

Limited Generation Profile Workshop Resolution E-5211

November 29th, 2022

Energy for What's Ahead[®]



Agenda

- General overview of core elements for OPs 15/16 and Resolution 5211
- Overview of issues not in scope for Resolution 5211 (Resolution 5230/R.17-07-007 Phase II)
- Follow up from previous workshops
 - Topics with General Agreement*
 - Non – Consensus Topics (based on Nov 17th Call with Stakeholders)
 - Topics that warrant further discussions
 - Topics proposed by ED
 - Additional topics based on Nov 7th Workshop Recording

* Subject to parties' feedback

General overview of core elements for OPs 15/16 and Resolution 5211

- **Issue 1:** Compliance with OP 16 of the Decision.
- **Issue 2:** Specifics of Whether and How a Reduction to a Customer's Limited Generation Profile (LGP) are Determined.
 - Issue 2A: Specifics of Whether Reductions to a Customer's LGP are Determined to be Necessary
 - Issue 2B: Specifics of How Reduction to a Customer's LGP are Determined
- Understanding of the Large IOUs' current business-as-usual practices on curtailment of export power and how they apply to the LGP-option, including circumstances in which export power may be reduced to below the lowest ICA-SG value identified at time of interconnection;
- Process for curtailment of export power for LGP customers and fairness to non-LGP customers who may have paid for grid upgrades;
- Defining Future Grid Conditions and the effect they may have on LGP customers;
- Defining and evaluating the availability of mitigation options, and how mitigation options differ from upgrade measures;
- Criteria to establish a new LGP and process to implement LGP.
- Curtailment down to zero (Floor Curtailment)

Overview of issues not in scope for Resolution 5211 (Resolution 5230/R.17-07-007 Phase II)

- Format for schedule (Resolution 5230)
- Quarterly reporting (Resolution 5230)
- Export vs Generation Nameplate (Resolution 5230)
- Cost Impact to address minor upgrades (Phase II)

Follow-up from November 7 Workshop

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Topics with General Agreement (not necessarily "consensus")

- Stakeholders agreed that unforeseen significant load reductions from what is modeled in ICA can impact LGP profiles
- Agreement that as Utilities start interconnecting LGP projects and gain experience, Utilities will have better data to assess potential detrimental grid impacts
- LGP profile retroactive reductions will occur from the approved LGP profiles and not from nameplate rating

Non-Consensus Topics

- Reduction in LGP level due to subsequent load reduction
 - CPUC Decision does not grant utilities the authority to charge all distribution customers for the cost of upgrades that would restore a LGP customer's ability to export above minimum ICA-SG level
 - The order specifically indicates "*we adopt the element that the utility may need to reduce generation to ensure safe and reliable service without grid updates*"
 - IOUs view that the Decision does not require that IOU should guarantee the LGP approved profiles
 - Non-IOU stakeholders view that no guarantee of LGP profiles (equivalent to non-LGP) is a non-starter
- Utilities maintain that CPUC Decision adopted one LGP level per month (the same level for all hours of each day during each month):
 - Other stakeholders believe CPUC Decision allows more than one LGP level per month (a different level for every hour of each day during each month: $24 \times 12 = 288$ values of which up to 288 may be different)
- Who holds the risk of cost of upgrades to return LGP to its original approved limits
 - IOUs view that LGP are getting commercial benefit of increased generation export and thus should hold the risk of cost of upgrades (or lower LGP limit)
 - Non-IOU stakeholders view that IOUs and subsequently all Rate payers should hold the risk to support California energy goals

Summary of Workshop Topics

Topic 1: What may be needed for a first iteration of the LGP process, and what data/experience is needed for future iterations to refine the process and meet its goal of taking advantage of available grid capacity.

Topic 2: Address LGP Output and When Reductions occur

Topic 3: Discussion of “how” (process)

Topic 4: LGP Output Reduction Circumstances

Topic 5: Address the format of the schedule to be submitted to allow a 288-hour profile, thus allowing flexibility for more granularity

Topic 6: Quarterly Reporting vs. AMI

Topic 7: Increased Risks with LGP Projects

Topic 8: Export vs. Generation Nameplate

Topic 1: Improvements to LGP based on experience

What may be needed for a first iteration of the LGP process, and what data/experience is needed for future iterations to refine the process and meet its goal of taking advantage of available grid capacity.

