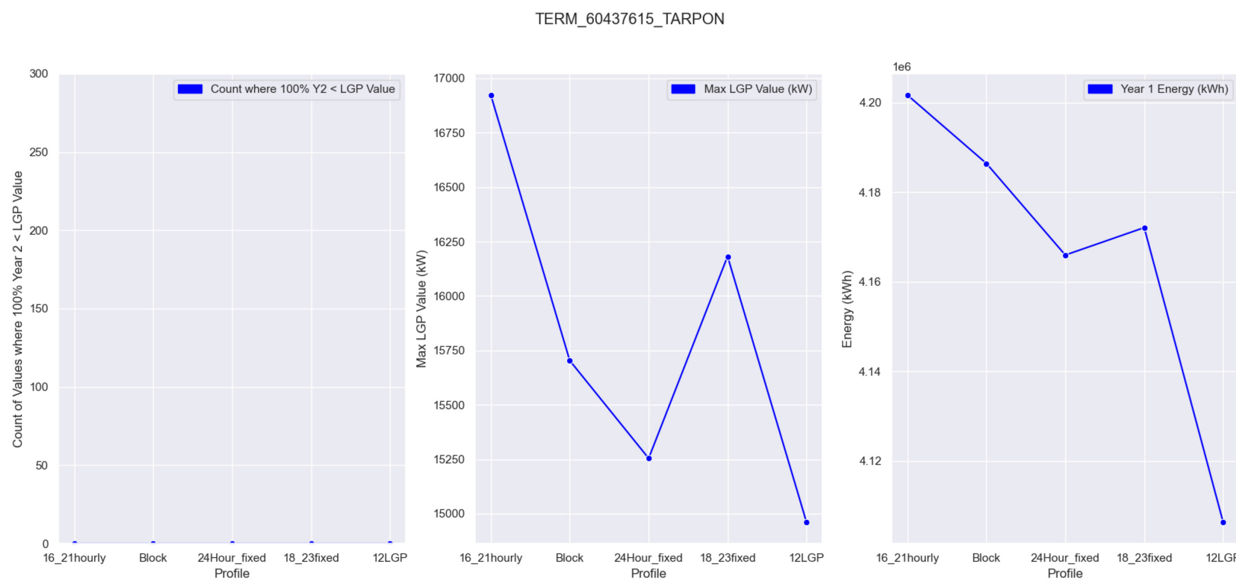


Figure 5: Tarpon 12 kV Risk, Maximum Instantaneous Power, and Cumulative Energy by LGP Configuration

III. Comments on the Exclusion of Voltage Variation Violations

Detailed Studies, i.e., System Impact Studies performed as part of SCE's Distribution Generation Interconnection process do not currently evaluate or identify mitigation measures to address voltage variation as defined by generation ICA criteria. SCE therefore finds it reasonable within the context of this data request response to perform no further load flow analysis to investigate voltage variation violations and corresponding mitigation measures.

IV. Fast Track Screening of Each LGP Configuration

SCE applied Fast Track Screening consistent with the assumptions documented in the data request for each of the four violation conditions in Table 10, all of which occurred on the Citrow 12 kV.

Table 9: Summary of Fast Track Results for Each LGP Configurations Most Severe Criteria Violation (Citrow 12 kV)

Screen	SSV_1 16_21Hourly (8341.524 kW)	SSV_2 24Hour_Fixed (8028.981 kW)	SSV_3 Block (6576.498 kW)	SSV_4 18_23fixed (6576.498 kW)
A	PASS	PASS	PASS	PASS
B	PASS	PASS	PASS	PASS
C	PASS	PASS	PASS	PASS
D	PASS	PASS	PASS	PASS
E	PASS	PASS	PASS	PASS
F	PASS	PASS	PASS	PASS
G	PASS	PASS	PASS	PASS
H	PASS	PASS	PASS	PASS
I	Continue	Continue	Continue	Continue
J	Continue	Continue	Continue	Continue
K	Continue	Continue	Continue	Continue
L	PASS	PASS	PASS	PASS
M	FAIL	FAIL	FAIL	FAIL
N	PASS	PASS	PASS	PASS
O	FAIL	FAIL	PASS	PASS
P	PASS	PASS	PASS	PASS

V. Load Flow Analysis and Mitigation Measures

SCE identified the month-hours where the magnitude difference between the LGP value and coincident Period 2 ICA-SG result were the largest for each node and LGP configuration. The Peso contained only voltage variation violations. For the reasons mentioned in Section III, SCE did not perform further analysis of voltage variation violations within the context of this data request response. No violations were identified on the Cottonmouth, Sevaine, or Tarpon. The Citrow 12 kV contained steady-state voltage violations for all but the 12 LGP configuration. These violations were further analyzed using load flow simulation.

Table 10 contains the month-hours and LGP values analyzed in load flow simulation and corresponding proposed mitigation measures. In summary, SSV_1 and SSV_2 would require more involved modeling of substation load tap changers and adjacent circuits fed by the same transformer bank as Citrow to identify the appropriate mitigation for the 105.2% steady-state voltage violations. SCE considered such analysis to be outside of the scope of this data request. SSV_3 was found to produce no criteria violations when evaluated in load flow simulation. SSV_4 resulted in a steady state voltage violation that impacted primary distribution lines but did not impact any distribution service transformers. SSV_4, therefore, required no mitigation measures to be taken.

SCE found smart inverter volt-VAR functionality to be ineffective in mitigating the steady-state voltage violations analyzed in load flow simulation. The portion of the Citrow 12 kV circuit exposed to steady-state overvoltage was located between the substation circuit breaker (feeder head) and as far as approximately 4,500 feet of primary conductor from the substation. As a result, the simulated generator detected voltage at its terminals within normal range and made no adjustments to its VAR consumption or production. Said another way, the simulated generator was unaware that an upstream portion of the circuit was exposed to voltage above the acceptable limit of 126 V on a 120 V base. As a result, the energy and power export amounts are unchanged and can be found in Section II.

Table 10: Summary of Load Flow Analysis of Most Severe Violation (Excluding VV) by LGP Configuration and Node

LGP Config. (LGP Value)	Circuit ID	Limiting ICA Criterion (thermal, voltage, etc.)	Viol. ID	Viol. Start Date (Mo-Yr)	Viol. Start Time (Hour)	Mag. (%)	Safety and Reliability Concern	Screen used to determine corrective action	Proposed Action Category (Mitigation or Upgrade)	Descrip. of Proposed Action (i.e., updating equipment settings)	Outlying Value? (Y or blank)
16_21Hourly (8341.524 kW)	CITROW	SSV	SSV_1	9-2022	21	105.2%	Rule 2 Voltage Violation and Reverse Powerflow	Screen M and N	Additional Study Required	Dependent on Study Results	
24Hour_Fixed (8028.981 kW)	CITROW	SSV	SSV_2	9-2022	21	105.2%	Rule 2 Voltage Violation and Reverse Powerflow	Screen M and N	Additional Study Required	Dependent on Study Results	
Block (6576.498 kW)	CITROW	SSV	SSV_3	7-2022	18	104.7%	Rule 2 Voltage Violation and Reverse Powerflow	Screen M and N	No mitigation required	N/A	
18_23fixed (6576.498 kW)	CITROW	SSV	SSV_4	9-2022	21	105.2%	Rule 2 Voltage Violation and Reverse Powerflow	Screen M and N	No mitigation required	N/A	

VI. Further Statistics

SCE is providing to Energy Division, as a separate attachment (SCE ICA Results and LGP Configs_20230926.xlsx), the tabular data needed to calculate 1) 90% of the lowest value in the Period 1 ICA-SG Profile and 2) the Average Maximum Instantaneous Power as defined in the data request.[1]. ICA Operational Flexibility results currently published to SCE's Distribution Resource Plan External Portal (DRPEP) are available as a reference.

VII. Comments on Implementation Effort

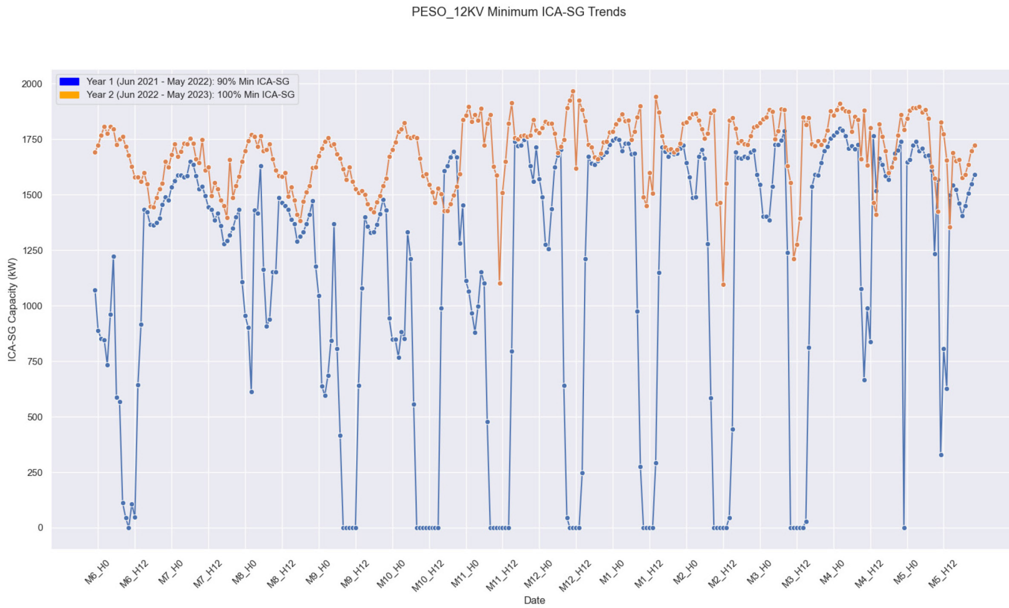
Section II.5. of the Data Request asks the following:
"Please comment on the IOU's assessment of the implementation effort required, benefits, and risks relating to allowing LGP customers to customize their LGP within limits, such as proposed by IREC in their Block Schedule analysis in Workshop 4."

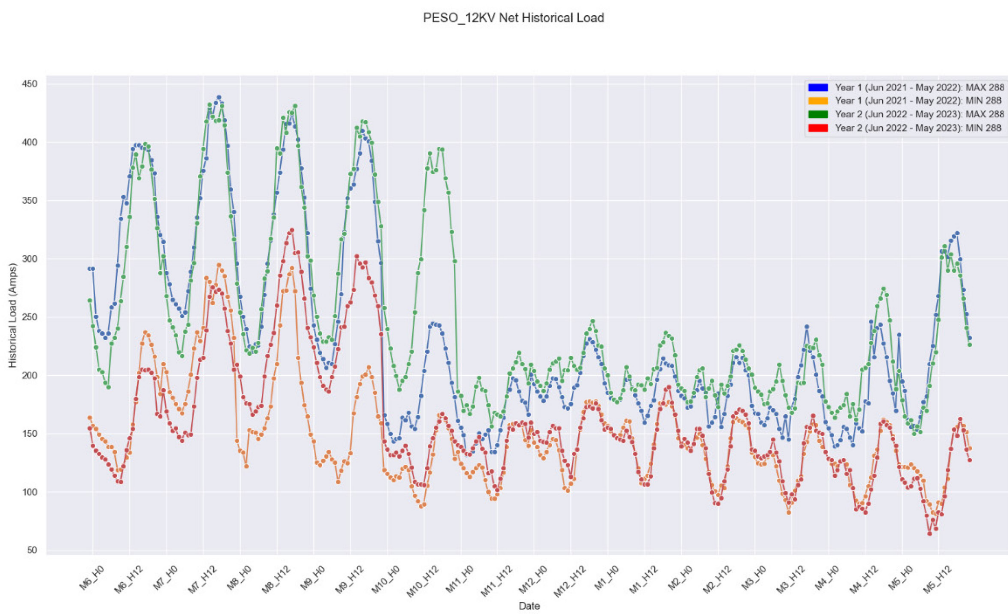
SCE's Response to Section II.5.:

Consistent with LGP Workshop discussions and Advice Letter 5025-E, SCE recommends a single, uniform LGP configuration be implemented at this time. As supported by the results of this data request, the 12 LGP configuration has been found to consistently offer the lowest exposure to risk while still resulting in considerable energy export over the course of the LGP. While various LGP configurations may offer higher energy export and/or higher maximum instantaneous power, which indeed in certain circumstances may have tangible benefit to customers and the grid, they do so at the cost of increased risk. Implementation efforts and Engineer review of customer submitted LGP values for a single, consistent LGP configuration are simpler than allowing a range of variable LGP configurations.

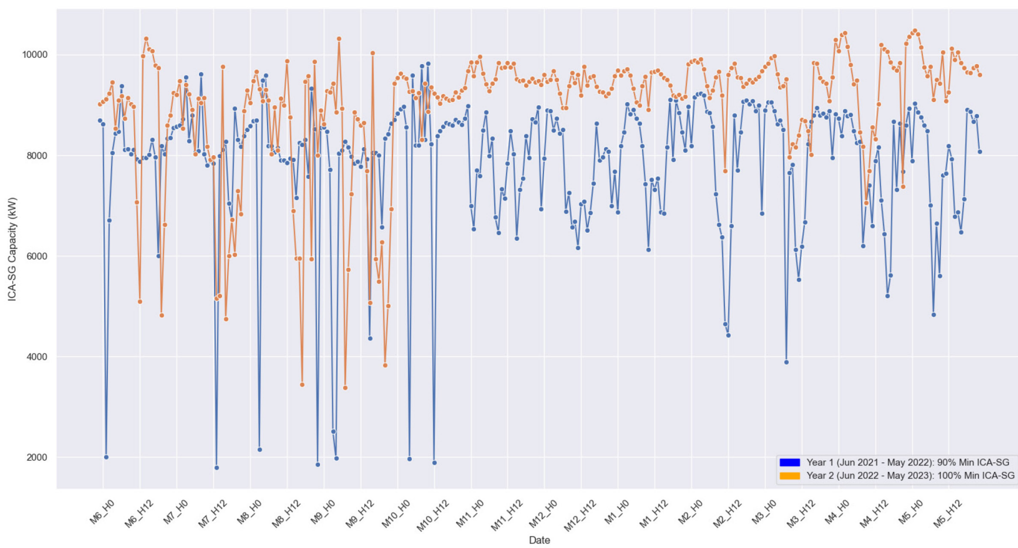
[1] Request to perform Period 1 ICA Operational Flexibility analysis was not included until Update #3 of this data request (issued on September 20, 2023), therefore ICA Operational Flexibility results are not available at this time.

APPENDIX A: ICA REULTS AND CIRCUIT LOAD PROFILES

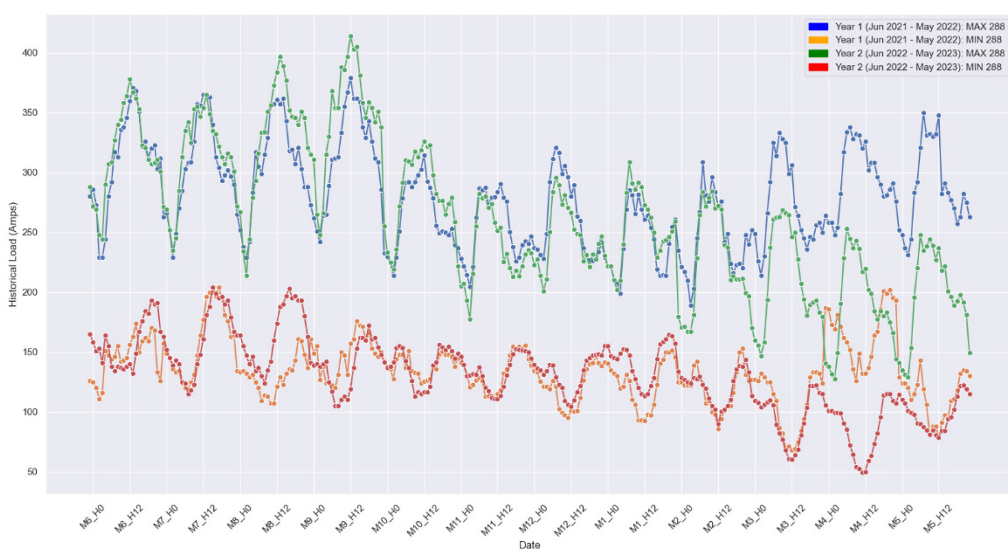




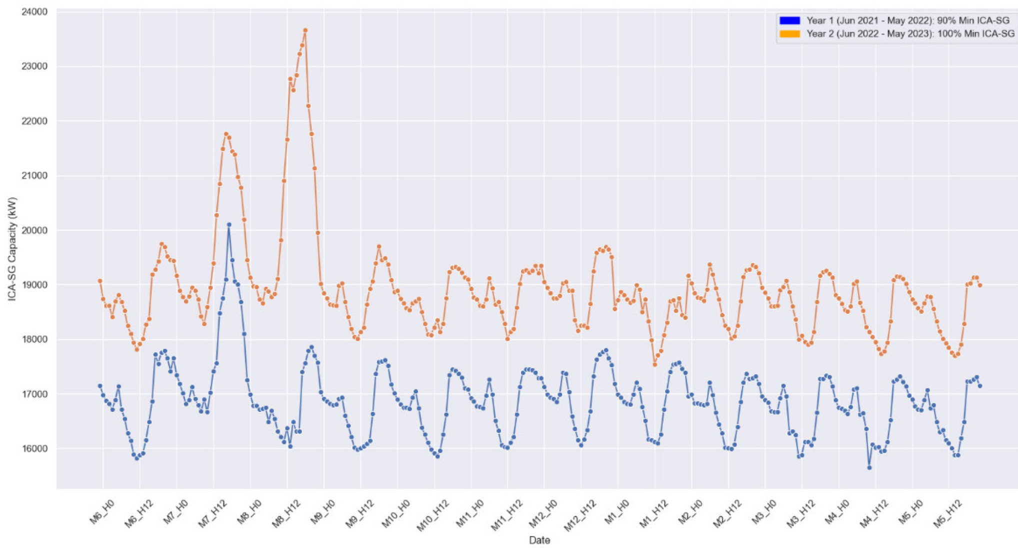
CITROW_12KV Minimum ICA-SG Trends



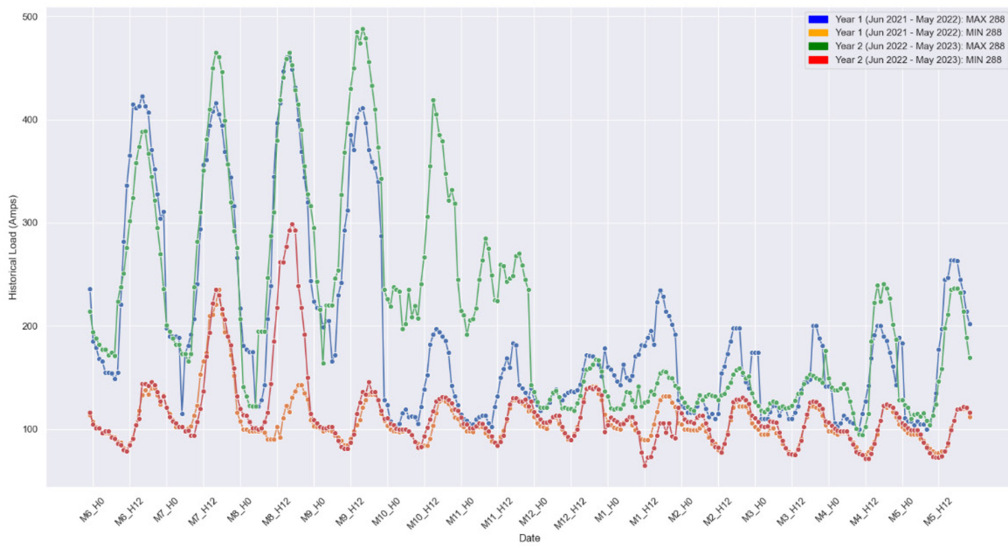
CITROW_12KV Net Historical Load

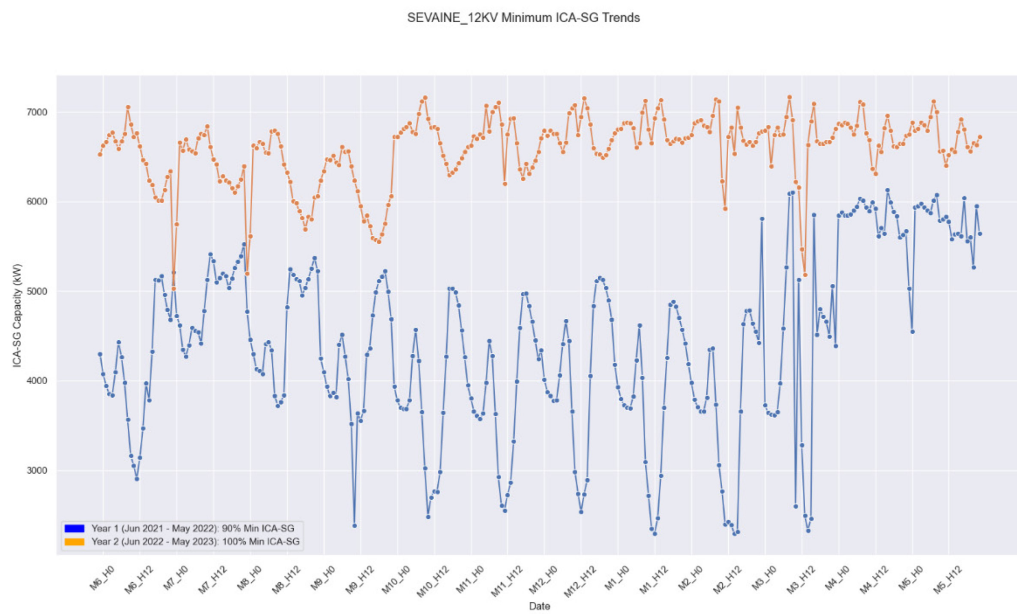


COTTONMOUTH_16KV Minimum ICA-SG Trends



COTTONMOUTH_16KV Net Historical Load




SEVAINE_12KV Minimum ICA-SG Trends
ICA-SG Capacity (kW)
7000
6000
5000
4000
3000
Year 1 (Jun 2021 - May 2022): 90% Min ICA-SG
Year 2 (Jun 2022 - May 2023): 100% Min ICA-SG
M6_H0
M6_H12
M7_H0
M7_H12
M8_H0
M8_H12
M9_H0
M9_H12
M10_H0
M10_H12
M11_H0
M11_H12
M12_H0
M12_H12
M1_H0
M1_H12
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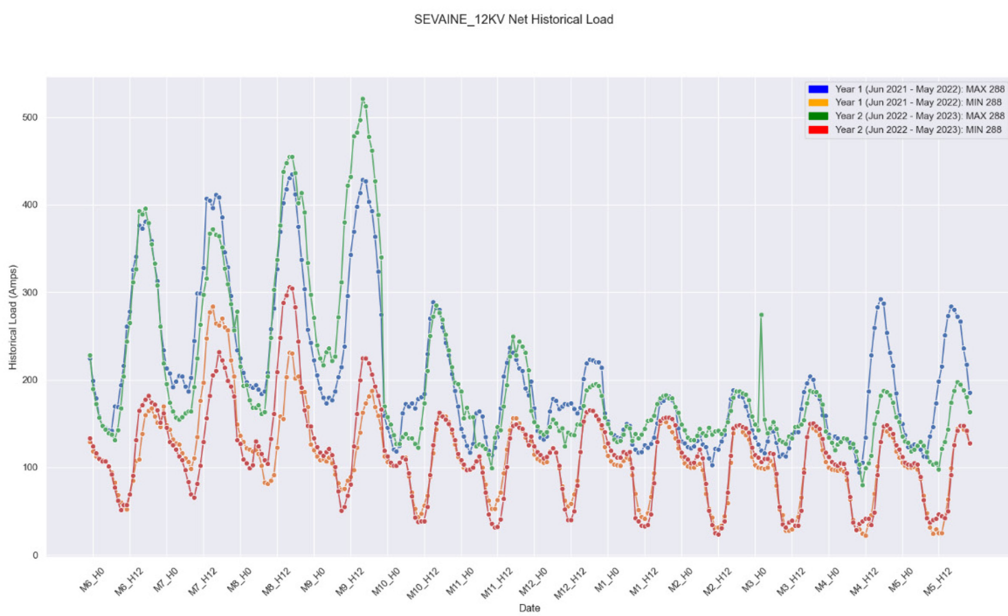
M3_H0
M3_H12
M4_H0
M4_H12
M5_H0
M5_H12
Date