- Modify IOU tariffs to in accordance with regulatory authorization for LGP
- Data needed for a “first iteration“ of the LGP process:
 - First iteration with duration of minimum 2 to 3 years to collect data
 - 12 month LGP profile for customers
 - Monitoring capabilities, time granularity of data capture, and compliance process
 - Monitoring will be at the Point of Common Coupling (PCC) with the grid
 - Retain the right given by CPUC to require reduction to the lowest value of profile ICA-SCG if safety and reliability concerns warrant it.
 - Understand impacts these “first iteration” projects have on the system during normal and abnormal operating conditions
- Data/experience needed for future iterations:
 - LGP profile reduction capabilities and triggering events/conditions
 - Whether or not DERs approved for LGP are abiding with their LGP profile.
 - How many times LGP projects are asked to reduce below the approved LGP profile.
 - How quickly can customers implement reductions to their approved LGP

Topic 2: LGP Output Reduction - Element 1

The extent to which the LGP-option allows for performance that avoids triggering upgrades within existing hosting capacity constraints;

As long as LGP exports are at or below minimum ICA-SG level, upgrades are avoided.

Topic 2: LGP Output Reduction - Element 2

if future grid conditions reduce the hosting capacity, the extent to which Large IOUs may need to reduce generation to ensure safety and reliability without grid upgrades;

- Extent of LGP reductions depends on the severity of the system condition
 - Operators will perform initial actions (e.g. voltage/LTC regulator etc.) to mitigate safety or reliability conditions
 - If these tools are not effective, reduction of LGP exports will be assessed and directed subject to the condition that exports may not be reduced below minimum ICA-SG level. Original LGP export level restored when reliability condition is mitigated.
- While the scenarios below are unlikely to occur for LGP projects, these would be scenarios that should be monitored for future discussion as experience in the LGP application is gained
 - When system conditions have changed and LGP export is causing an overvoltage or an overload condition
 - Grid operator observes a potential grid safety issue and determines that LGP export is causing the condition
 - Premature equipment failure investigation determines that LGP export was the cause of the equipment failure
 - Inadvertent equipment malfunction (such as inverters tripping offline)
 - If generation has telemetry, then Distribution Operations Engineer can scrutinize more and based on non-test, actual export, clearance limits and/or loading, Distribution Operations Engineer can approve generation to stay online or direct that it come offline
 - If generation has no telemetry, then most likely Distribution Operations Engineer will direct generation to come offline.
 - Other

Topic 2: LGP Output Reduction - Element 3

The permanence of that reduction of capacity in generation. That is, if another entity takes future action that reduces hosting capacity for those using the LGP-option, the other entity is the one causing the issue and should ultimately be responsible for the cost of curing the lack of hosting capacity. The ability of LGP customers to dial back production to the grid hosting capacity is a convenient and expedient short-term fix, but this expediency alone is not justification for a permanent reduction of export power. As part of the discussions, the Large IOUs shall present on scenarios that trigger analysis using cost causation principle.

- The permanence of LGP reduction not to be below the lowest ICA-SG value could be temporary under Emergency conditions and potentially permanent for future grid conditions
 - Conditions that may arise:
 - Unforeseen significant load reductions (e.g., customer closing plant) creating a new future grid condition.
 - Customers installing large amounts of non-export projects which causes significant reduction of metered load creating a new future grid condition.
 - Permanent grid modification
 - Future expansion of the grid requiring system outages needed to complete large system upgrades could have long lead times (e.g., duct bank re-configuration) and can create a long-term grid condition different from the original grid configuration
- There is no mechanism to hold customers that reduce their load, responsible for the cost of curing the resulting reduction in hosting capability.

Topic 3: The process (the “how”) to reduce a customer’s LGP

- When curtailment are deemed necessary, the IOUs envision utilizing contact information to inform them of a need to change the operating profile.
 - If customer is unable to make those changes, then customer will be required to disconnect from the system until such time that they can make the change.
 - IOUs will require confirmation that the changes have been performed.
- Some examples to consider:
 - IOUs will notify customers in writing as soon as safety and reliability issues result in a need to temporarily adjust LGP (does not include emergency conditions)
 - The temporary LGP changes will not require a new Interconnection Agreement; update to the attachment may be needed
 - It would be customer’s responsibility to engage authorized personnel to implement the LGP changes within customer’s power control system
 - IOUs reserve the rights to request proof of the updated profile
- Implementation Process will be memorialized in the appropriate interconnection agreement.
- Notifications for planned maintenance and system upgrades will the requirements set for in the interconnection agreements (i.e. notification in advance). All other drivers implementation would be required with subsequent information provided to the customer.