SEVAINE_12KV Net Historical Load
Historical Load (Amps)
500
400
300
200
100
0
Year 1 (Jun 2021 - May 2022): MAX 288
Year 1 (Jun 2021 - May 2022): MIN 288
Year 2 (Jun 2022 - May 2023): MAX 288
Year 2 (Jun 2022 - May 2023): MIN 288
M6_H0
M6_H12
M7_H0
M7_H12
M8_H0
M8_H12
M9_H0
M9_H12
M10_H0
M10_H12
M11_H0
M11_H12
M12_H0
M12_H12
M1_H0
M1_H12
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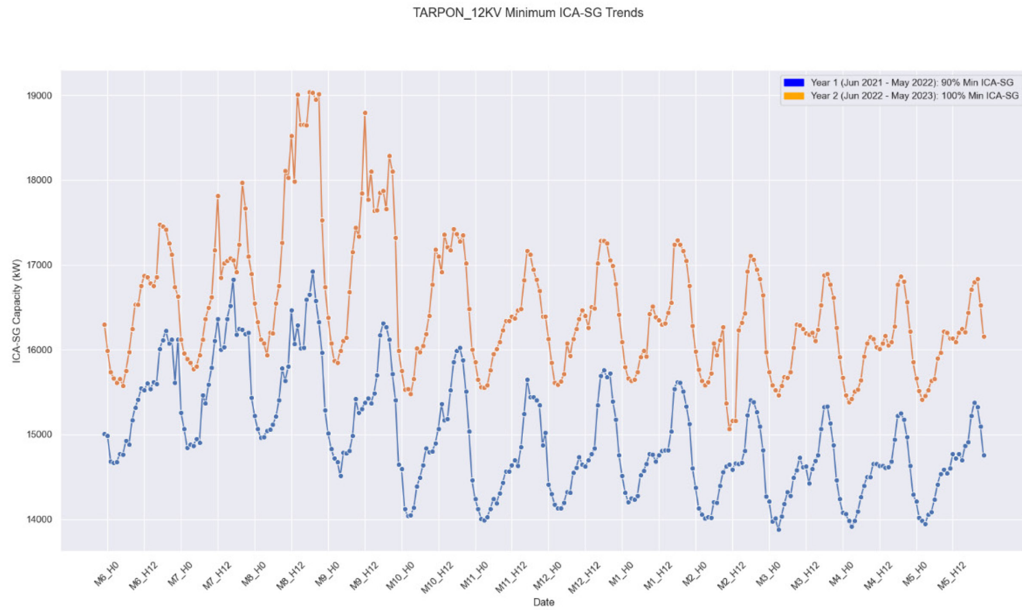
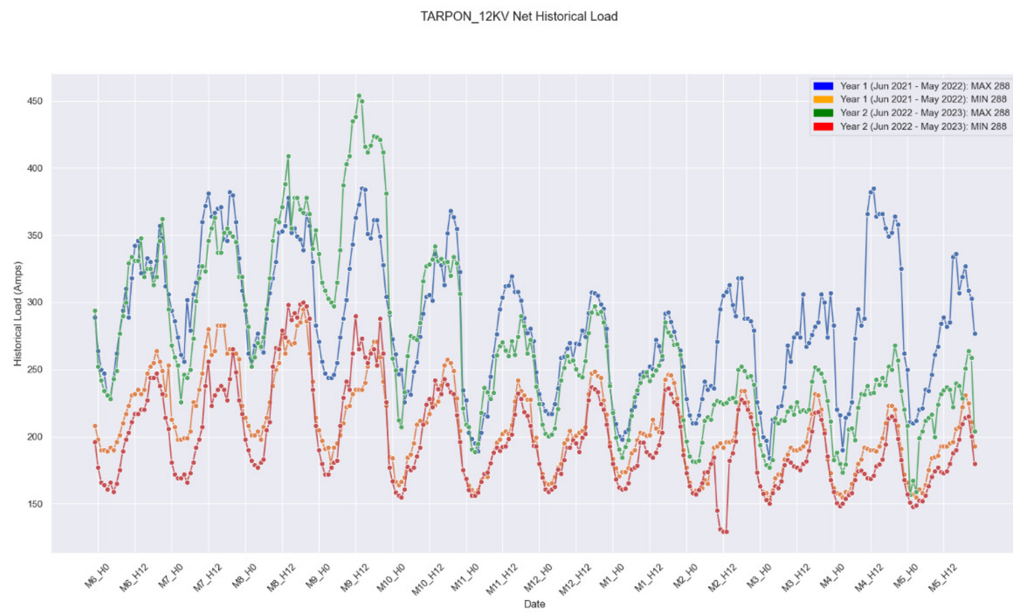
M5_H0
M5_H12
Date


TARPON_12KV Minimum ICA-SG Trends
Year 1 (Jun 2021 - May 2022): 90% Min ICA-SG
Year 2 (Jun 2022 - May 2023): 100% Min ICA-SG
ICA-SG Capacity (kW)
Date


TARPON_12KV Net Historical Load
Year 1 (Jun 2021 - May 2022): MAX 288
Year 1 (Jun 2021 - May 2022): MIN 288
Year 2 (Jun 2022 - May 2023): MAX 288
Year 2 (Jun 2022 - May 2023): MIN 288
Historical Load (Amps)
Date

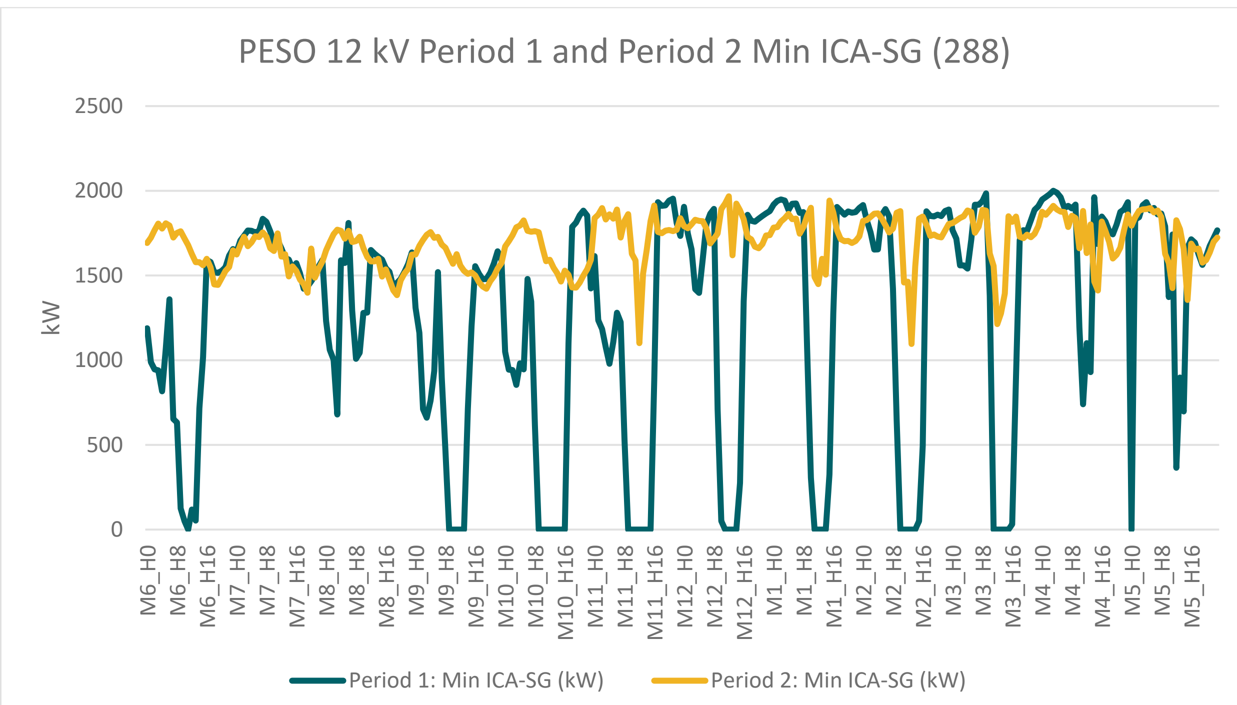
APPENDIX B: SUSPECTED OUTLIERS IN ICA-SG RESULTS

Data Request Section I.6.7.: For ICA-SG data that contains outlying values, such as zeros, all outlying values must be identified in a table, as shown below. To identify the outlying values, graph the ICA-SG data and visually note any values that significantly deviate from the surrounding data points. If values seem to be on the cusp, include these as outlying values.

ICA-SG Data Set Name (i.e. X Circuit)	Period (e.g., Period 1, Period 2). If outlying value shows in both periods, list both in separate lines.	Time Stamp (split into Day, Hour, etc. as necessary)	Outlying Value	Notes on Potential Source of Outlier (error in computing, outage, etc.) if readily available

SCE's Response to Section I.6.7.:

Peso 12 kV



Based on visual inspection of the Period 1 and Period 2 minimum ICA Static Grid Results, SCE identified and investigated the following suspected outliers with findings as indicated.

ICA-SG Data Set Name (i.e. X Circuit)	Period (e.g., Period 1, Period 2). If outlying values shows in both periods, list both in separate lines.	Time Stamp (split into Day, Hour, etc. as necessary)	Outlying Value (kW)	Notes on Potential Source of Outlier (error in computing, outage, etc.) if readily available
Peso 12kV Circuit	Period 1	M6_H0	1070.1	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M6_H1	889.4	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M6_H2	851.3	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M6_H3	846.4	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M6_H4	734.9	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M6_H5	960.9	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M6_H6	1223.8	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M6_H7	587.3	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M6_H8	568.7	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M6_H9	112.6	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M6_H10	45.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M6_H11	0.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M6_H12	106.5	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M6_H13	48.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M6_H14	643.6	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M6_H15	915.5	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M8_H0	1107.7	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M8_H1	954.9	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M8_H2	902.0	This value reflects historical coincidental circuit model conditions.

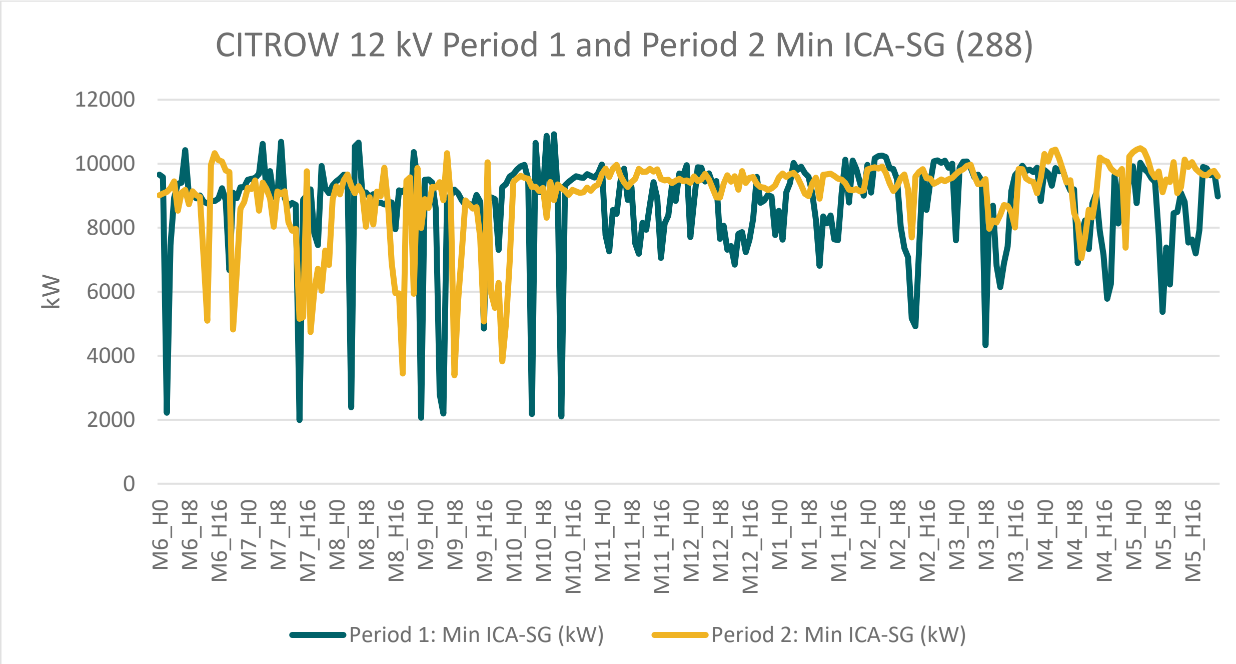
Peso 12kV Circuit	Period 1	M8_H3	611.9	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M8_H7	1163.3	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M8_H8	906.9	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M8_H9	939.8	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M8_H10	1151.5	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M8_H11	1152.8	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M9_H0	1178.7	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M9_H1	1045.3	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M9_H2	639.2	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M9_H3	594.7	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M9_H4	685.1	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M9_H5	842.9	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M9_H7	805.6	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M9_H8	416.5	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M9_H9	0.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M9_H10	0.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M9_H11	0.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M9_H12	0.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M9_H13	0.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M9_H14	641.1	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M9_H15	1079.2	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M10_H0	944.5	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M10_H1	849.1	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M10_H2	848.2	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M10_H3	768.6	This value reflects historical coincidental circuit model conditions.

Peso 12kV Circuit	Period 1	M10_H4	883.2	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M10_H5	851.5	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M10_H7	1211.2	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M10_H8	556.3	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M10_H9	0.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M10_H10	0.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M10_H11	0.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M10_H12	0.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M10_H13	0.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M10_H14	0.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M10_H15	0.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M10_H16	0.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M10_H17	988.2	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M11_H1	1112.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M11_H2	1065.2	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M11_H3	968.1	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M11_H4	881.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M11_H5	997.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M11_H6	1152.5	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M11_H7	1102.2	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M11_H8	479.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M11_H9	0.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M11_H10	0.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M11_H11	0.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M11_H12	0.0	This value reflects historical coincidental circuit model conditions.

Peso 12kV Circuit	Period 1	M11_H13	0.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M11_H14	0.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M11_H15	0.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M11_H16	796.6	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M12_H9	639.7	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M12_H10	45.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M12_H11	0.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M12_H12	0.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M12_H13	0.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M12_H14	0.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M12_H15	247.3	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M12_H16	1212.8	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M1_H9	974.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M1_H10	275.9	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M1_H11	0.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M1_H12	0.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M1_H13	0.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M1_H14	0.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M1_H15	293.5	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M1_H16	1149.2	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M2_H9	584.4	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M2_H10	0.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M2_H11	0.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M2_H12	0.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M2_H13	0.0	This value reflects historical coincidental circuit model conditions.

Peso 12kV Circuit	Period 1	M2_H14	0.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M2_H15	45.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M2_H16	444.6	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M3_H11	0.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M3_H12	0.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M3_H13	0.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M3_H14	0.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M3_H15	0.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M3_H16	28.4	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M3_H17	813.3	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M4_H10	1076.1	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M4_H11	666.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M4_H12	990.4	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M4_H13	836.6	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M5_H0	0.0	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M5_H10	1235.2	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M5_H12	328.2	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M5_H13	807.7	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 1	M5_H14	627.2	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 2	M11_H12	1101.1	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 2	M2_H13	1095.8	This value reflects historical coincidental circuit model conditions.
Peso 12kV Circuit	Period 2	M3_H12	1212.7	This value reflects historical coincidental circuit model conditions.

Citrow 12 kV



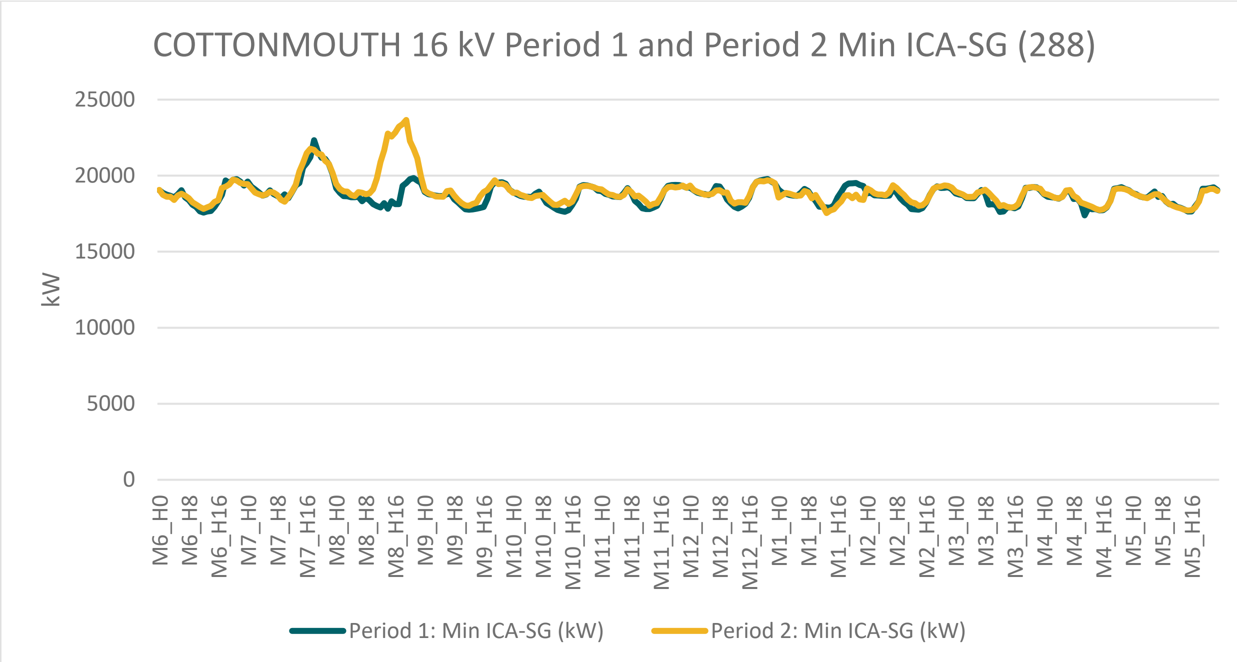
Based on visual inspection of the Period 1 and Period 2 minimum ICA Static Grid Results, SCE identified and investigated the following suspected outliers with findings as indicated.

ICA-SG Data Set Name (i.e. X Circuit)	Period (e.g., Period 1, Period 2). If outlying values shows in both periods, list both in separate lines.	Time Stamp (split into Day, Hour, etc. as necessary)	Outlying Value (kW)	Notes on Potential Source of Outlier (error in computing, outage, etc.) if readily available
Citrow 12kV Circuit	Period 1	M6_H2	1998.7	This value reflects historical coincidental circuit model conditions.
Citrow 12kV Circuit	Period 1	M7_H14	1792.1	This value reflects historical coincidental circuit model conditions.
Citrow 12kV Circuit	Period 1	M8_H4	2151.5	This value reflects historical coincidental circuit model conditions.
Citrow 12kV Circuit	Period 1	M8_H23	1858.9	This value reflects historical coincidental circuit model conditions.
Citrow 12kV Circuit	Period 1	M9_H4	2513.3	This value reflects historical coincidental circuit model conditions.
Citrow 12kV Circuit	Period 1	M9_H5	1975.9	This value reflects historical coincidental circuit model conditions.

Citrow 12kV Circuit	Period 1	M9_H16	4364.7	This value reflects historical coincidental circuit model conditions.
Citrow 12kV Circuit	Period 1	M10_H5	1960.9	This value reflects historical coincidental circuit model conditions.
Citrow 12kV Circuit	Period 1	M10_H13	1894.0	This value reflects historical coincidental circuit model conditions.
Citrow 12kV Circuit	Period 1	M2_H12	4648.0	This value reflects historical coincidental circuit model conditions.
Citrow 12kV Circuit	Period 1	M2_H13	4426.5	This value reflects historical coincidental circuit model conditions.
Citrow 12kV Circuit	Period 1	M3_H8	3894.6	This value reflects historical coincidental circuit model conditions.
Citrow 12kV Circuit	Period 1	M3_H12	5530.5	This value reflects historical coincidental circuit model conditions.
Citrow 12kV Circuit	Period 1	M4_H17	5201.2	This value reflects historical coincidental circuit model conditions.
Citrow 12kV Circuit	Period 1	M4_H18	5616.1	This value reflects historical coincidental circuit model conditions.
Citrow 12kV Circuit	Period 1	M5_H8	4832.1	This value reflects historical coincidental circuit model conditions.
Citrow 12kV Circuit	Period 1	M5_H10	5604.0	This value reflects historical coincidental circuit model conditions.
Citrow 12kV Circuit	Period 2	M6_H13	5097.6	This value reflects historical coincidental circuit model conditions.
Citrow 12kV Circuit	Period 2	M6_H20	4821.7	This value reflects historical coincidental circuit model conditions.
Citrow 12kV Circuit	Period 2	M7_H14	5156.1	This value reflects historical coincidental circuit model conditions.
Citrow 12kV Circuit	Period 2	M7_H15	5204.0	This value reflects historical coincidental circuit model conditions.
Citrow 12kV Circuit	Period 2	M7_H17	4742.1	This value reflects historical coincidental circuit model conditions.
Citrow 12kV Circuit	Period 2	M8_H16	5956.5	This value reflects historical coincidental circuit model conditions.
Citrow 12kV Circuit	Period 2	M8_H17	5946.9	This value reflects historical coincidental circuit model conditions.
Citrow 12kV Circuit	Period 2	M8_H18	3445.1	This value reflects historical coincidental circuit model conditions.
Citrow 12kV Circuit	Period 2	M8_H21	5933.8	This value reflects historical coincidental circuit model conditions.
Citrow 12kV Circuit	Period 2	M9_H8	3387.2	This value reflects historical coincidental circuit model conditions.
Citrow 12kV Circuit	Period 2	M9_H9	5727.6	This value reflects historical coincidental circuit model conditions.
Citrow 12kV Circuit	Period 2	M9_H16	5071.7	This value reflects historical coincidental circuit model conditions.
Citrow 12kV Circuit	Period 2	M9_H18	5942.1	This value reflects historical coincidental circuit model conditions.
Citrow 12kV Circuit	Period 2	M9_H19	5495.1	This value reflects historical coincidental circuit model conditions.

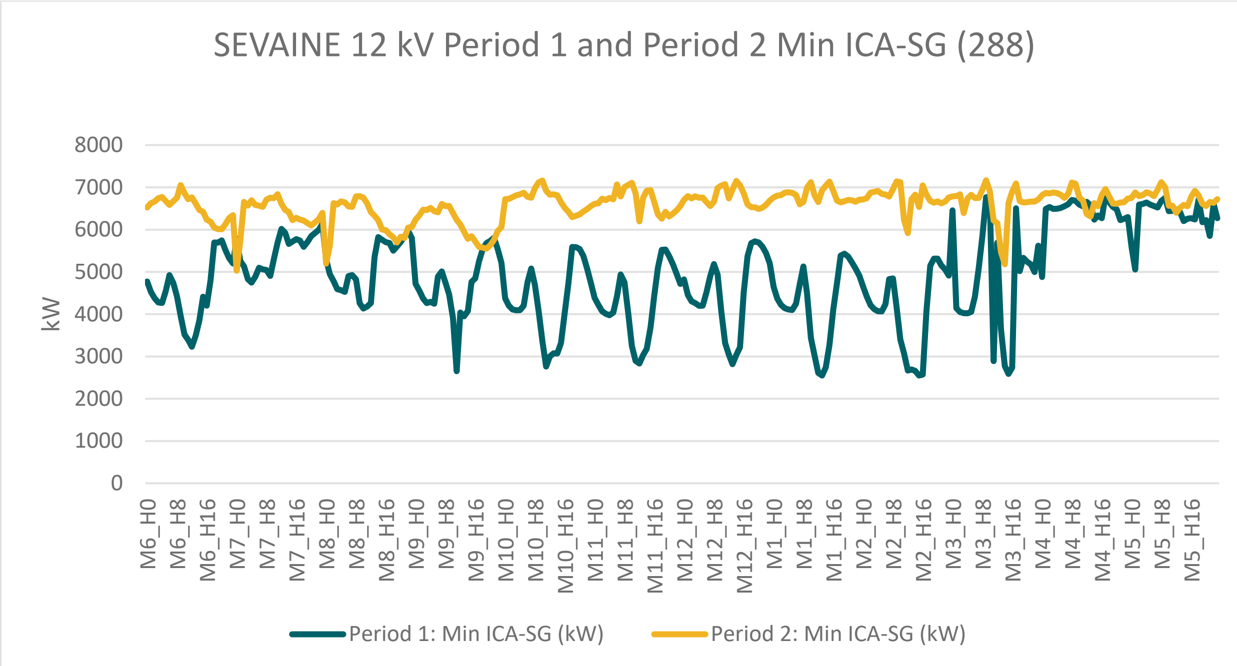
Citrow 12kV Circuit	Period 2	M9_H21	3826.7	This value reflects historical coincidental circuit model conditions.
Citrow 12kV Circuit	Period 2	M9_H22	5003.5	This value reflects historical coincidental circuit model conditions.

<u>Cottonmouth 16 kV</u>



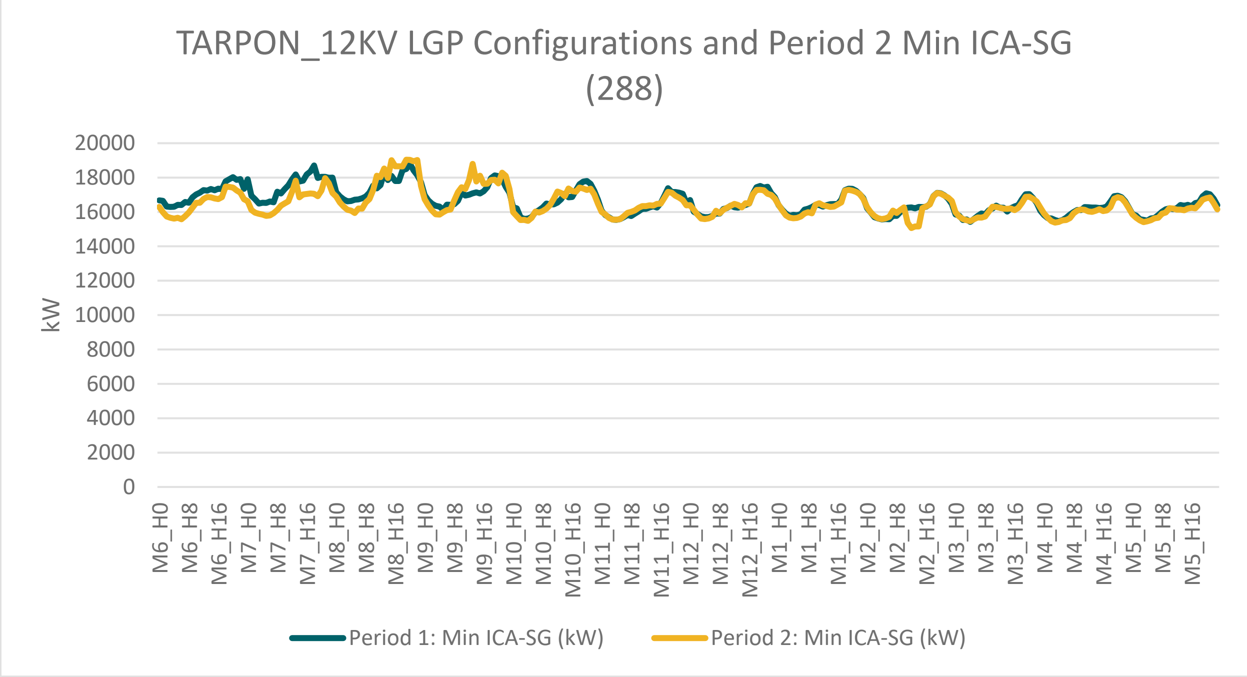
Based on visual inspection of the Period 1 and Period 2 minimum ICA Static Grid Results, SCE identified no suspected outliers for the Cottonmouth 16 kV.

Sevaine 12 kV



Based on visual inspection of the Period 1 and Period 2 minimum ICA Static Grid Results, SCE identified no suspected outliers for the Sevaine 12 kV.

Tarpon 12 kV



Based on visual inspection of the Period 1 and Period 2 minimum ICA Static Grid Results, SCE identified no suspected outliers for the Tarpon 12 kV.

APPENDIX C: Update #3 to CPUC Energy Division Data Request #1 on Joint Advice Letter (SCE 5025-E, PG&E 6929-E and SD&E 4215-E--Joint Proposed Modifications to Implement Limited Generation Profiles Pursuant to Ordering Paragraph 3 of Resolution E-5230) filed May 1, 2023 (dated September 20, 2023)

PG&E Response to CPUC Energy Division Data Request #1 on Joint Advice Letter PG&E 6929-E, SCE 5025-E and SD&E 4215-E
September 26, 2023

Table of Contents

1. EXECUTIVE SUMMARY 2
2. ANALYSIS AND ASSOCIATED MITIGATIONS 4
2.1 Study Results Summary 4
2.2 Circuit ID: 013111151 (Thermal) 5
2.2.1 Relevant Initial Review Screens 5
2.2.2 Load flow analysis 6
2.3 Circuit ID: 42631110 (Thermal) 10
2.3.1 Relevant Initial Review Screens 10
2.3.2 Load flow analysis (Thermal) 11
2.4 Circuit ID: 83631108 (Thermal/Voltage) 17
2.4.1 Relevant Initial Review Screens 17
2.4.2 Load flow analysis (Voltage) 18
2.4.2 Load flow analysis (Thermal) 22
2.4.3 Mitigations and Costs 23
2.5 Circuit ID: 102041101 (Thermal) 23
2.5.1 Relevant Initial Review Screens 23
2.5.2 Load flow analysis 24
2.5.3 Mitigations and Costs 29
2.6 Circuit ID: 163301105 (Thermal) 30
2.6.1 Relevant Initial Review Screens 30
2.6.2 Load flow analysis 31
2.6.3 Mitigations and Costs 35
2.7 Comments on Implementation Effort 35

1. Executive Summary

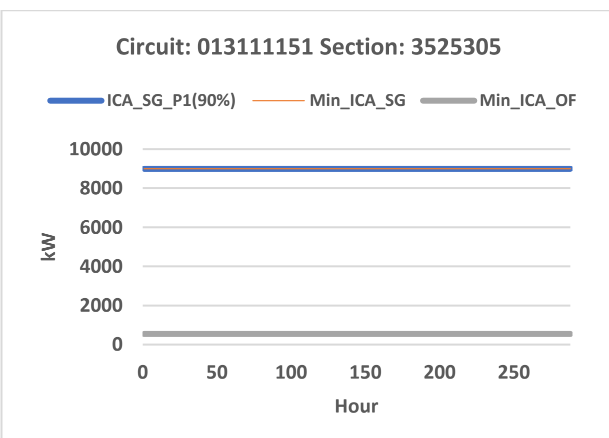
PG&E performed the following analysis in response to the CPUC Energy Division (ED) Data Request #1 on Joint Advice Letter (SCE 5025-E, PG&E 6929-E and SD&E 4215-E).

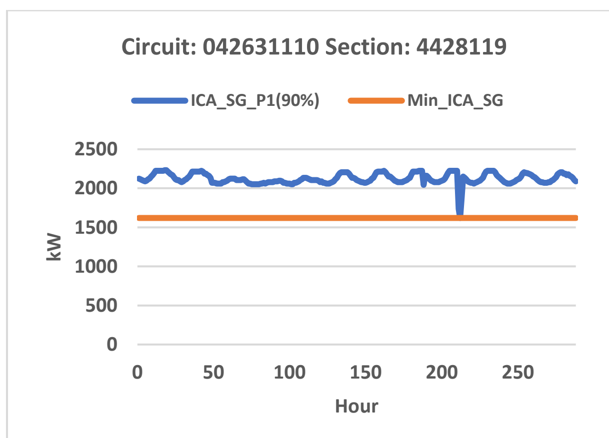
As provided in the first portion of PG&E's data request response dated August 25, 2023, PG&E identified the following line sections in the randomly selected feeders as having the highest magnitude of violations:

Table 1: Selected feeders and linesections for studies.

Circuit ID	SectionId of max violation magn	ICA_SG_diff_max_magn	ICA_SG_max_magn_l_p2
013111151	3525305	5880	Thermal
042631110	4428119	164	Thermal
083631108	4310786	910	Voltage
102041101	4078583	2084	Thermal
163301105	4505362	305	Thermal

The figures below show the 90% of the ICA_SG values in the Period 1, including the minimum values. In cases where the data is available, the 90% of the lowest ICA_OF profile in the Period 1 is also displayed. Traditionally, PG&E set the lesser of 90% of the minimum ICA-SG or 90% of the minimum ICA-OF as the export power limit. Table 2 summarizes this information.





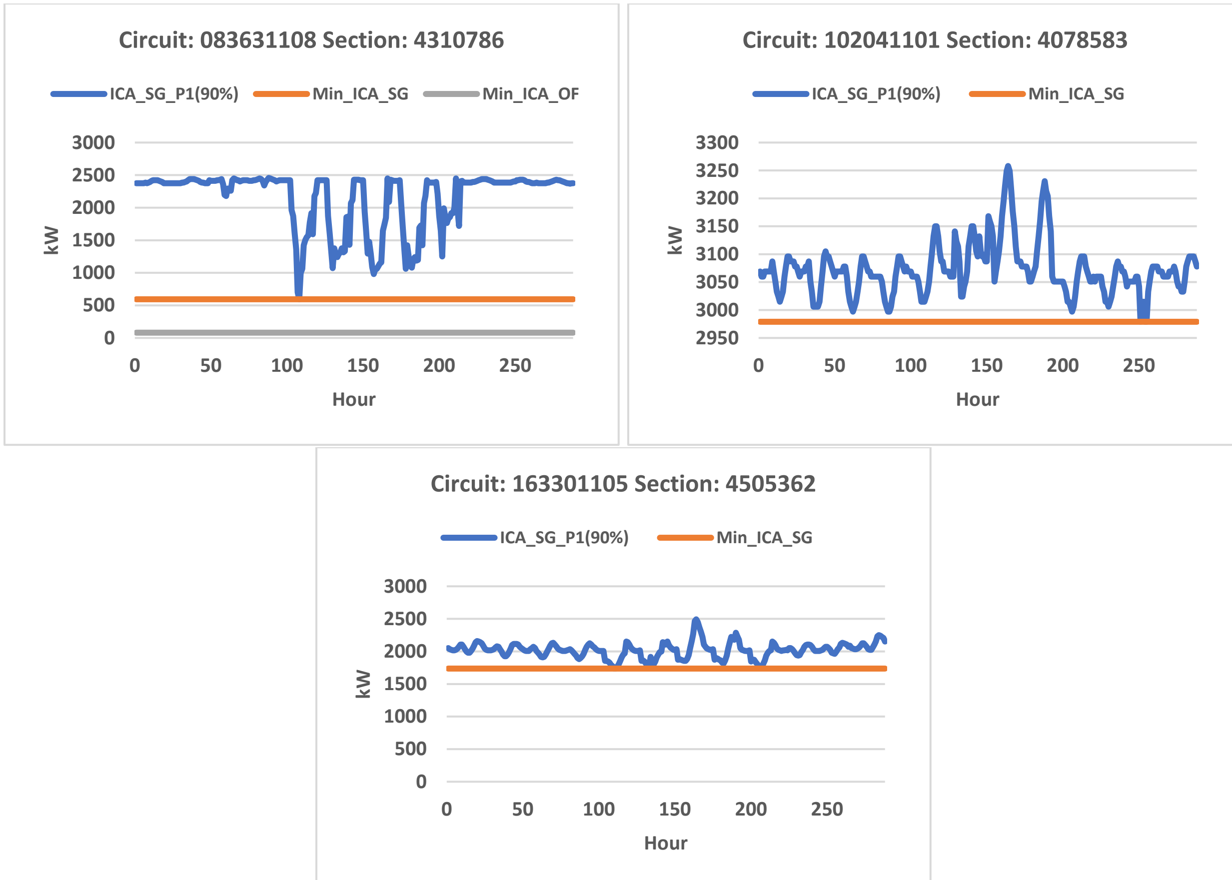


Figure 1: Comparison of ICA-SG with the minimum value of ICA-SG and ICA-OF

Table 2: 90% of the lowest values in Period 1 ICA-SG and ICA-OF as well as 90% of the lowest value in the most recent ICA-OF profile

Circuit ID	Line section	90% of the lowest value in the Period 1 ICA-SG 576 Profile (kW)	90% of the lowest value in the Period 1 ICA-OF 576 Profile (kW)	90% of the lowest value in the most recently available ICA-OF 576 Profile (kW)
013111151	3525305	9000	540	720
042631110	4428119	1620	NA[1]	135
083631108	4310786	594	81	0
102041101	4078583	2979	NA	0
163301105	4505362	1737	NA	0

Table 3 summarizes a calculation of the Maximum Instantaneous Power by computing the average value for each LGP configuration across the circuit line sections/nodes.

[1] NA=Not available: PG&E does not have access to the Period 1 CYME files. The ICA-OF values shown in 4th Column of Table 1 are obtained via post-processing of the historical data available in the csv files (was historically published on the public map). It is PG&E's standard practice to redact the Safety column information of the csv files, if 15/15 confidentiality rule applies to protect customer privacy. For the fields populated with NA, the Safety column was redacted for the linesection under study. Therefore, PG&E was not able to post-process the results to obtain ICA-OF, and thus the fields are filled with NA.

Table 3: Average Maximum Instantaneous Power (kW) Across Detailed Study Circuit Line sections by LGP Configuration

	12LGP	Block	24Hour_fixed	16_21hourly	18_23fixed
Average Maximum Instantaneous Power (kW)	3709.8	3749.4	3731.4	3886.2	3783.6

Table 4 shows the percent difference with respect to the average maximum instantaneous power of the 12LGP for each LGP configuration.

Table 4: Percent Difference with Respect to the 12LGP of Average Maximum Instantaneous Power by LGP Configuration (%)

	12LGP	Block	24Hour_fixed	16_21hourly	18_23fixed
Percent Difference of Average Maximum Instantaneous Power with Respect to the 12LGP (%)	0	1.1	0.6	4.8	2

PG&E would like to clarify the definition of the 18_23fixed profile described in Joint IOU AL[2]. The 18_23fixed profile uses minimum ICA-SG value for 6PM-11PM for these hours for each month and uses minimum ICA-SG value for 12AM-5PM for these hours for each month (24 values in a year).

ED staff requested that these sections be studied further to identify the required mitigations and investigate whether low-cost mitigations can resolve the issues. It was the direction that the studies include:

> ” For each circuit with violations identified, further analyze what mitigation measures and/or upgrades would be needed to preserve safe and reliable grid operation. Apply the same screening process that would be used for a project seeking grid interconnection[3]”

As per the discussions with ED staff, screen A – E, H, I, and are assumed to PASS or that the project will continue to the next screen.

Only screens F, F1, G, J, and M will be reviewed as part of this analysis.

2. Analysis and Associated Mitigations

2.1 Study Results Summary

Circuit ID	Relevant Section ID’s	Limiting ICA Criterion	Proposed Mitigation
13111151	3525305	Thermal	No mitigation required
42631110	4428119	Thermal	No mitigation required

[2] SCE Advice 5025-E et al (Joint Proposed Modifications to Implement Limited Generation Profiles Pursuant to Ordering Paragraph 3 of Resolution E-5230)

[3] Pg 10 CPUC Energy Division Data Request on Joint Advice Letter (SCE 5025-E, PG&E 6929-E and SD&E 4215-E)

83631108	4310786	Thermal	Reconductor
83631108	4310786	Voltage[4]	Settings change
102041101	4078583	Thermal	Replace Fuse w/ LR
163301105	4505362	Thermal	Reconductor

2.2 Circuit ID: 013111151 (Thermal)

2.2.1 Relevant Initial Review Screens

Screen F (Is the Short-Circuit Current Contribution Ratio within acceptable limits?): When measured at primary side (high-side) of the Dedicated Distribution Transformer serving a Generating Facility, the sum of the Short-Circuit Contribution Ratios of all Generating Facilities connected to Distribution Provider's Distribution System circuit that serves the Generating Facility must be less than or equal to 0.1.

Therefore, three-phase fault contribution of all generation on the circuit nearest the proposed point of connection is less than the required 0.1 criteria.
PASS Screen F

Screen F1 (Is the per unit Short Circuit Contribution under allowable levels?): Is the short circuit current contribution less than or equal to 1.2 per unit or is the Generating Facility Gross Nameplate Rating multiplied by its per unit contribution less than the Protection Integrated Capacity Analysis (ICA) Value multiplied by 1.2 per unit?

Short circuit current contribution assumed to not exceed 1.2 per unit.
PASS Screen F1

Screen G (Is the Short-Circuit Interrupting Capability Exceeded?): Does the proposed Generating Facility, in aggregate with other generation on the Distribution circuit, cause any Distribution protective devices and equipment (including, but not limited to, substation breakers, fuse cutouts, and line reclosers), or Interconnection Request equipment on the system to exceed 87.5% of the short circuit interrupting capability; or is the Interconnection proposed for a circuit that already exceeds 87.5% of the short circuit interrupting capability?

The combined fault duty from proposed Generating Facility and PG&E Distribution system will not exceed 87.5% of any equipment short-circuit interrupting capability on the 13111151 circuit.
PASS Screen G

Screen J (Is the Generating Facility ≤ 30kVA?): The Generating Facility will have a minimal impact on fault current levels and any potential line over-voltages from loss of Distribution Provider's Distribution System neutral grounding if it is ≤ 30kVA.

The proposed project is greater than 30 kVA.
FAIL Screen J

Screen M (Is proposed generation ≤ ICA Hosting Capacity:

[4] Although voltage was not the maximum limiting criteria, an additional study for voltage issues was conducted based on discussions with ED staff.

Is the proposed Generating Facility nameplate rating ≤ 0.9 * minimum ICA-SG 576 profile and nameplate rating ≤ 0.9 * minimum ICA-OF 576 profile?

The Generating Facility nameplate rating of 9000 kW is greater than 90% of the ICA-SG 576 and ICA-OF 576 profiles. ICA SG in 2023 = 3120kW.
FAIL Screen M

This project would fail initial review and require further study in supplemental review/system impact study.

2.2.2 Load flow analysis

This additional study assumes a 9,000kW is added at line SectionID 3525305. A load flow analysis was then performed to determine distribution system impacts and identify any mitigations.