Topic 3 Cont'd

IOUs identify the system condition (unacceptable voltage or thermal overload)

Violations that are detected on a planned basis

Violations that are detected near or in real-time

Planned

IOUs perform planning analysis ahead of time, including power flow analysis, to identify anticipated violations and possible remedies

- IOUs evaluate potential no-cost options (such as switching additional load into the circuit)
- When no no-cost options are available, IOUs provide customer, in writing, a reduced LGP export level for each month (schedule).
- IOUs also provide a written description of the cause of the problem and the reason for the export reduction

Near, or in, Real-Time

IOUs will investigate the issue or take immediate action depending on the situation

- Immediate action may include verbal direction to reduce export, or remote customer disconnection in extreme cases or if initial verbal direction not followed
- Further communication on the situation and mitigation plans will be coordinated between IOU and the customer as appropriate

Topic 4: LGP Reduction Circumstances

Scenario 1: Load reduction

- Underlying concern: Future reduction in load that limits available capacity and raises concerns of possible exceedance in distribution system voltage or equipment thermal limits
- Triggering condition: Installation of non-export generation to serve existing load or load reduction (e.g., plant closing)
- Parameters: Would need to reevaluate the level of LGP which reduce underlying concern to an acceptable level and provide customer new LGP schedule based on maximum export from LGP to maintain grid voltage or thermal limits within Rule 2 or equipment rating limits. Reduction would last until mitigation is resolved. The mitigation may be an IOU no-cost solution which may occur quickly (<1 month), or IOU-Low cost solution at the discretion of the utility.

Scenario 2: Emergency condition/Planned outage

- Underlying concern: Emergency grid condition such as Grid reconfiguration as a result of a fault condition or planned outage that creates risk of possible exceedance in distribution system voltage or equipment thermal limits.
- Triggering condition: Grid reconfiguration as a result of a fault condition or planned outage
- Parameters: Customer would need to curtail to zero export until further notified by IOU. Reduction would only last for the duration of the emergency or planned outage (i.e., until IOU provides customer notification that it may resume normal operations)

Topic 5: LGP Schedule

Address the format of the schedule to be submitted to allow a 288-hour profile, thus allowing flexibility for more granularity
Address how this would simplify and streamline a customer's experience as opposed to filling out manually the values in an IOU portal

- IOU's view is that the decision only requires 12 values
 - WG 2/3 Resolving Issue 9 Discussion: "Accordingly, we adopt the Utilities' counter proposal to resolve Issue 9, with the modification to allow the frequency of changes to be monthly versus seasonal, which will take advantage of the Integration Capacity Analysis. Allowing a customer to establish scheduled outputs aligns the Issue 9 proposal with the Integration Capacity Analysis. Further, as described below, allowing a customer to establish monthly scheduled output limits strikes a balance between the proposed schedule and the more conservative seasonal schedule recommended in the counter proposal."
- Customer to download ICA profiles from Utility ICA portals and should determine/calculate their LGP level for each month
- Customer to provide the LGP in the utility portal based on utility portal capabilities

Sample LGP Profile

Month	Limits (MW)
Jan	2.00
Feb	2.00
Mar	2.00
Apr	1.53
May	2.00
Jun	2.00
Jul	2.00
Aug	2.00
Sept	1.79
Oct	1.14
Nov	2.00
Dec	2.00

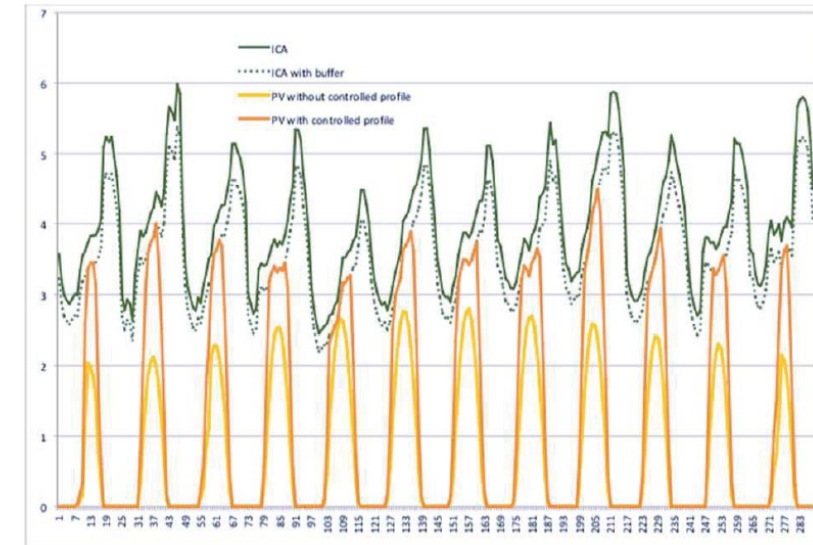
Topic 5: LGP Schedule Cont'd

Risk of allowing more granularity of the LGP schedule

IOUs concerns (Working Group 2)