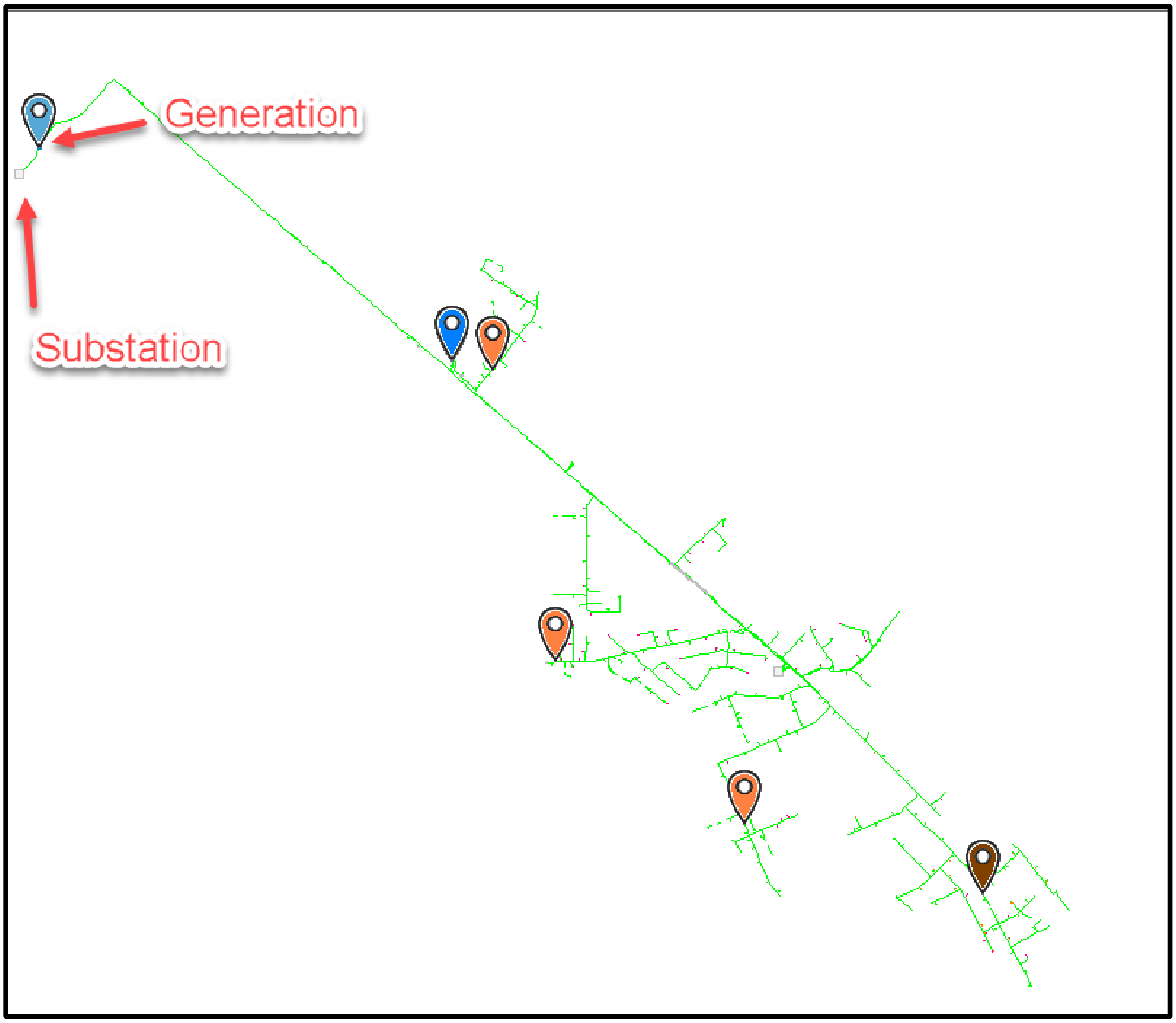


Figure 2: Feeder 13111151

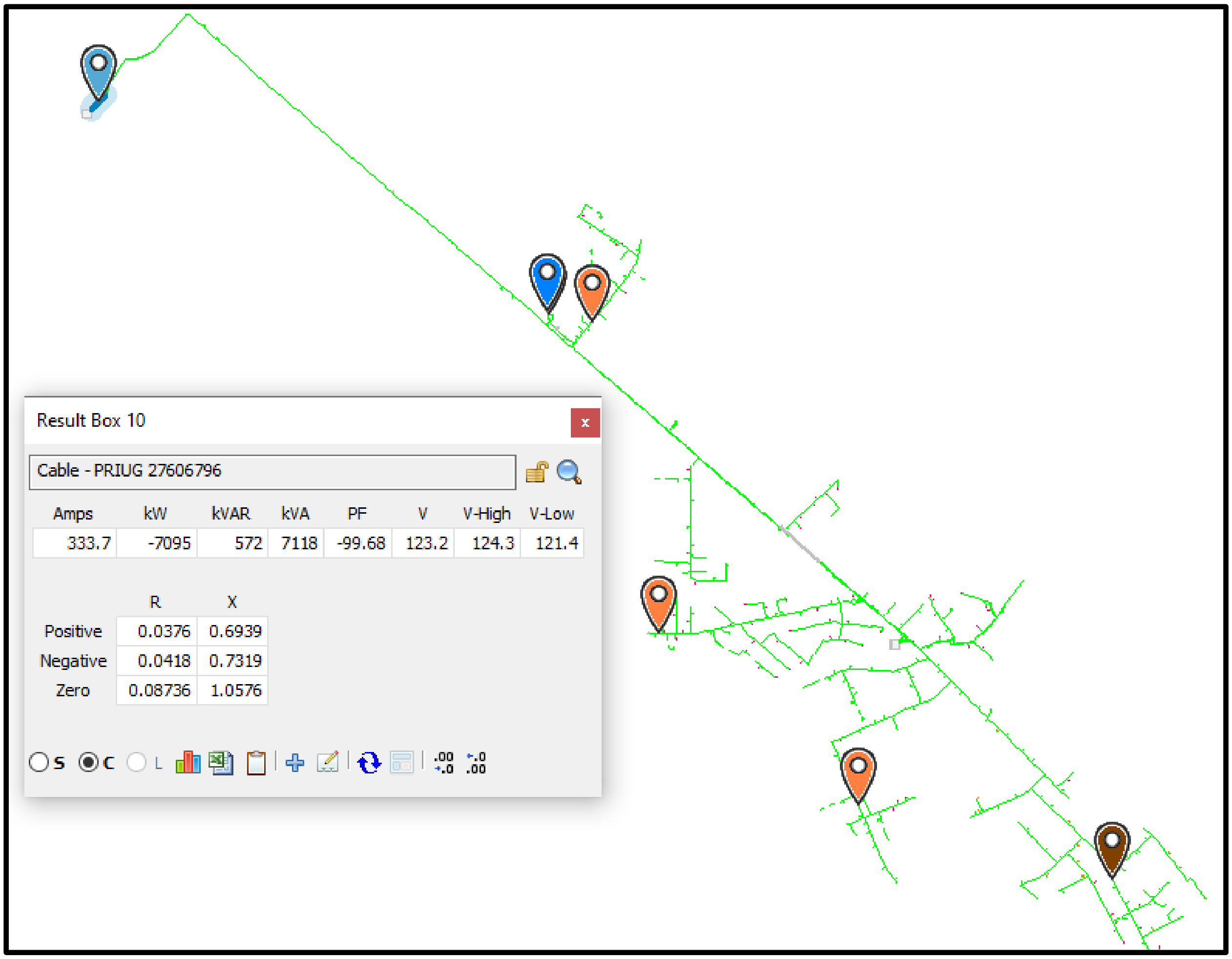


Figure 3: Load Flow Results at the Substation (Volt-VAR and Volt-WATT not activated)

7

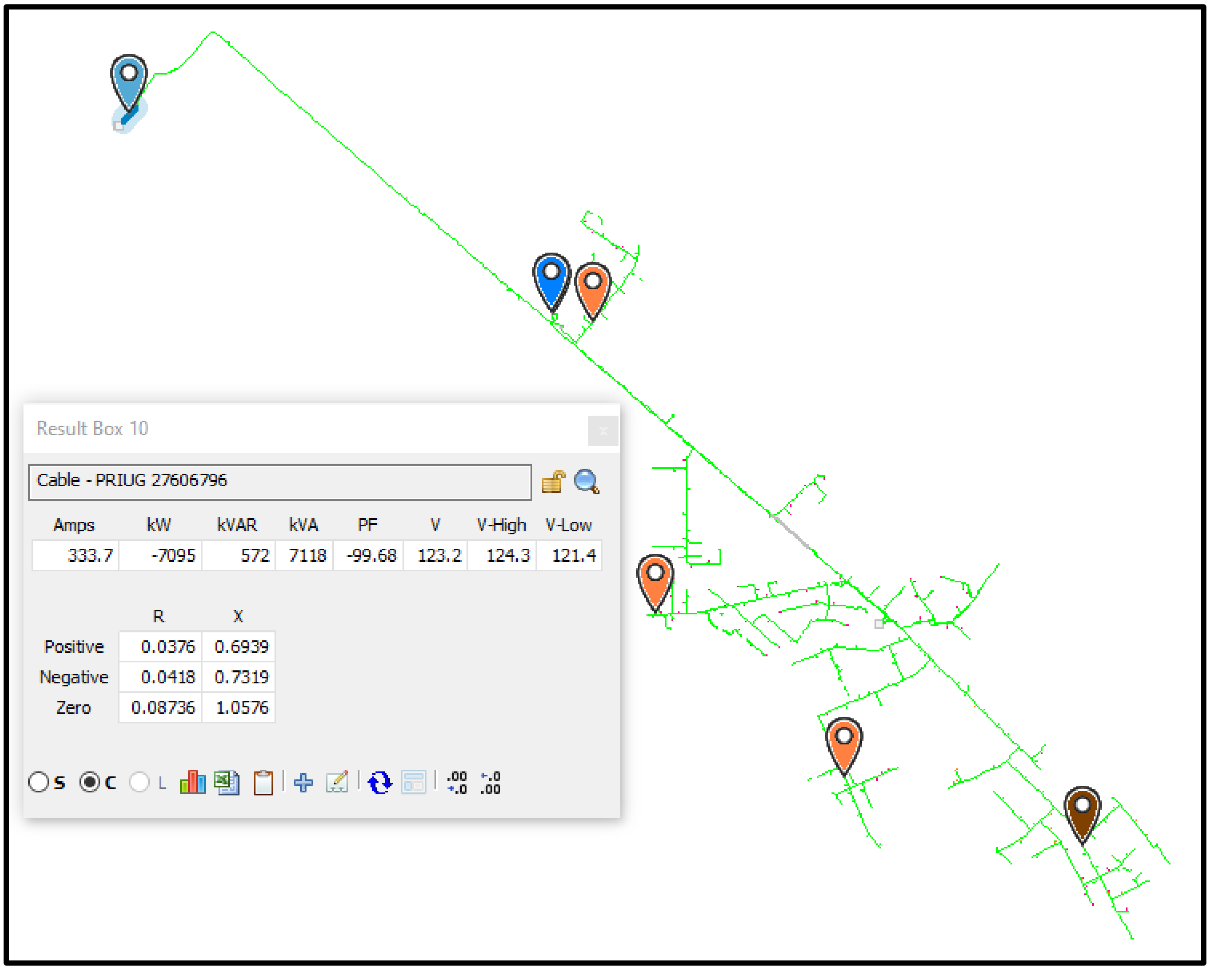


Figure 4: Load Flow Results at Substation (Volt-VAR and Volt-WATT Activated)

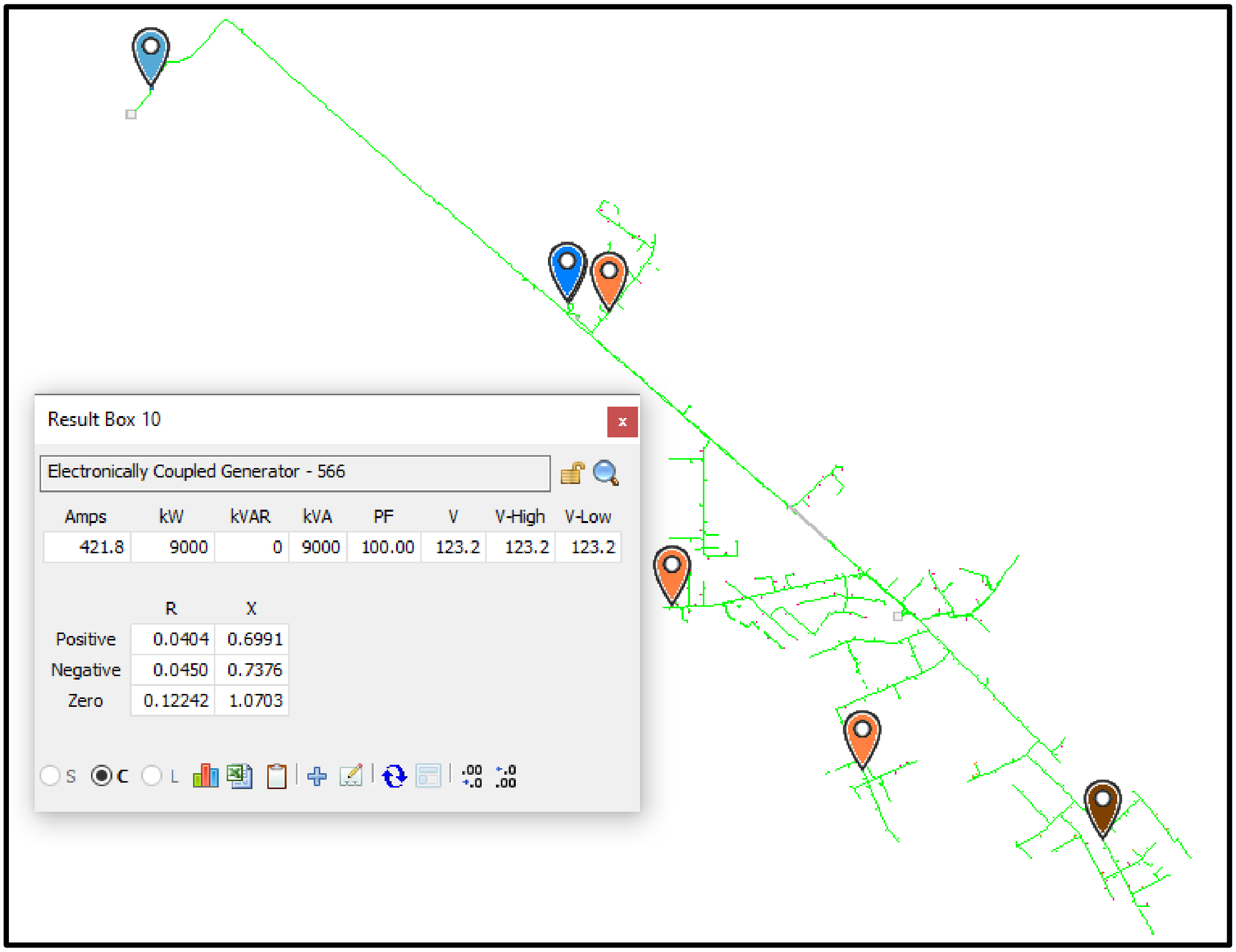


Figure 5: Load Flow Results at the Generation Site (Volt-VAR and Volt-WATT not activated)

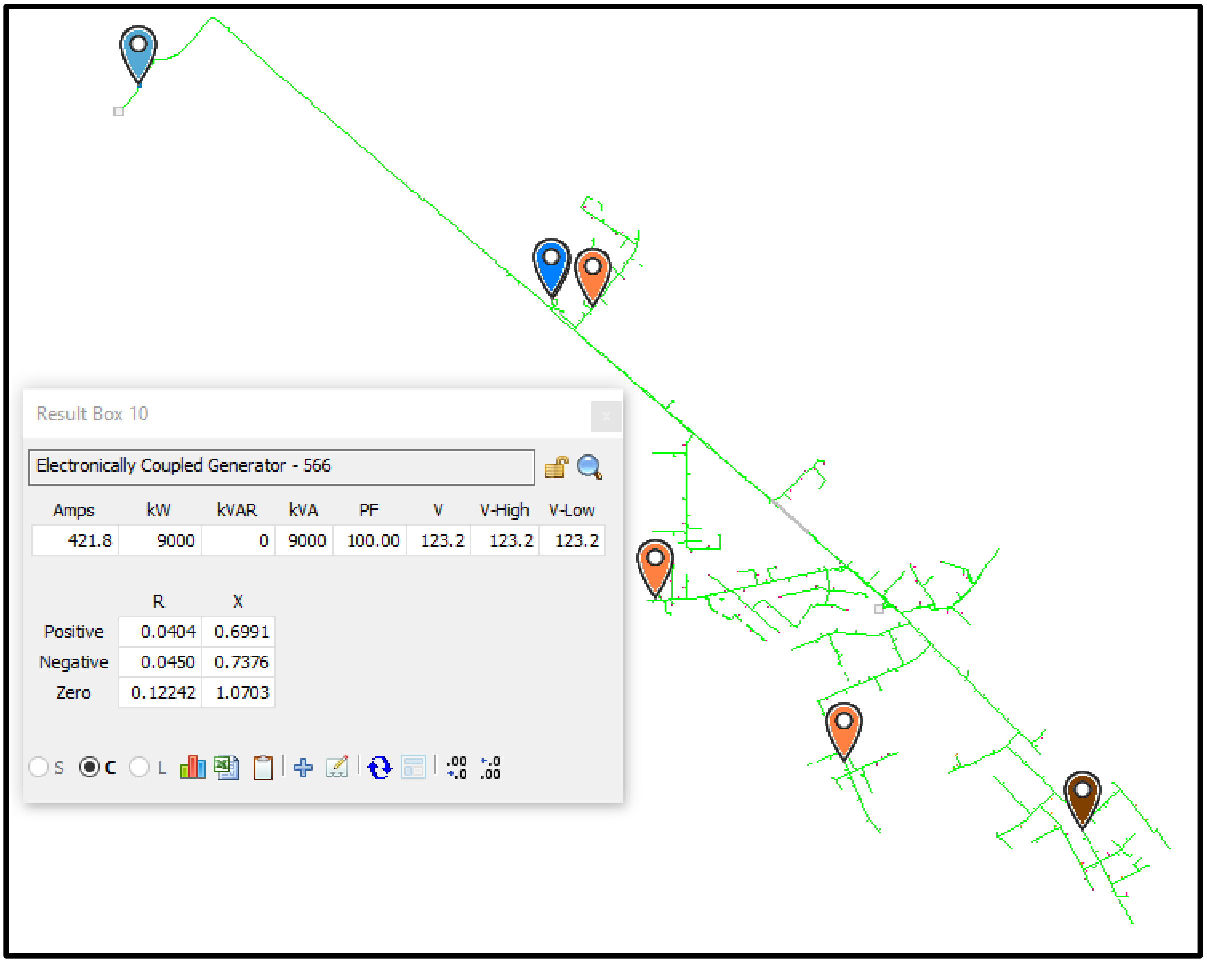


Figure 6: Load Flow Results at Generation Site (Volt-VAR and Volt-WATT Activated)

Based on the load flow study, there will be ~ 7,095 kW reverse flow into the feeder if a 9,000 project came online. This would cause an overload on a 12kV – 4kV transformer which can be ignored for a 12kV connected generator.

2.3 Circuit ID: 42631110 (Thermal)

2.3.1 Relevant Initial Review Screens

<u>Screen F (Is the Short-Circuit Current Contribution Ratio within acceptable limits?)</u>: When measured at primary side (high-side) of the Dedicated Distribution Transformer serving a Generating Facility, the sum of the Short-Circuit Contribution Ratios of all Generating Facilities connected to Distribution Provider's Distribution System circuit that serves the Generating Facility must be less than or equal to 0.1.

Therefore, three-phase fault contribution of all generation on the circuit nearest the proposed point of connection is less than the required 0.1 criteria.
PASS Screen F

<u>Screen F1 (Is the per unit Short Circuit Contribution under allowable levels?)</u>: Is the short circuit current contribution less than or equal to 1.2 per unit or is the Generating

Facility Gross Nameplate Rating multiplied by its per unit contribution less than the Protection Integrated Capacity Analysis (ICA) Value multiplied by 1.2 per unit?

Short circuit current contribution assumed to not exceed 1.2 per unit.
PASS Screen F1

Screen G (Is the Short-Circuit Interrupting Capability Exceeded?): Does the proposed Generating Facility, in aggregate with other generation on the Distribution circuit, cause any Distribution protective devices and equipment (including, but not limited to, substation breakers, fuse cutouts, and line reclosers), or Interconnection Request equipment on the system to exceed 87.5% of the short circuit interrupting capability; or is the Interconnection proposed for a circuit that already exceeds 87.5% of the short circuit interrupting capability?

The combined fault duty from proposed Generating Facility and PG&E Distribution system will not exceed 87.5% of any equipment short-circuit interrupting capability on the 42631110 circuit.
PASS Screen G

Screen J (Is the Generating Facility ≤ 30kVA?): The Generating Facility will have a minimal impact on fault current levels and any potential line over-voltages from loss of Distribution Provider's Distribution System neutral grounding if it is ≤ 30kVA.

The proposed project is greater than 30 kVA.
FAIL Screen J

Screen M (Is proposed generation ≤ ICA Hosting Capacity:
Is the proposed Generating Facility nameplate rating ≤ 0.9 * minimum ICA-SG 576 profile and nameplate rating ≤ 0.9 * minimum ICA-OF 576 profile?

The Generating Facility nameplate rating of 2,214 kW is greater than 90% of the ICA-SG 576 and ICA-OF 576 profiles. ICA SG in 2023 = 2050kW.
FAIL Screen M

This project would fail initial review and require further study in supplemental review/system impact study.

2.3.2 Load flow analysis (Thermal)

This additional study assumes a 2,214kW is added at line SectionID 4428119. A load flow analysis was then performed to determine distribution system impacts and identify any mitigations.

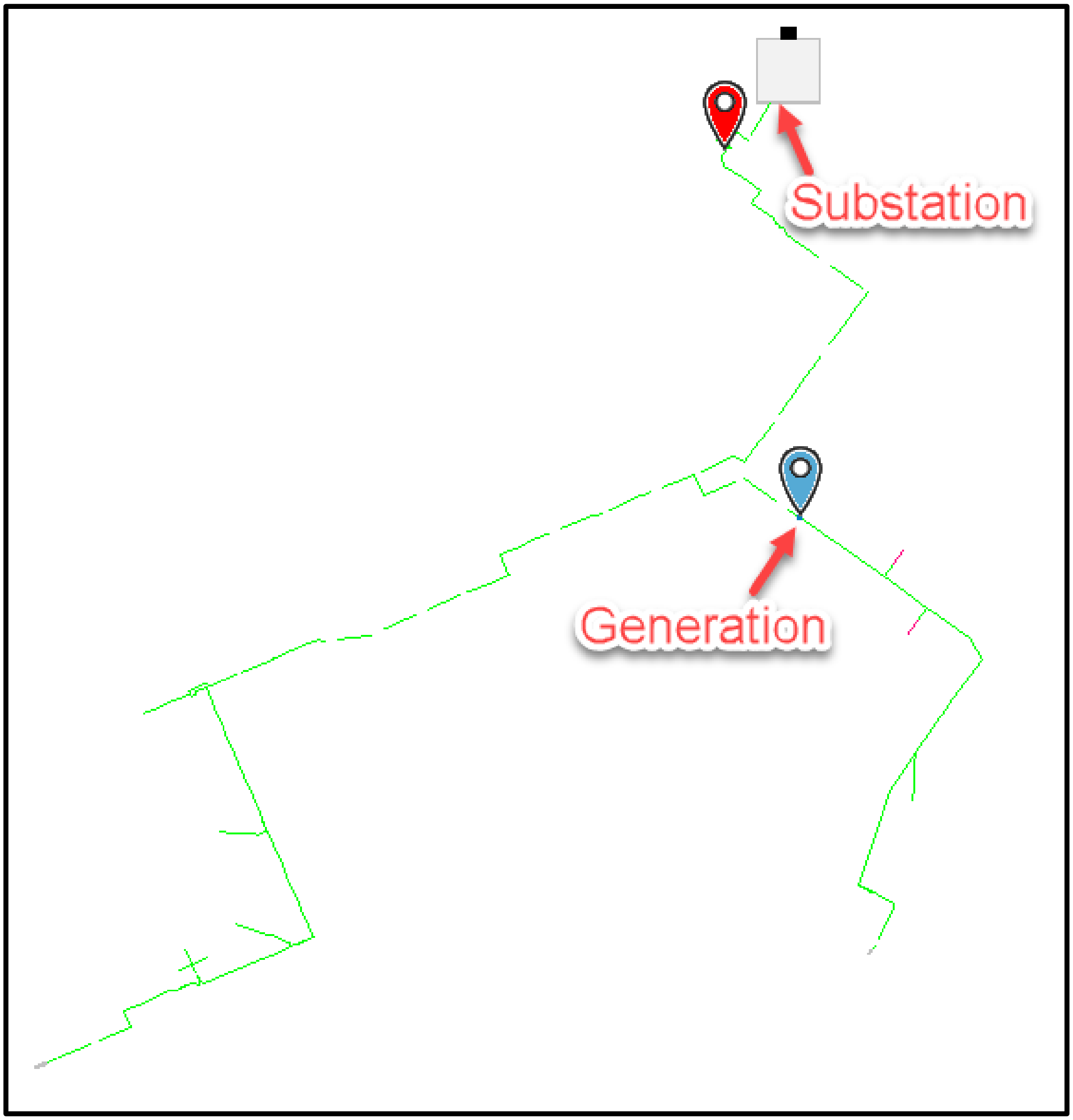


Figure 7: Feeder 42631110

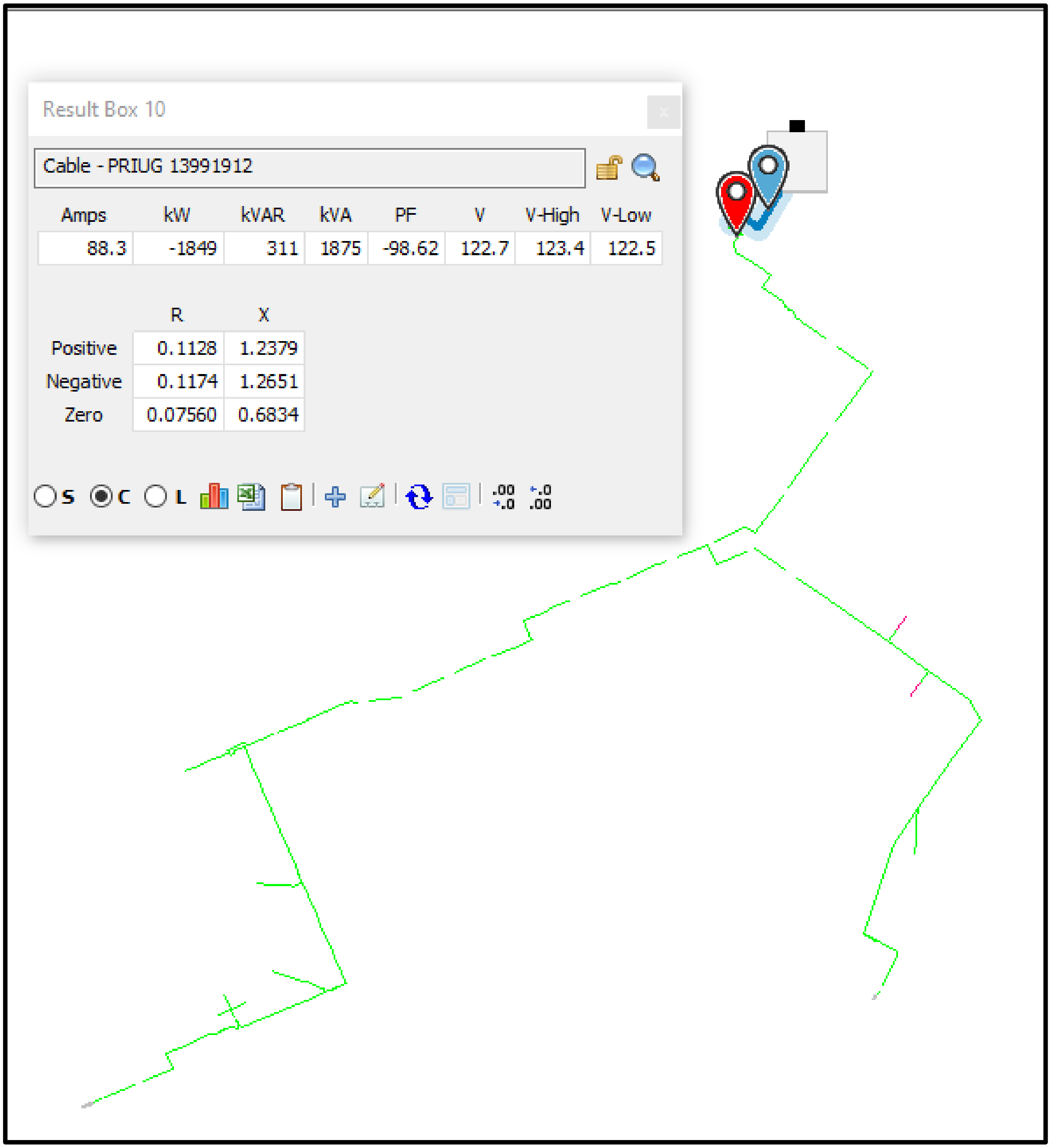


Figure 8: Load Flow Results at the Substation (Volt-VAR and Volt-WATT not activated)

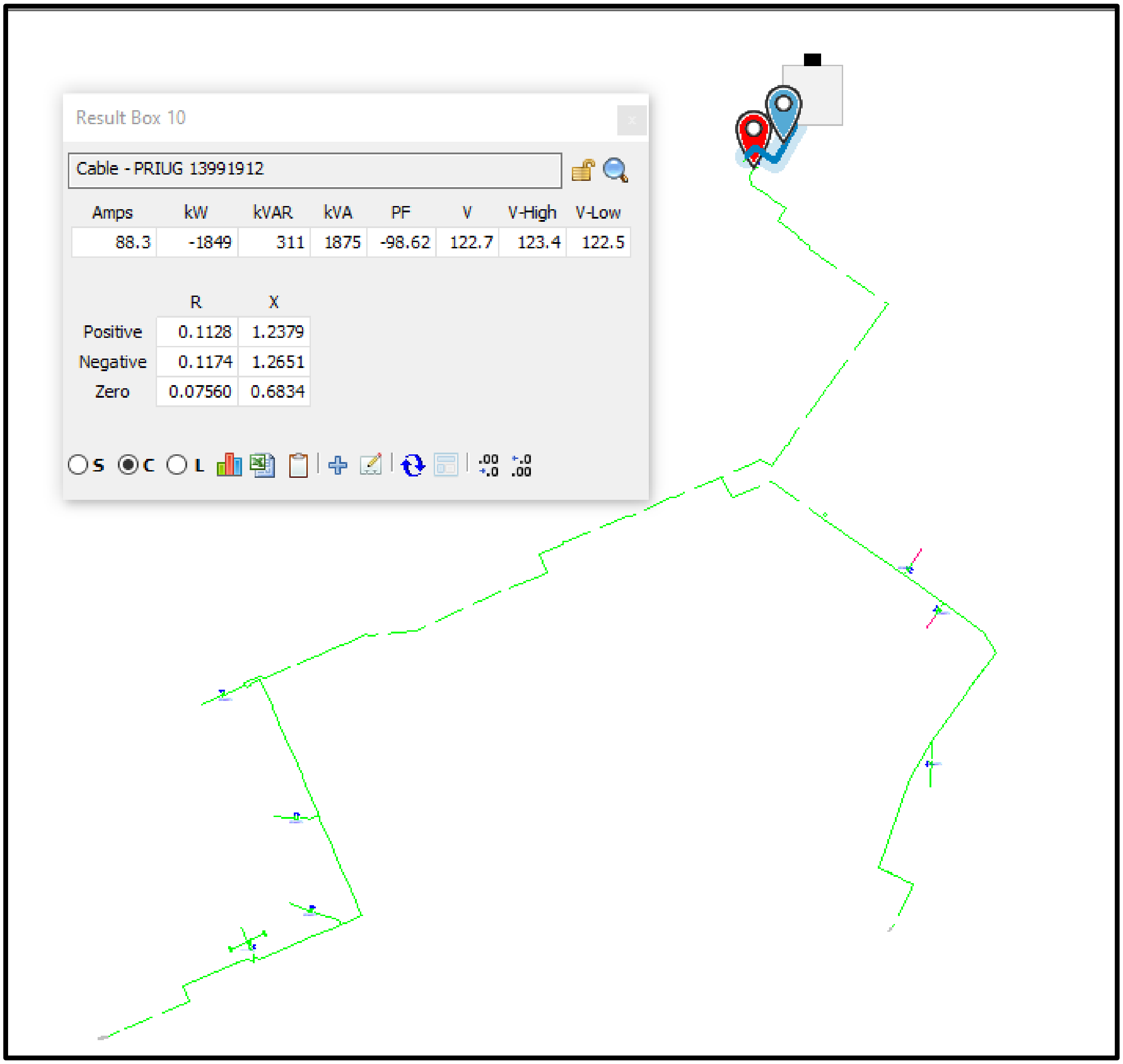


Figure 9: Load Flow Results at Substation (Volt-VAR and Volt-WATT Activated)

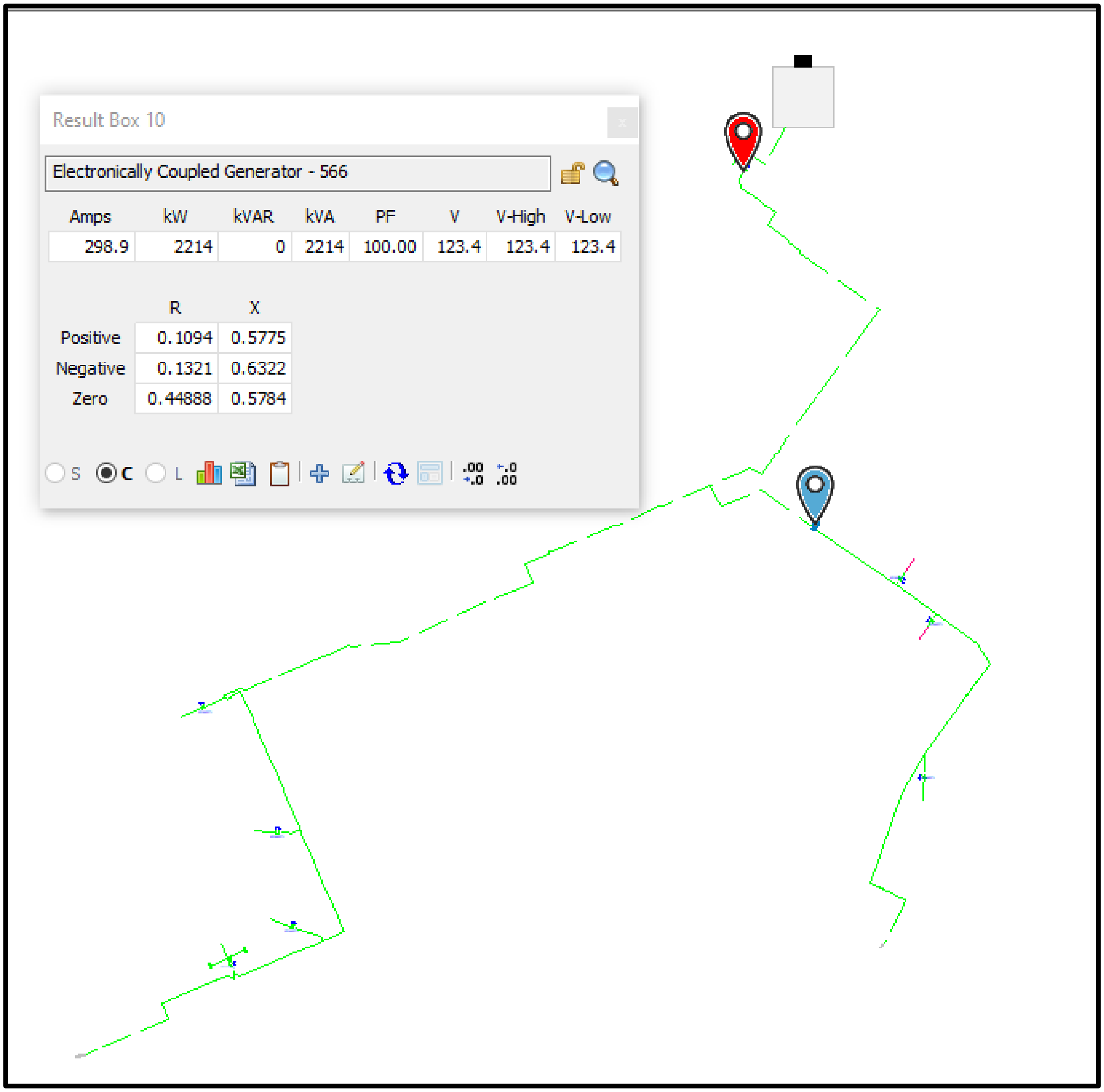


Figure 10: Load Flow Results at the Generation Site (Volt-VAR and Volt-WATT not activated)

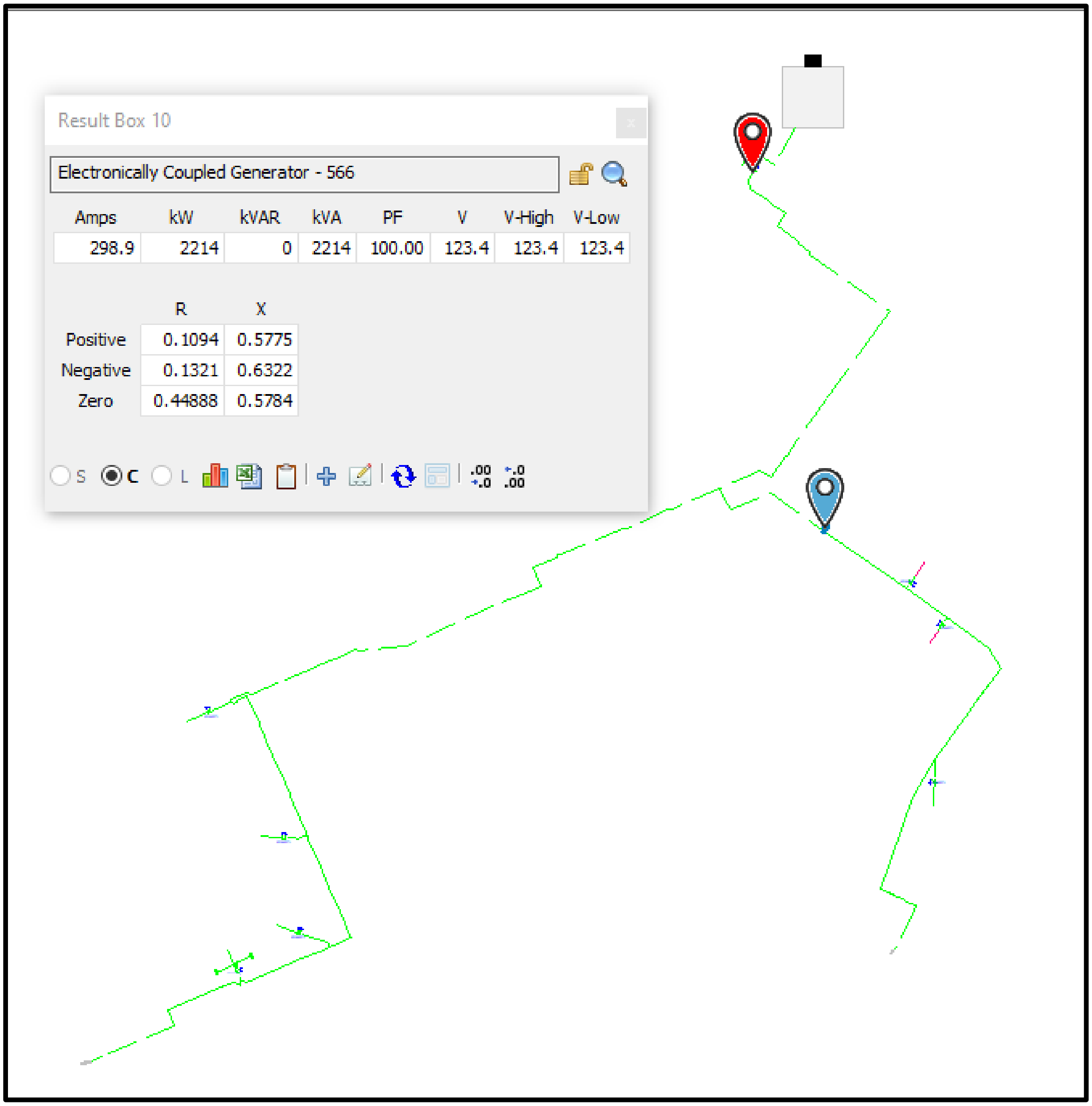


Figure 11: Load Flow Results at Generation Site (Volt-VAR and Volt-WATT Activated)

Further investigation revealed that there is no overload issue.

2.4 Circuit ID: 83631108 (Thermal/Voltage)

2.4.1 Relevant Initial Review Screens

Screen F (Is the Short-Circuit Current Contribution Ratio within acceptable limits?): When measured at primary side (high-side) of the Dedicated Distribution Transformer serving a Generating Facility, the sum of the Short-Circuit Contribution Ratios of all Generating Facilities connected to Distribution Provider's Distribution System circuit that serves the Generating Facility must be less than or equal to 0.1.

Therefore, three-phase fault contribution of all generation on the circuit nearest the proposed point of connection is less than the required 0.1 criteria.
PASS Screen F

Screen F1 (Is the per unit Short Circuit Contribution under allowable levels?): Is the short circuit current contribution less than or equal to 1.2 per unit or is the Generating Facility Gross Nameplate Rating multiplied by its per unit contribution less than the Protection Integrated Capacity Analysis (ICA) Value multiplied by 1.2 per unit?

Short circuit current contribution assumed to not exceed 1.2 per unit.
PASS Screen F1

Screen G (Is the Short-Circuit Interrupting Capability Exceeded?): Does the proposed Generating Facility, in aggregate with other generation on the Distribution circuit, cause any Distribution protective devices and equipment (including, but not limited to, substation breakers, fuse cutouts, and line reclosers), or Interconnection Request equipment on the system to exceed 87.5% of the short circuit interrupting capability; or is the Interconnection proposed for a circuit that already exceeds 87.5% of the short circuit interrupting capability?

The combined fault duty from proposed Generating Facility and PG&E Distribution system will not exceed 87.5% of any equipment short-circuit interrupting capability on the 83631108 circuit.
PASS Screen G

Screen J (Is the Generating Facility ≤ 30kVA?): The Generating Facility will have a minimal impact on fault current levels and any potential line over-voltages from loss of Distribution Provider's Distribution System neutral grounding if it is ≤ 30kVA.

The proposed project is greater than 30 kVA.
FAIL Screen J

Screen M (Is proposed generation ≤ ICA Hosting Capacity:
Is the proposed Generating Facility nameplate rating ≤ 0.9 * minimum ICA-SG 576 profile and nameplate rating ≤ 0.9 * minimum ICA-OF 576 profile?

The Generating Facility nameplate rating of 2430 kW is greater than 90% of the ICA-SG 576 and ICA-OF 576 profiles. ICA SG in 2023 = 1520kW.
FAIL Screen M

This project would fail initial review and require further study in supplemental review/system impact study.

2.4.2 Load flow analysis (Voltage)

This additional study assumes a 2,430kW is added at line SectionID 4310786. A load flow analysis was then performed to determine distribution system impacts and identify any mitigations.

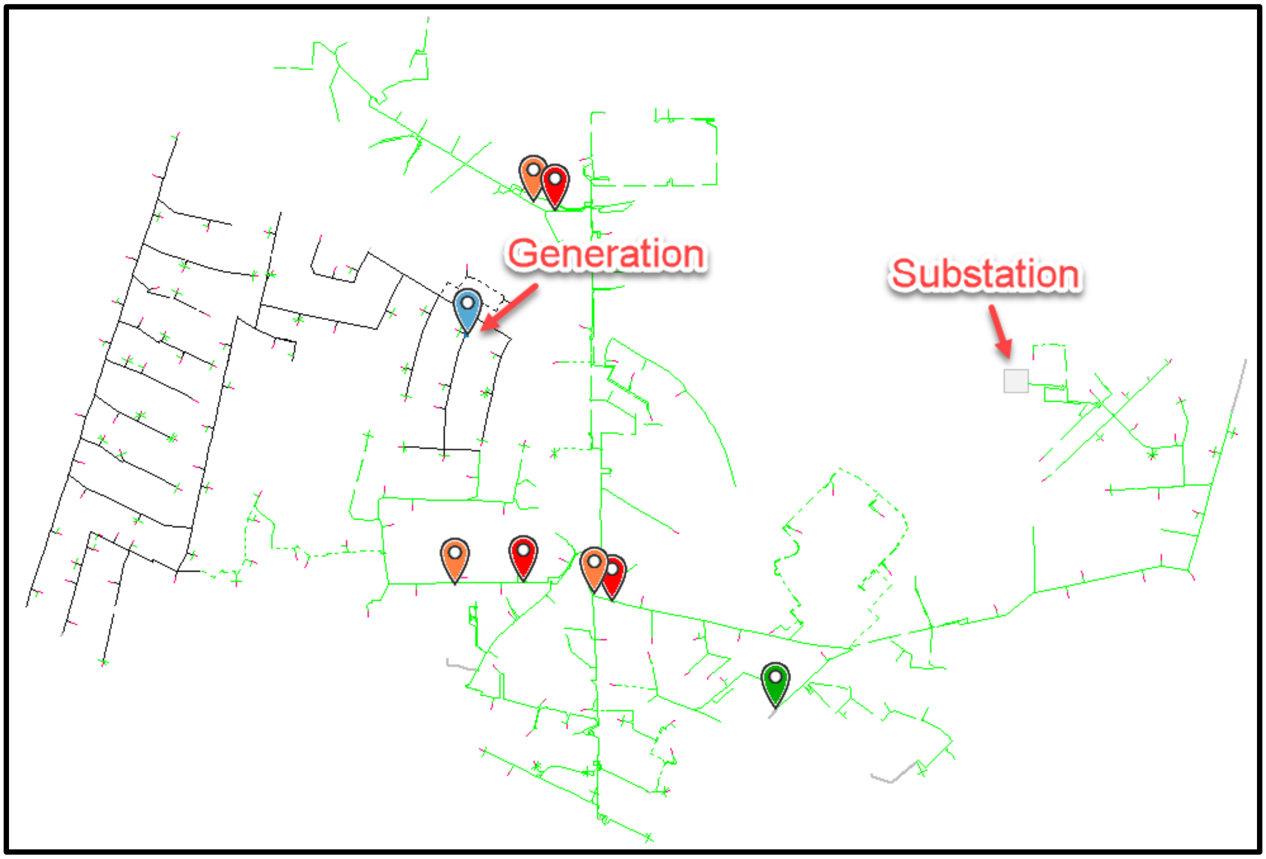


Figure 12: Feeder 83631108

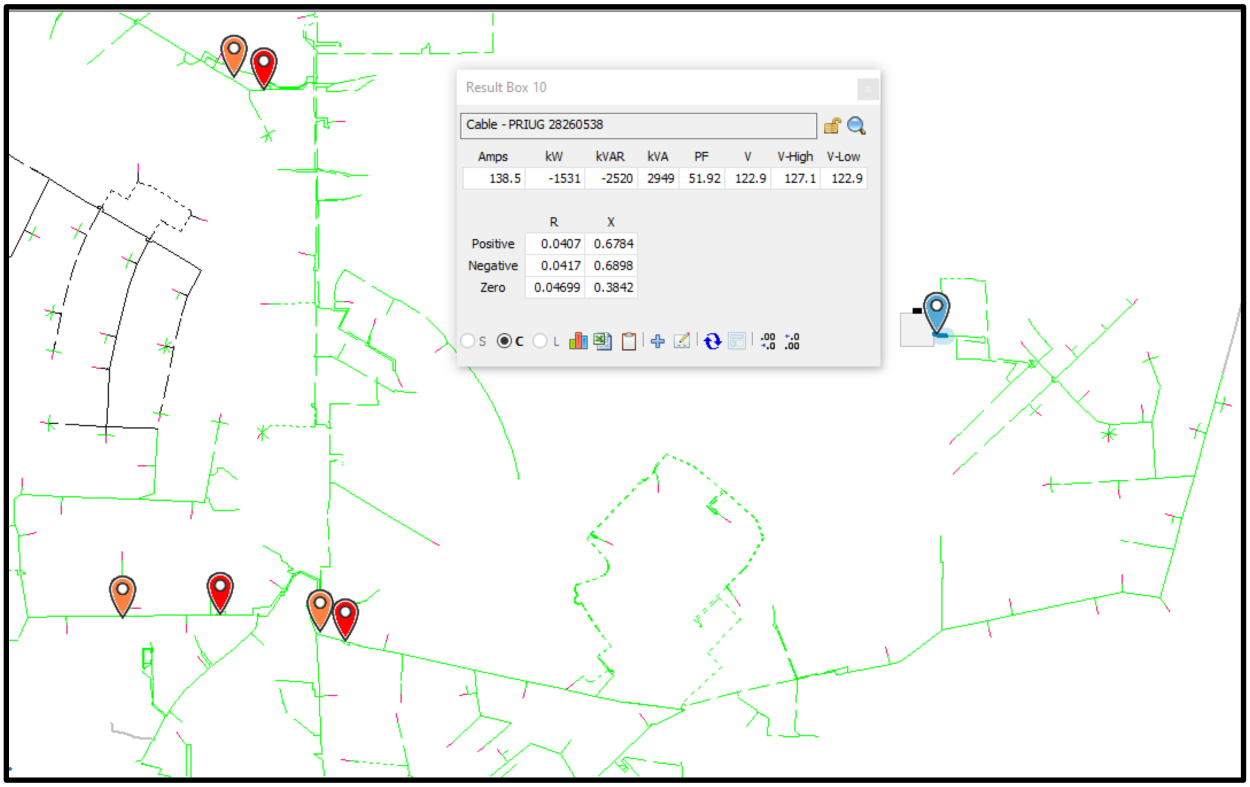


Figure 13: Load Flow Results at the Substation (Volt-VAR and Volt-WATT not activated)

The line sections colored black are experiencing high voltage. The highest voltage in the feeder is ~ 127.1V (120V base) which is over Rule 2.

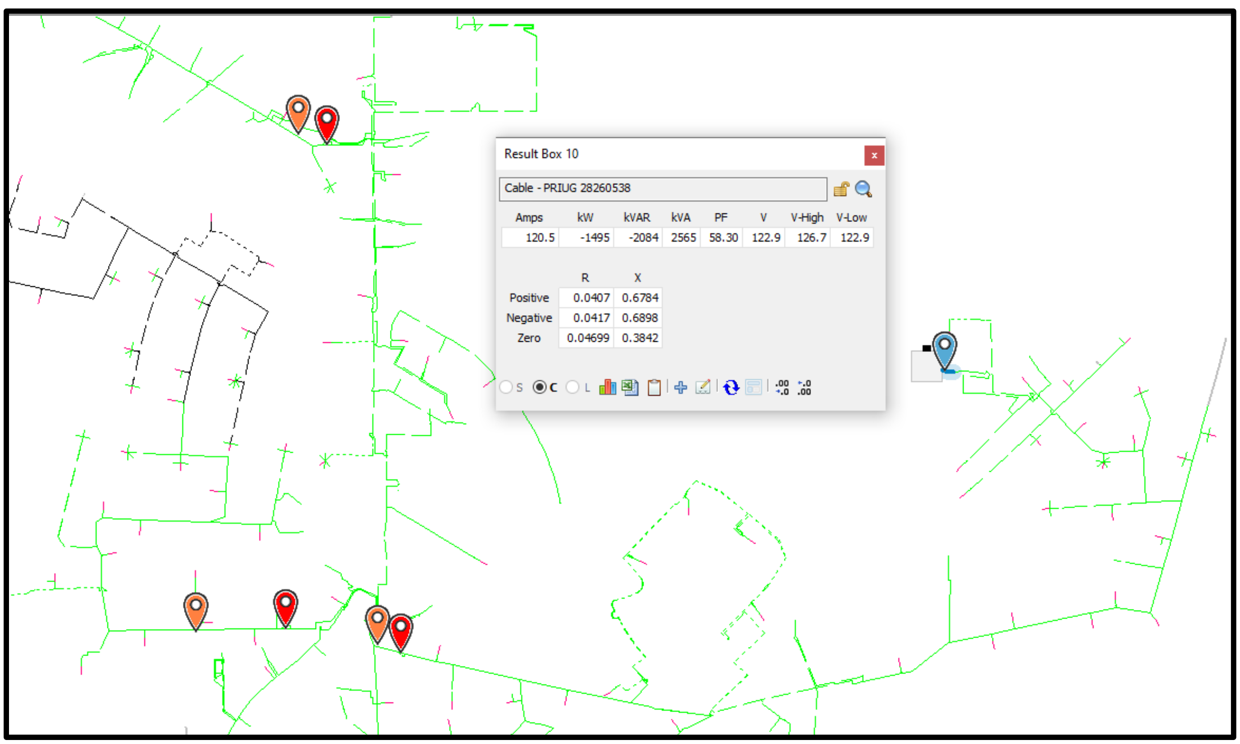


Figure 14: Load Flow Results at Substation (Volt-VAR and Volt-WATT Activated)

Activating Volt-VAR reduces the high voltage slightly from 127.1V to 126.7V which is still over Rule 2.

Figure 15: Load Flow Results at the Generation Site (Volt-VAR and Volt-WATT not activated)

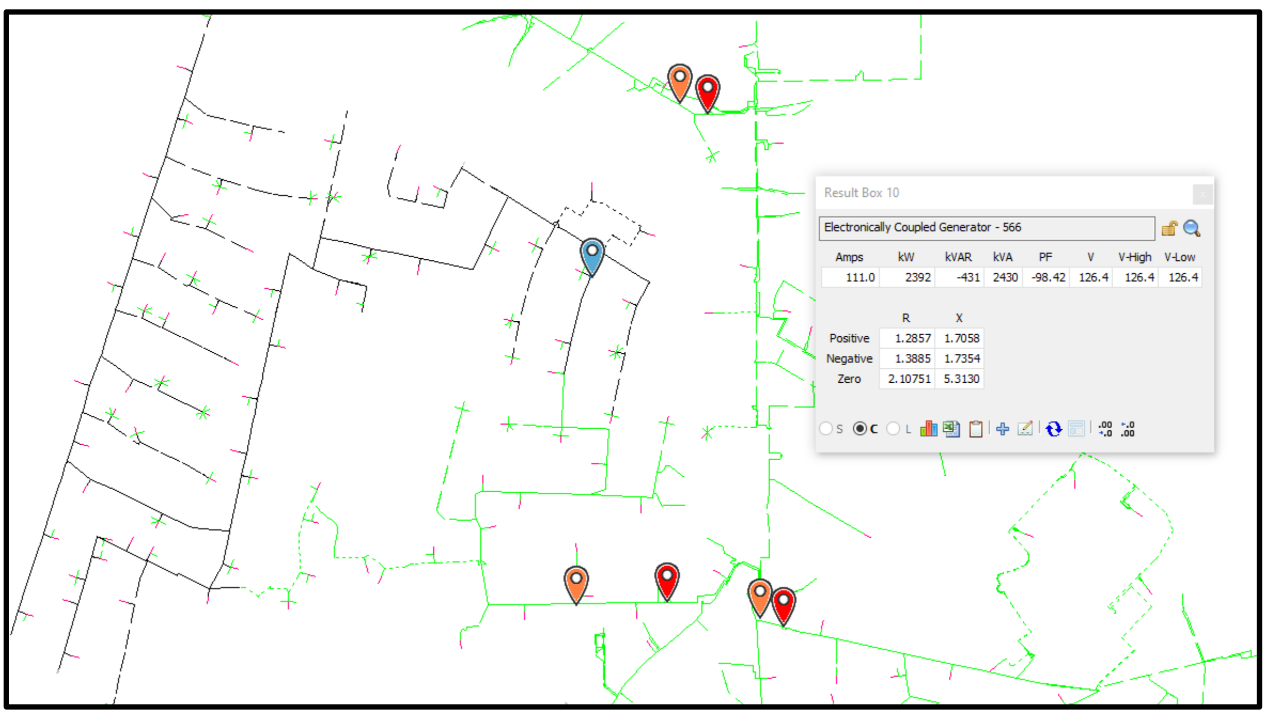


Figure 16: Load Flow Results at Generation Site (Volt-VAR and Volt-WATT Activated)

Activating Volt-VAR reduces the high voltage slightly from 126.8V to 126.4V which is still over Rule 2.

An additional settings change was made to a capacitor bank. Making this settings change caused the voltage to be within Rule 2.

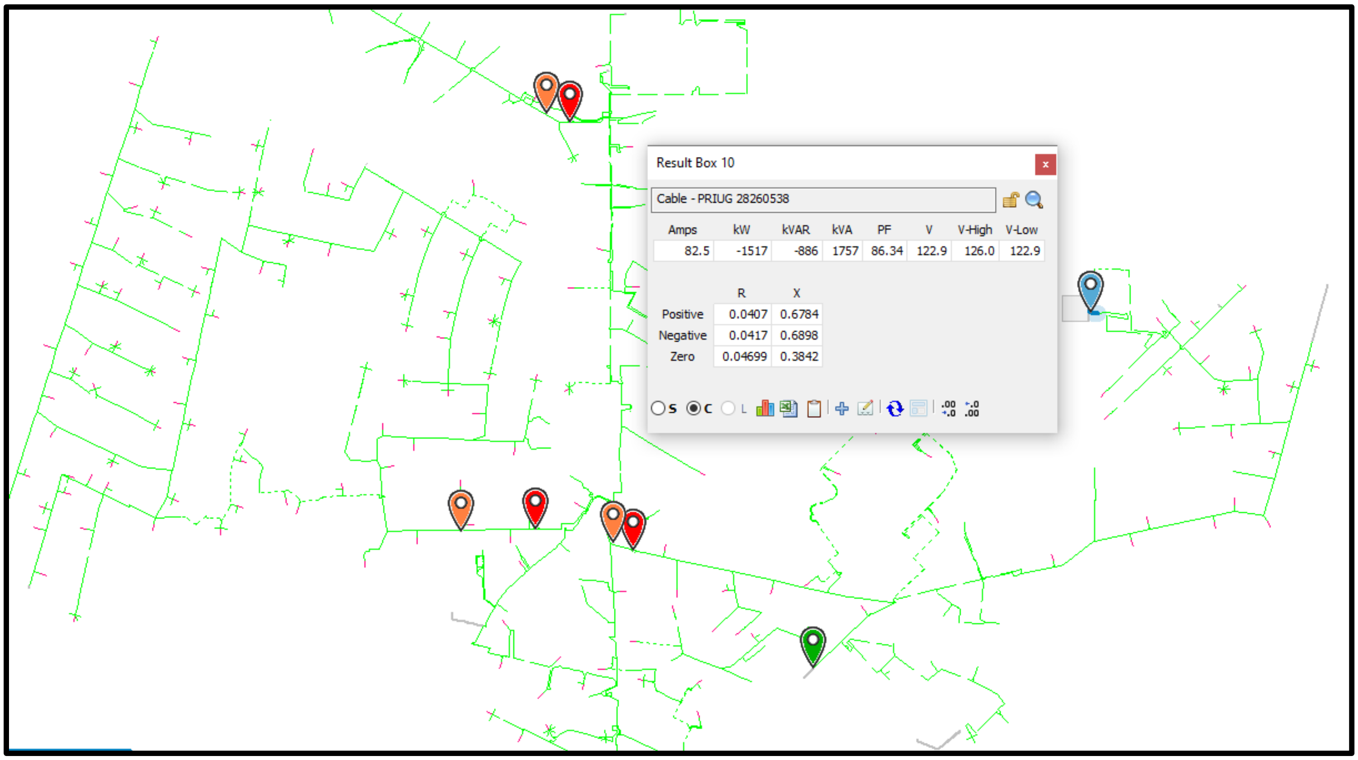


Figure 17: Load Flow Results at Substation after Capacitor bank settings change

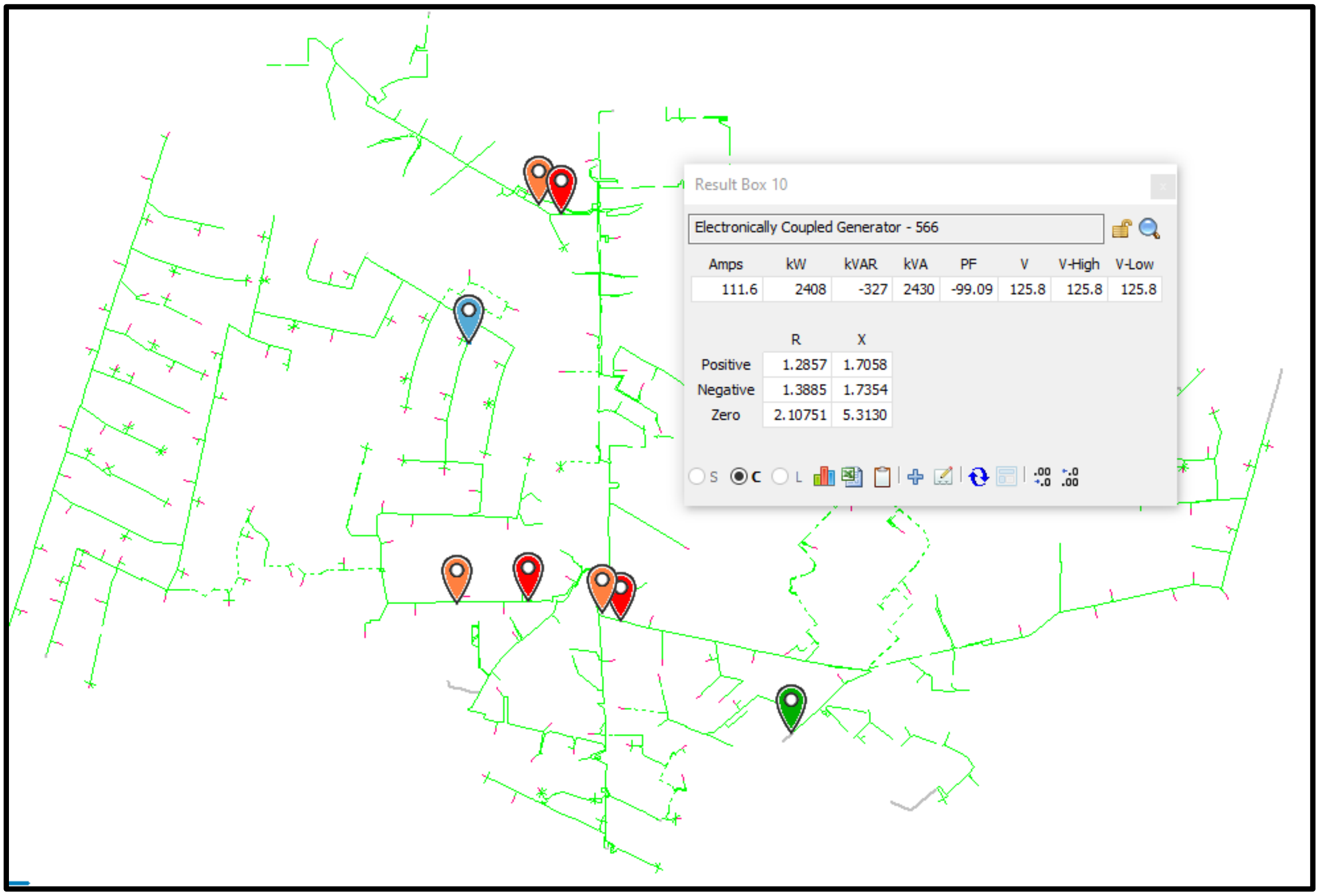


Figure 18: Load Flow Results at Generation Site after Capacitor bank settings change

2.4.2 Load flow analysis (Thermal)

In addition to the voltage issues covered above, adding a 2,430kW generation project will also cause thermal overloads of several line sections. About 1,328 ft of 4 ACSR C will need to be upgraded.

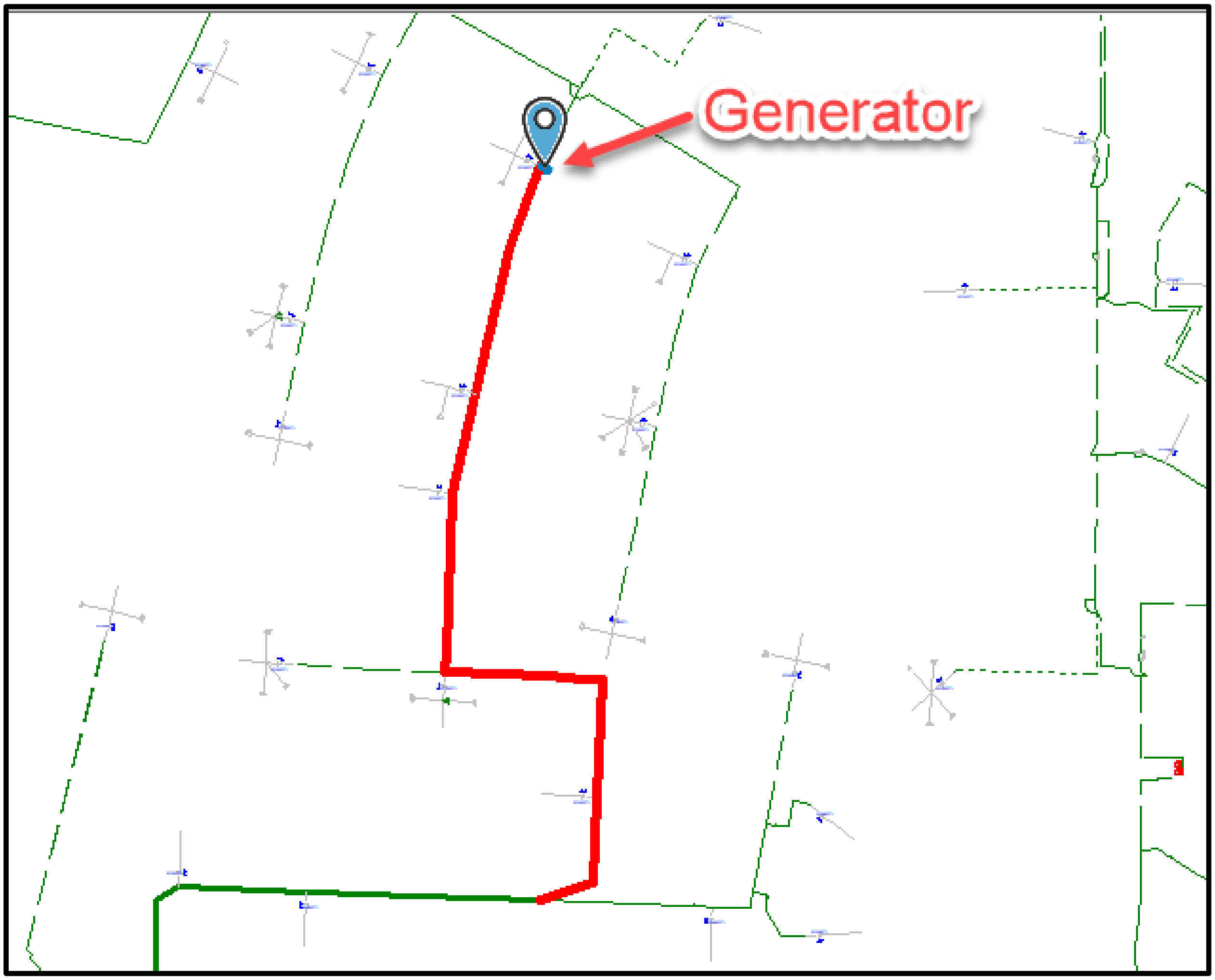


Figure 19: Overloaded line sections

2.4.3 Mitigations and Costs

Distribution Upgrades	Unit Cost
Capacitor Bank Settings Change	$2,500.00
Line reconductor	$212,480.00

2.5 Circuit ID: 102041101 (Thermal)

2.5.1 Relevant Initial Review Screens

Screen F (Is the Short-Circuit Current Contribution Ratio within acceptable limits?): When measured at primary side (high-side) of the Dedicated Distribution Transformer serving a Generating Facility, the sum of the Short-Circuit Contribution Ratios of all Generating Facilities connected to Distribution Provider's Distribution System circuit that serves the Generating Facility must be less than or equal to 0.1.

Therefore, three-phase fault contribution of all generation on the circuit nearest the proposed point of connection is less than the required 0.1 criteria.
PASS Screen F

Screen F1 (Is the per unit Short Circuit Contribution under allowable levels?): Is the short circuit current contribution less than or equal to 1.2 per unit or is the Generating Facility Gross Nameplate Rating multiplied by its per unit contribution less than the Protection Integrated Capacity Analysis (ICA) Value multiplied by 1.2 per unit?

Short circuit current contribution assumed to not exceed 1.2 per unit.
PASS Screen F1

Screen G (Is the Short-Circuit Interrupting Capability Exceeded?): Does the proposed Generating Facility, in aggregate with other generation on the Distribution circuit, cause any Distribution protective devices and equipment (including, but not limited to, substation breakers, fuse cutouts, and line reclosers), or Interconnection Request equipment on the system to exceed 87.5% of the short circuit interrupting capability; or is the Interconnection proposed for a circuit that already exceeds 87.5% of the short circuit interrupting capability?

The combined fault duty from proposed Generating Facility and PG&E Distribution system will not exceed 87.5% of any equipment short-circuit interrupting capability on the 102041101 circuit.
PASS Screen G

Screen J (Is the Generating Facility ≤ 30kVA?): The Generating Facility will have a minimal impact on fault current levels and any potential line over-voltages from loss of Distribution Provider's Distribution System neutral grounding if it is ≤ 30kVA.

The proposed project is greater than 30 kVA.
FAIL Screen J

Screen M (Is proposed generation ≤ ICA Hosting Capacity:
Is the proposed Generating Facility nameplate rating ≤ 0.9 * minimum ICA-SG 576 profile and nameplate rating ≤ 0.9 * minimum ICA-OF 576 profile?

The Generating Facility nameplate rating of 3114 kW is greater than 90% of the ICA-SG 576 and ICA-OF 576 profiles. ICA SG in 2023 = 1030kW.
FAIL Screen M

This project would fail initial review and require further study in supplemental review/system impact study.

2.5.2 Load flow analysis

This additional study assumes a 3114kW is added at line SectionID 4078583. A load flow analysis was then performed to determine distribution system impacts and identify any mitigations.

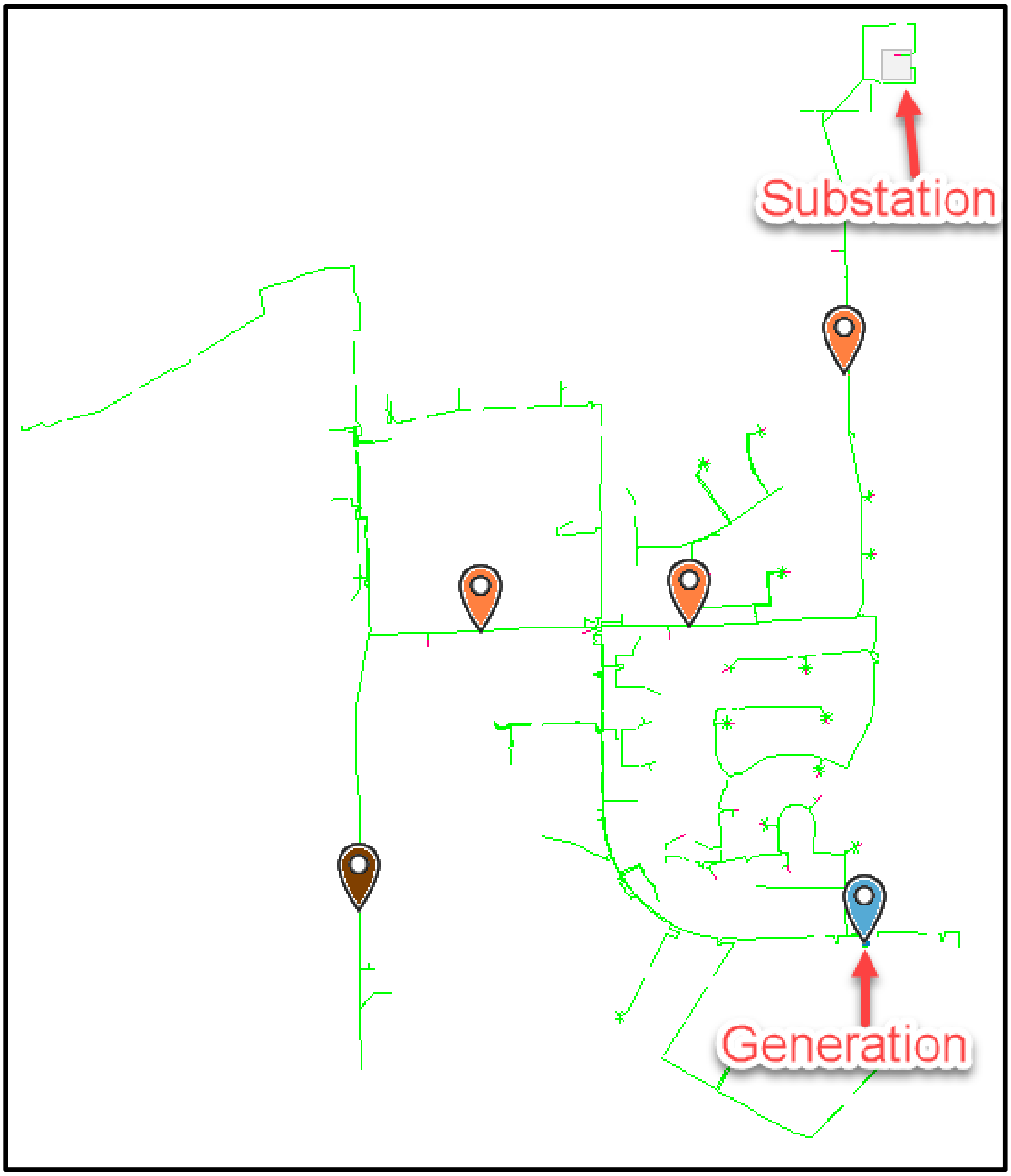


Figure 20: Feeder 102041101

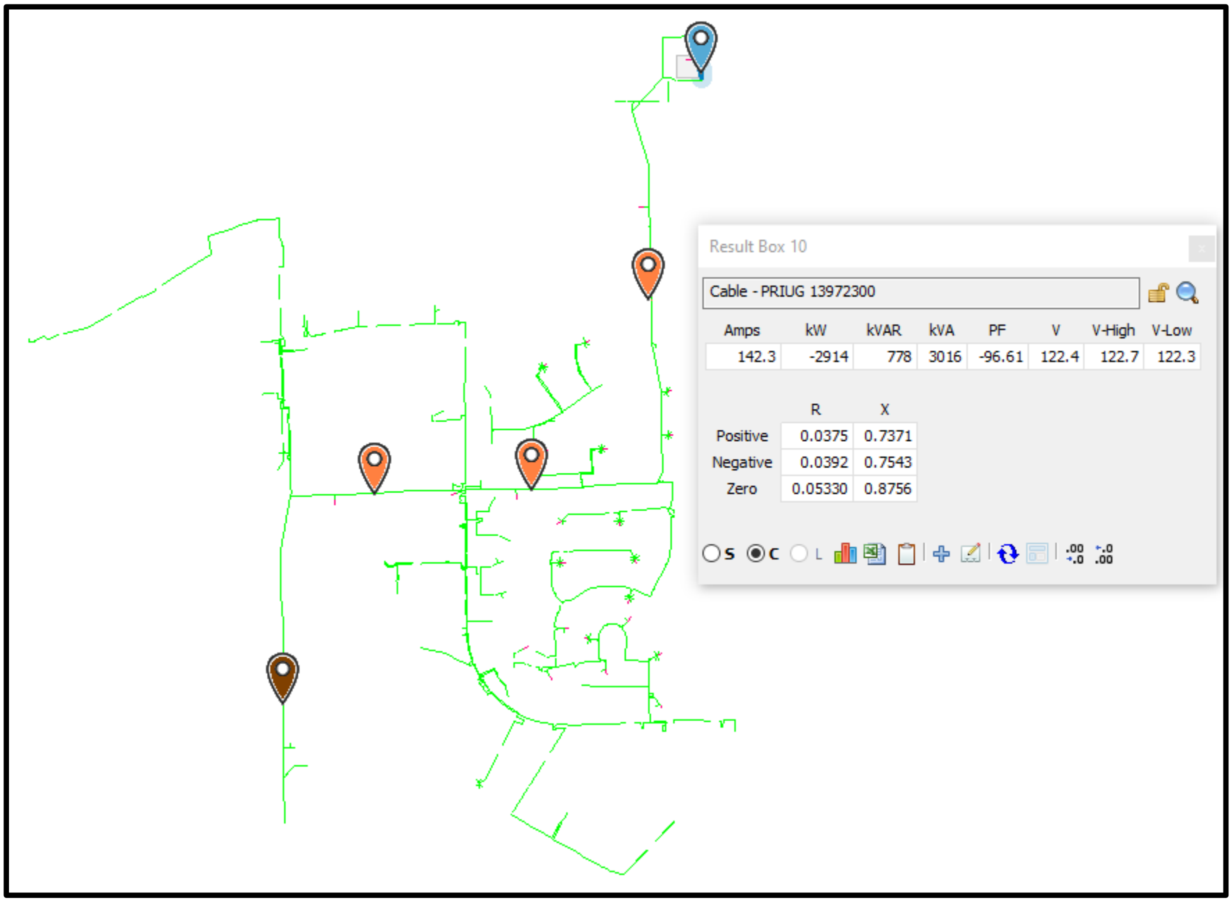


Figure 21: Load Flow Results at the Substation (Volt-VAR and Volt-WATT not activated)

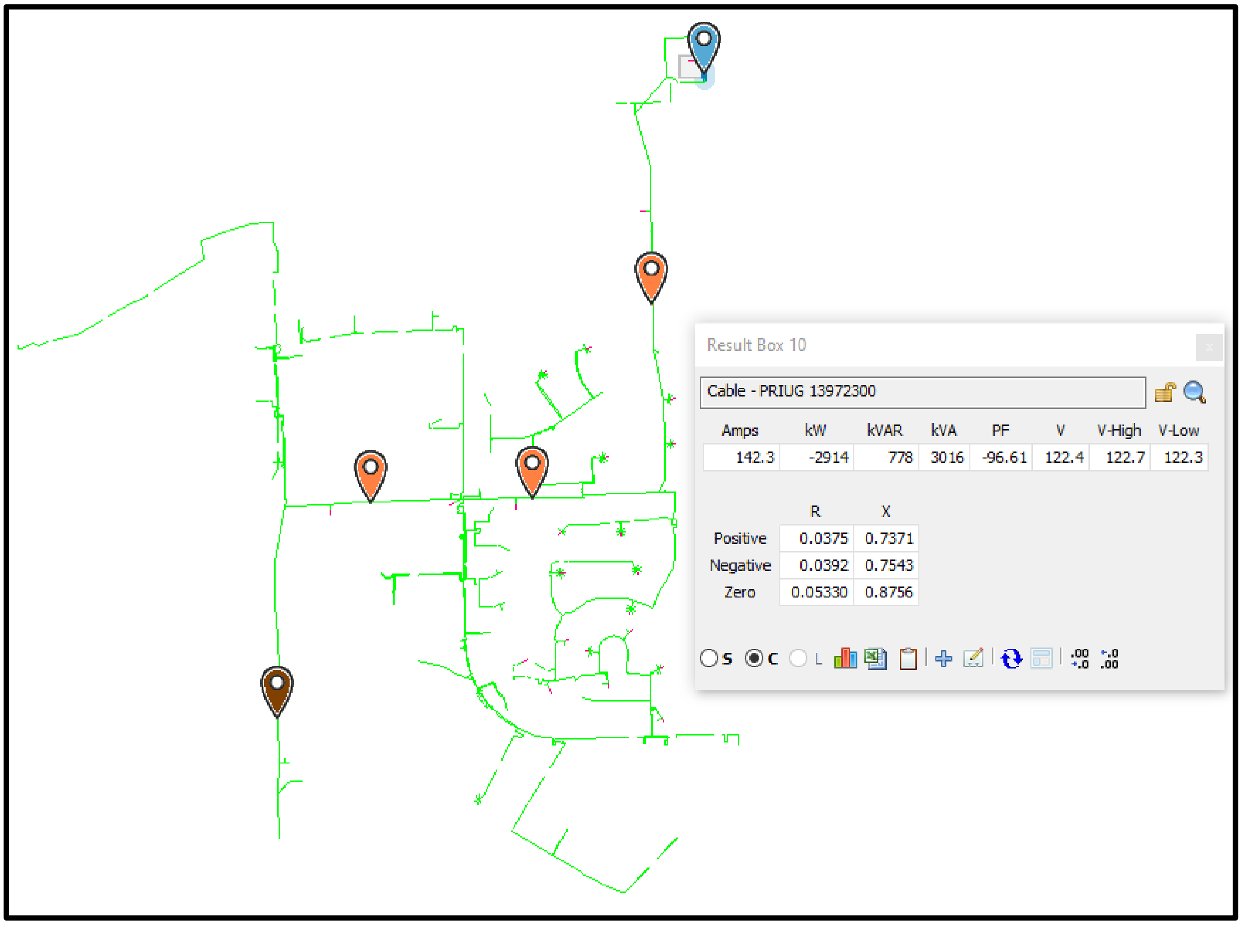


Figure 22: Load Flow Results at Substation (Volt-VAR and Volt-WATT Activated)

27

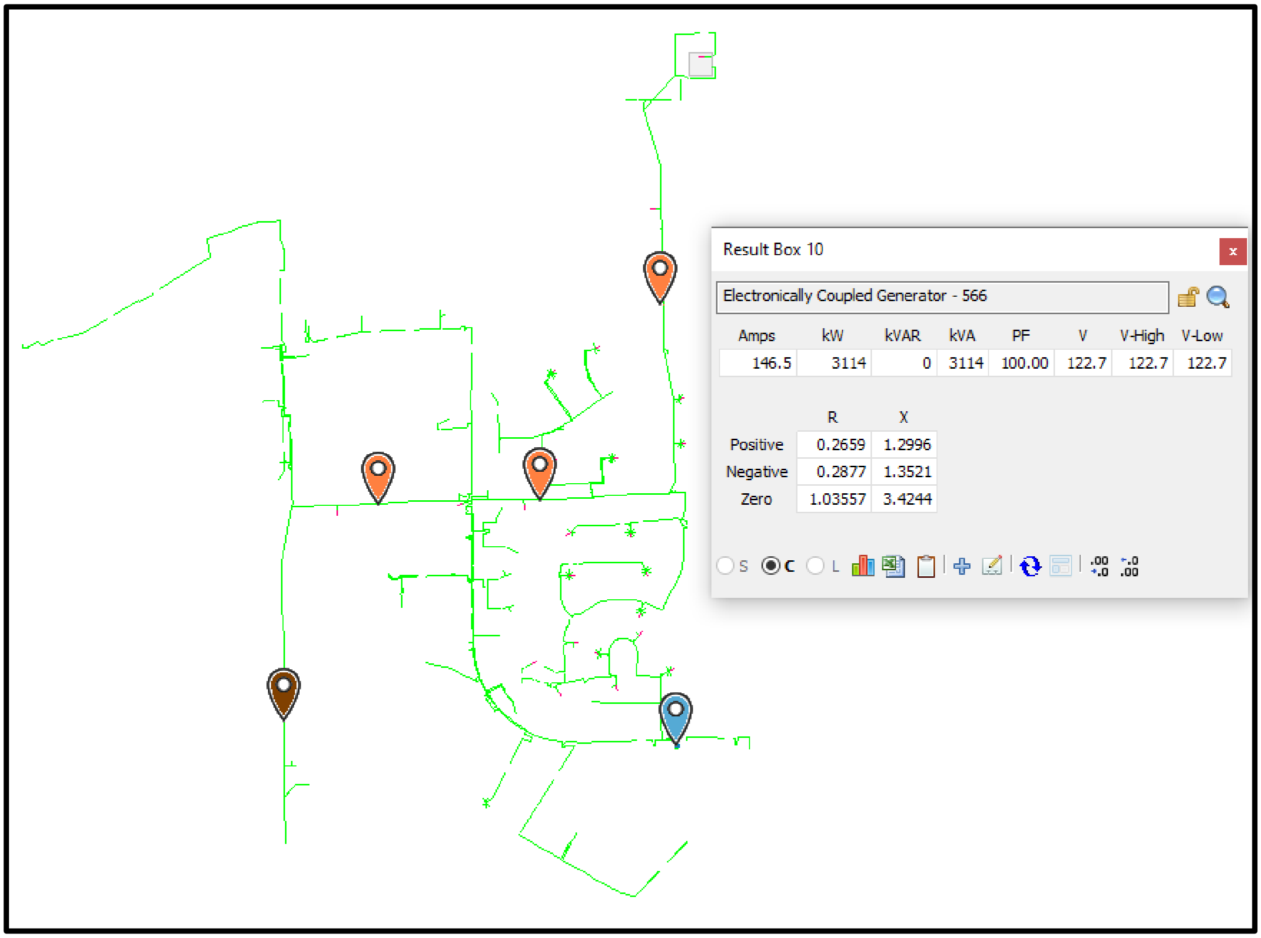


Figure 23: Load Flow Results at the Generation Site (Volt-VAR and Volt-WATT not activated)

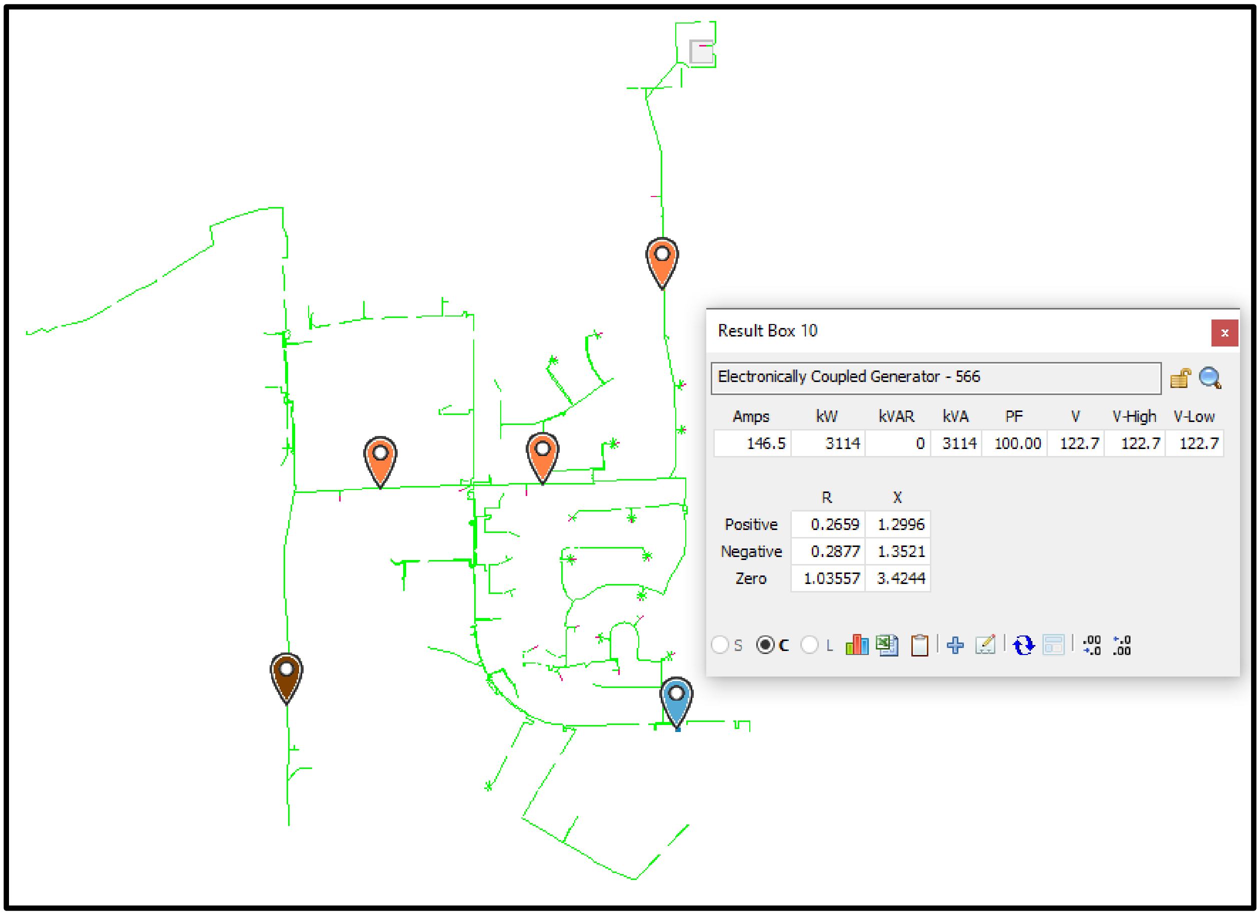


Figure 24: Load Flow Results at Generation Site (Volt-VAR and Volt-WATT Activated)

Based on the load flow study, there will be ~ 147 Amps through a 40Amp line fuse. The fuse will need to be replaced with a line recloser.

2.5.3 Mitigations and Costs

Distribution Upgrades	Unit Cost
Replace Fuse 8251 with a line recloser	$85,000

2.6 Circuit ID: 163301105 (Thermal)

2.6.1 Relevant Initial Review Screens

Screen F (Is the Short-Circuit Current Contribution Ratio within acceptable limits?): When measured at primary side (high-side) of the Dedicated Distribution Transformer serving a Generating Facility, the sum of the Short-Circuit Contribution Ratios of all Generating Facilities connected to Distribution Provider's Distribution System circuit that serves the Generating Facility must be less than or equal to 0.1.

Therefore, three-phase fault contribution of all generation on the circuit nearest the proposed point of connection is less than the required 0.1 criteria.
PASS Screen F

Screen F1 (Is the per unit Short Circuit Contribution under allowable levels?): Is the short circuit current contribution less than or equal to 1.2 per unit or is the Generating Facility Gross Nameplate Rating multiplied by its per unit contribution less than the Protection Integrated Capacity Analysis (ICA) Value multiplied by 1.2 per unit?

Short circuit current contribution assumed to not exceed 1.2 per unit.
PASS Screen F1

Screen G (Is the Short-Circuit Interrupting Capability Exceeded?): Does the proposed Generating Facility, in aggregate with other generation on the Distribution circuit, cause any Distribution protective devices and equipment (including, but not limited to, substation breakers, fuse cutouts, and line reclosers), or Interconnection Request equipment on the system to exceed 87.5% of the short circuit interrupting capability; or is the Interconnection proposed for a circuit that already exceeds 87.5% of the short circuit interrupting capability?

The combined fault duty from proposed Generating Facility and PG&E Distribution system will not exceed 87.5% of any equipment short-circuit interrupting capability on the 163301105 circuit.
PASS Screen G

Screen J (Is the Generating Facility ≤ 30kVA?): The Generating Facility will have a minimal impact on fault current levels and any potential line over-voltages from loss of Distribution Provider's Distribution System neutral grounding if it is ≤ 30kVA.

The proposed project is greater than 30 kVA.
FAIL Screen J

Screen M (Is proposed generation ≤ ICA Hosting Capacity:
Is the proposed Generating Facility nameplate rating ≤ 0.9 * minimum ICA-SG 576 profile and nameplate rating ≤ 0.9 * minimum ICA-OF 576 profile?

The Generating Facility nameplate rating of 9000 kW is greater than 90% of the ICA-SG 576 and ICA-OF 576 profiles. ICA SG in 2023 = 1630kW.
FAIL Screen M

This project would fail initial review and require further study in supplemental review/system impact study.

2.6.2 Load flow analysis

This additional study assumes a 1,935kW is added at line SectionID 4505362. A load flow analysis was then performed to determine distribution system impacts and identify any mitigations.

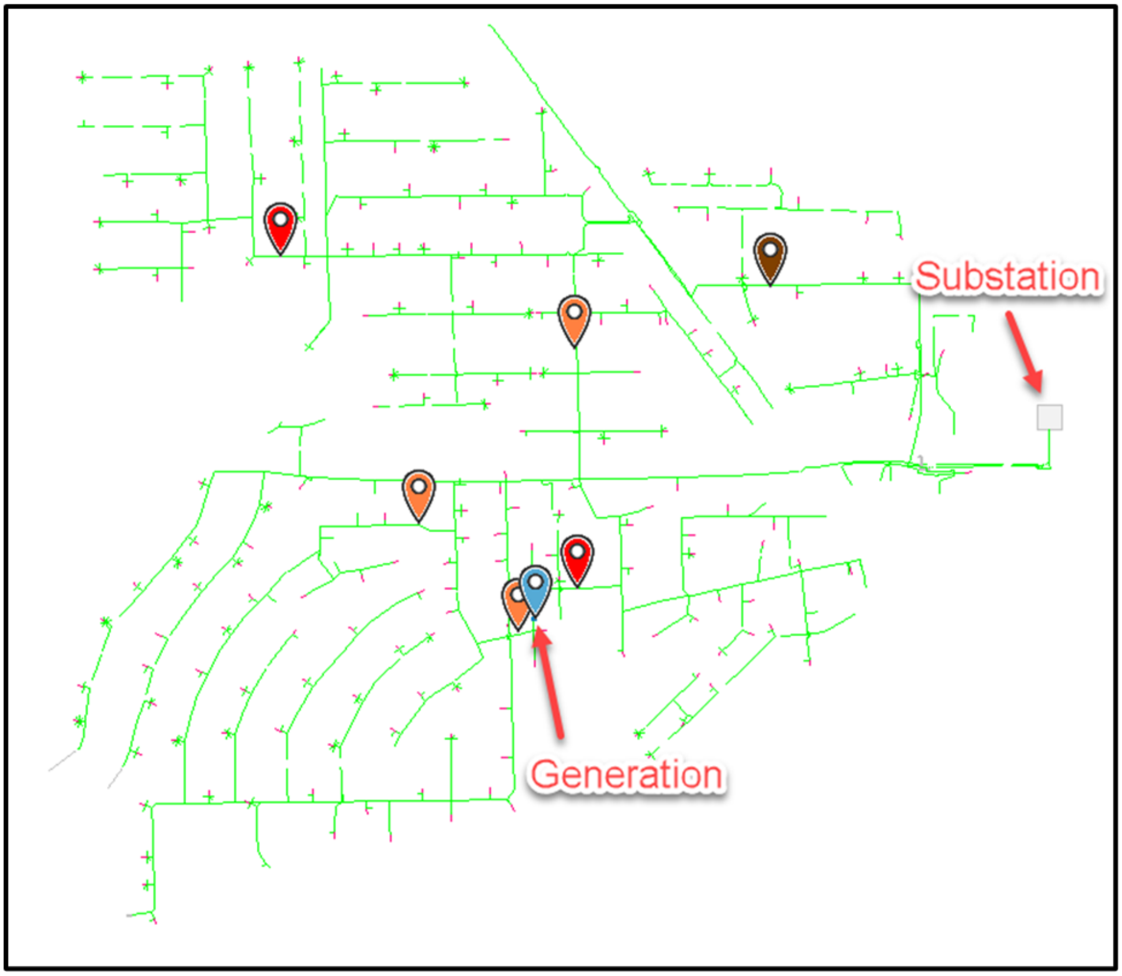


Figure 25: Feeder 163301105

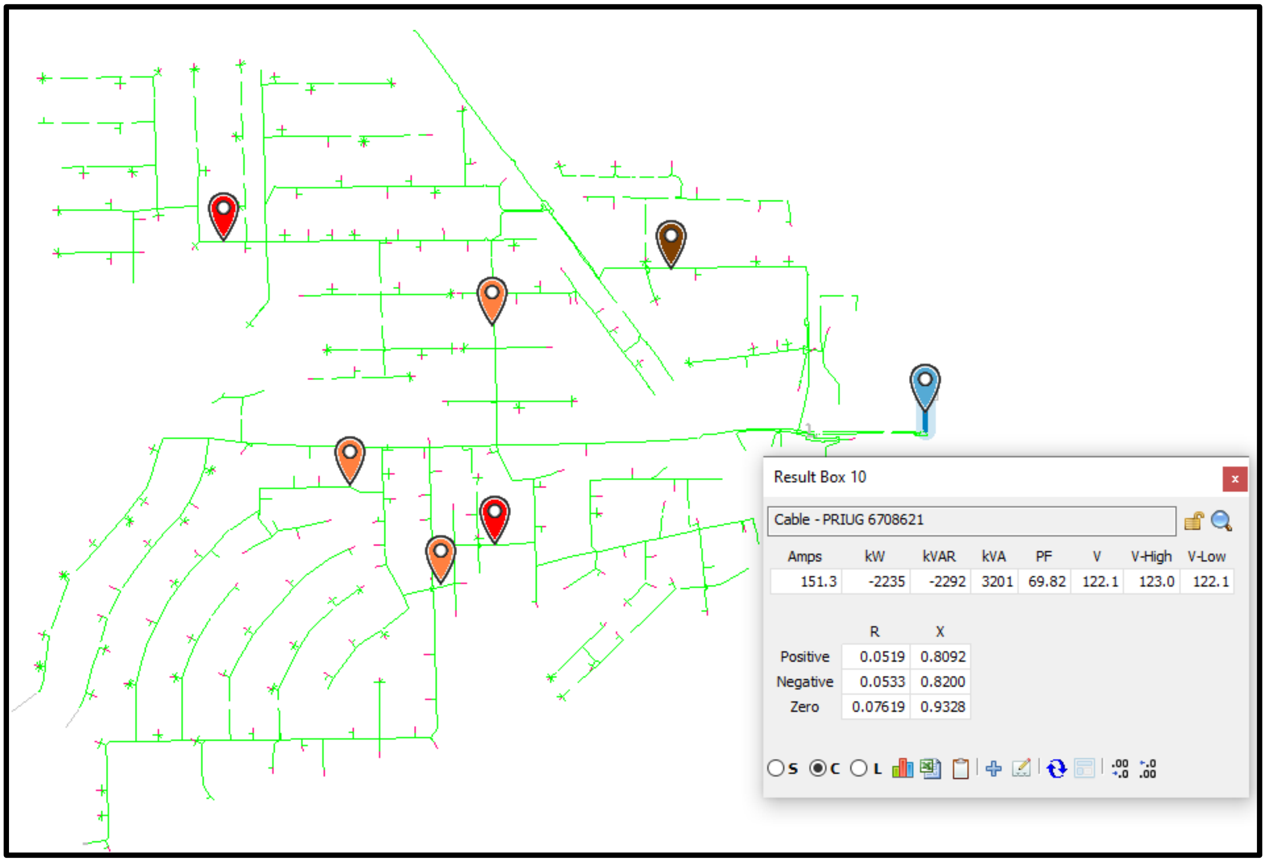


Figure 26: Load Flow Results at the Substation (Volt-VAR and Volt-WATT not activated)

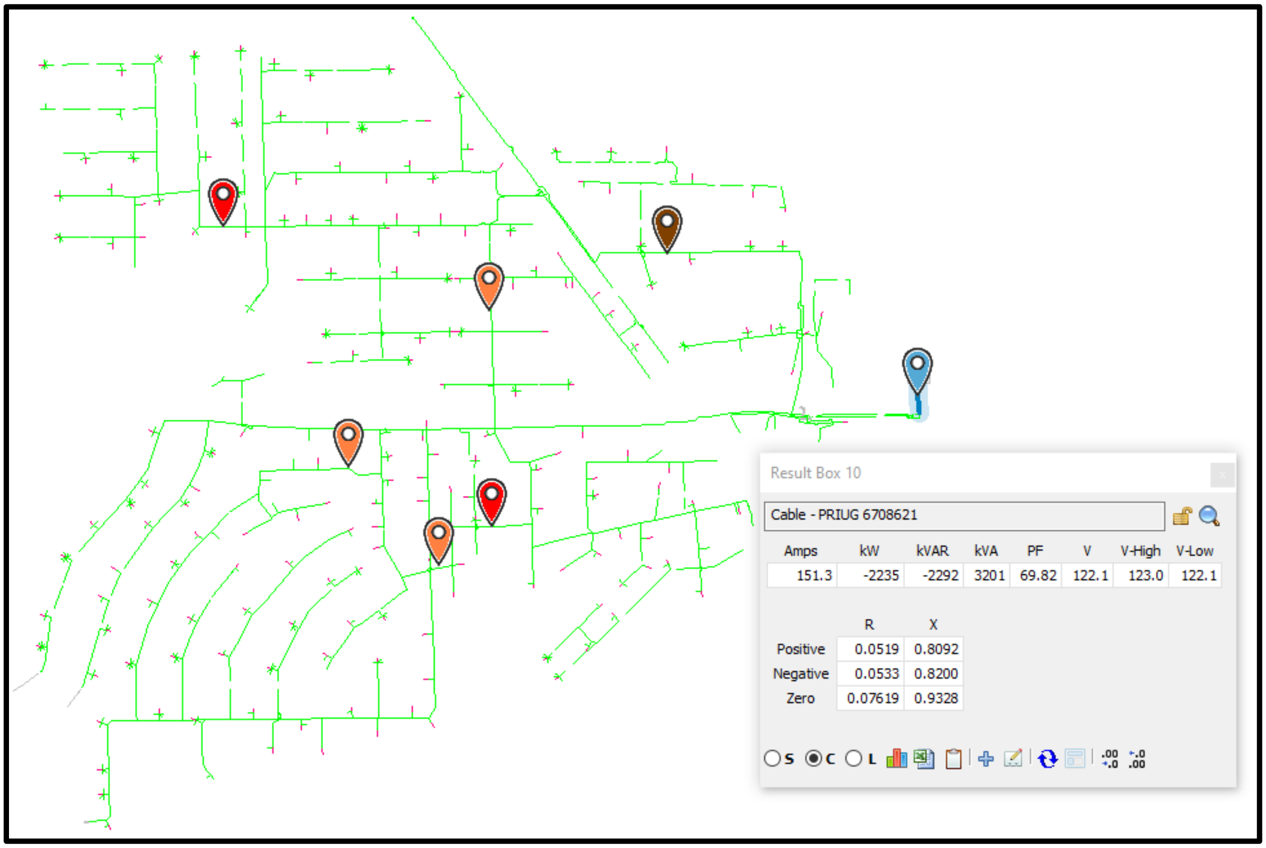


Figure 27: Load Flow Results at Substation (Volt-VAR and Volt-WATT Activated)

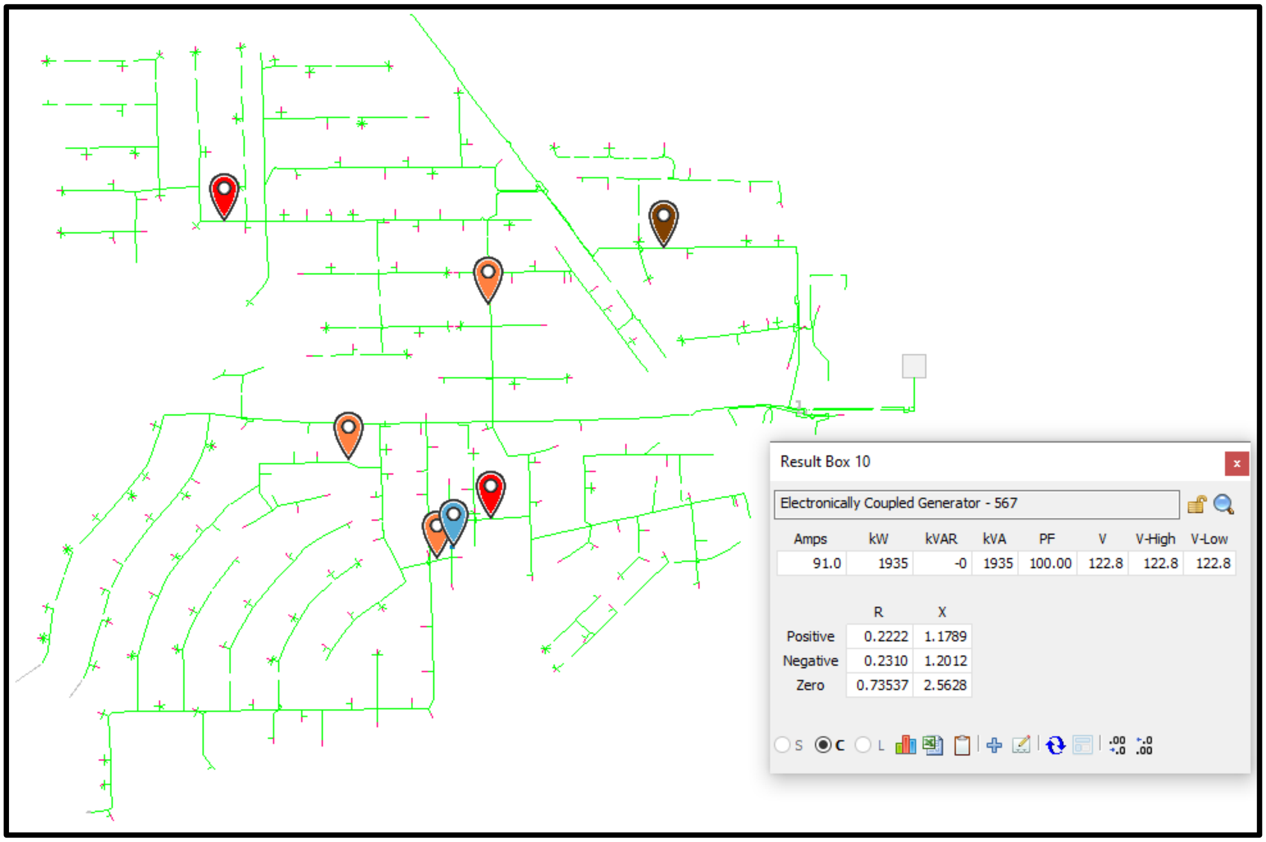


Figure 28: Load Flow Results at the Generation Site (Volt-VAR and Volt-WATT not activated)

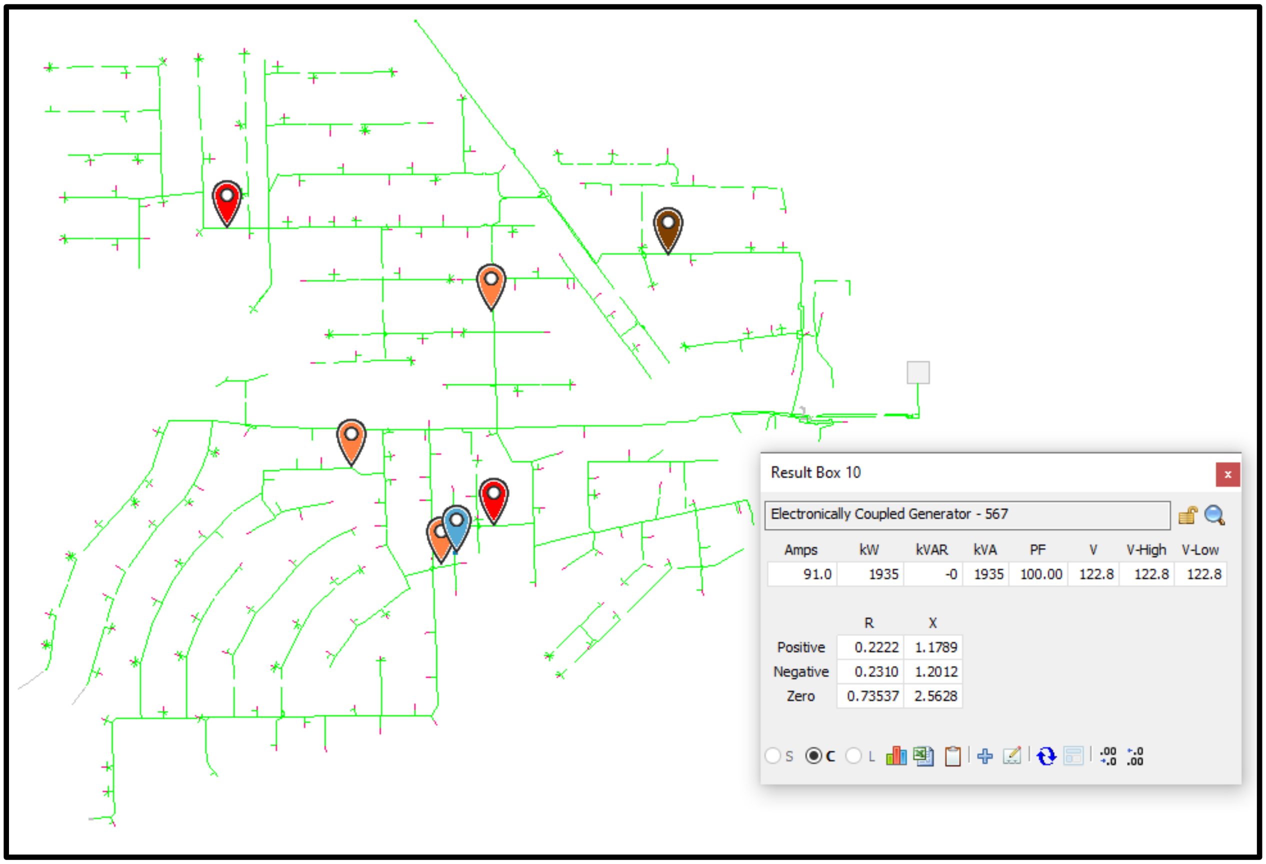


Figure 29: Load Flow Results at Generation Site (Volt-VAR and Volt-WATT Activated)

Based on the load flow study, there will be ~ 106 Amps through a line section that is rated at 100Amps. 147 ft of distribution line will have to be reconductored.

2.6.3 Mitigations and Costs

Distribution Upgrades	Unit Cost
Reconductor 147 ft of distribution line	$28,320.00

2.7 Comments on Implementation Effort

Section II.5. of the Data Request asks the following: *"Please comment on the IOU's assessment of the implementation effort required, benefits, and risks relating to allowing LGP customers to customize their LGP within limits, such as proposed by IREC in their Block Schedule analysis in Workshop 4."*

PG&E's Response:

Consistent with LGP Workshop discussions and Advice Letter 6929-E, PG&E recommends a single, uniform LGP configuration be implemented at this time. The 12 offers lower exposure to risk while still resulting in considerable energy export over the course of the LGP.

There are an enormous number of possible LGPs under IREC's proposal, almost none of which have been assessed at a system-wide level. Absent analysis, at least as rigorous as PG&E's, each

24 unique value profiles would constitute “unquantified” risk. IREC did perform some limited analysis for one possible free style 24 block profile, but it should be noted that it is not feasible to statistically evaluate all 24 hour blocked profiles that would be possible under IREC’s proposal.

Even the 12 unique value LGP profile proposed by the Joint Utilities results in some level of increased risk compared to building the distribution upgrades that will allow an interconnecting generator to export up to its nameplate rating. Hence, the Joint Utilities’ phased approach for considering expanded LGP flexibility, which allows learning based on 12 unique values, is reasonable and prudent. Also, Implementation efforts and Engineering review of customer submitted LGP values for a single, consistent LGP configuration are simpler and with less potential errors than allowing a range of variable LGP configurations.

Appendix L: IREC Slides from Workshop November 29, 2022

LGP Risk Management Options

IREC

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What is the Long Term Reduction Risk?

- In the previous workshop the utilities identified two categories of reductions: temporary and long term.
- The long term risks included:
  - load reductions (from either customers changing or install of non-export systems)
  - Permanent grid modification
  - Future expansion of the grid
- In IREC's view, neither of the latter two conditions appear to be uniquely aggravated by a limited generation profile.
- Risk of long term reduction is the primary sticking point.

IREC

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What is the Long Term Reduction Risk?

- IOUs presented that reductions in load profiles are the "most impactful grid condition" and could result in reductions to the minimum ICA-SG
- The risks (either from exceeding voltage, voltage flicker or thermal limits) could result in the need for either minor or major grid upgrades
- *No data has been provided to characterize the likelihood this would occur OR the potential costs that could be incurred if it did arise. However, the IOUs have indicated they expect it to be "unlikely."*
- Applicants have little, if any, ability to know whether the conditions requiring an upgrade could be triggered prior to applying because the conditions are entirely dependent on the actions of other customers.

IREC

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What is the Long Term Reduction Risk?

- If the conditions arose where a minor upgrade was required, the IOUs have indicated they (aka the ratepayers) may be willing to absorb the costs of mitigating that risk.
- If major upgrades are required, however, the IOUs position is that the LGP customer would have to absorb the risk, either by curtailing down to the minimum ICA-SG for some unspecified period (potentially permanently) or paying the upgrade costs (which are unknowable in advance).
- Under this scenario, the LGP customer's risk is only limited by what the minimum ICA-SG is. It seems unlikely, based upon current economics, that a customer will choose to build an LGP project where there is potential for 100% of the value to be eliminated.

IREC

4

5

Cost Cap

- Pros
  - This would enable a project to more clearly evaluate the risk
  - Would effectively be a cost share between customers and ratepayers, with the customers being first responsible for costs, but ratepayers bearing the risk for any overage
- Cons
  - Would be difficult to decide on a cap amount that would work for a range of project types and ICA capacity differentials
  - Lacking data to inform total ratepayer risk under this scenario
- Current IREC conclusion: arriving at a rational cap for both customers and ratepayers is not likely with the data available (if ever).

IREC

5

6

NEW: Limit LGP to lower risk feeders for initial "test" period

- It may be possible to identify feeders where the risk of reductions in load triggering a voltage, flicker or thermal upgrade are more likely (even if unlikely overall).
- For example, where a feeder has a significant amount of load from one customer, the risks might be higher. Would like to discuss if this or other criteria could be used to identify the feeders where there is a greater risk of load reductions that would necessitate an upgrade.
- The IOUs have already identified feeders that meet a significance threshold established by the 15/15 rule and that could be a starting point for a test period.

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6

[redacted]

NEW: Limit LGP to lower risk feeders for initial "test" period

7

- Concept:
  - For initial "test" period, exclude LGP from highest risk feeders
  - Do robust data collection during test period (see next slides)
  - Ratepayers would bear risk of upgrades during test period, but would have higher confidence of reduced risks.
- Challenges:
  - Not really related to the unique, theoretical, LGP risks
  - Need to determine high risk feeders with limited data

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7

Data Needs to Inform Present Decision

8

- Historic load reductions by feeder?
  - Is there a way to target this to identify feeders where load reductions occurred not from exporting (i.e. NEM) DERs?
- Better data on what the potential upgrade costs could be should they arise?
- Data on forecasted load growth and how it is expected to vary by feeder
- Other?

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8

Data Needs to Evaluate Test Period

9

- Detail data on overall load fluctuations across system
- Detailed data on system conditions on feeders after LGP systems are installed
- Data on forecasted load growth
- If a safety or reliability issue emerges on *any* feeder, detailed data on cause and mitigations taken
- Other?

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9

Examining Actual ICA Load Curves

10

- IREC is using 2021 ICA data to example sample ICA (aka LGP) curves on both a 24 hour and 12 month basis across each IOU's system
- IREC hopes to be able to share and discuss the data at the next workshop or sooner to inform discussions about the granularity of the profiles.

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10