- ICA vs Operational Values: uncertainty as to whether the ICA-SG, the least conservative metric of the ICA process, is based on a forecast representative of actual grid conditions.
- Going from operating below the annual minimum ICA-SG to monthly ICA-SG decreases the safety margin since the generator will be allowed to operate at the higher level during most months. Increasing the schedule to 288 further decreases the safety margin.
- Lack of experiences and infrastructure to work with generator controls: uncertainty as to whether the Power Control System (PCS) (inverter and Data Acquisition System) will meet expectations and avoid need for a utility system to supervise site controller.
- Lack of infrastructure needed to be able to reduce generation in real-time: recognizing grid operations happen in real-time, whether and how the IOU would know with certainty if/when the generator's output needed to be reduced, whether the IOU could effectively communicate the needed change to the DER, and whether the DER would respond in a timely and accurate manner.
 - Infrastructure such as DERMS (i.e. associated infrastructure) – Allows for more real-time visibility and control of inverters.
- Modeling Challenges: currently, modeling assumes a typical PV output. LGPs add complexity to modeling. Going from 12 limits to 288 limits further complicates the modeling process and how queued generation applications get modelled

Working Group 2: Initial Proposal (more granular)



Topic 6: Quarterly Reporting versus AMI

Comparison of Screen M for non-LGP and LGP Customers

- For LGP projects with nameplate under 1 MW, utilities will utilize AMI data
 - For example, exported energy at PCC recorded with 15-minute time stamps
- For LGP projects with nameplate over 1 MW, telemetry already required per current Rule 21.
- The Joint IOUs would be comfortable with removing the quarterly reporting requirement.

Topic 7: Increased Risks with LGP Projects

Comparison of Screen M¹ for non-LGP and LGP Customers

Process for Non – LGP Customers

- Is the Generating Facility aggregate Gross Nameplate Rating less than or equal to 90% of the lowest value in the ICA-SG 576 Profile?
- Is the Generating Facility aggregate Gross Nameplate Rating less than or equal to 90% of the lowest value in the ICA-OF 576 Profile?

Potential Process for LGP Customers

- Is the LGP number for each month less than or equal to 90% of the lowest monthly ICA – SG value.

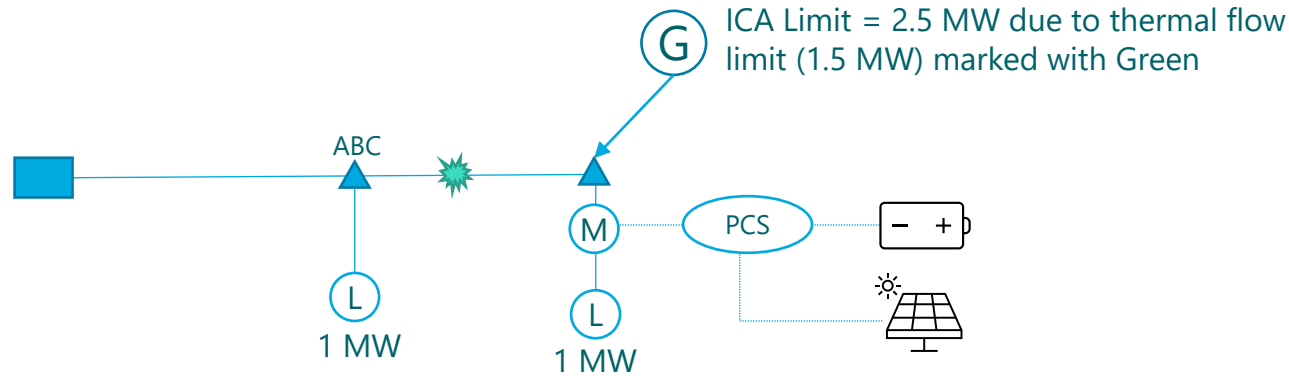
Unique Benefits for LGP Customers (not available to other customers)

- Operating at a higher capacity for 11 months of the year; system violations on the distribution transformer and its load side are more likely
- Operating at a higher capacity than ICA – OF may result in reverse flow on the low side of the bus. Also, reverse flow on voltage regulators and switching devices is not considered. Decreased operating flexibility; more likely to have issues during system reconfiguration.

1. As presented in Joint IOU presentation at Nov 10th SIWG meeting, Screen M, N, O and some aspects of P may be impacted to study LGP projects.

Topic 8: Export vs Generation Nameplate

Issue with LGP customer that already has on-site load that gets double-counted in ICA analysis and its LGP



Issue with LGP Customer that has on-site Load:

- LGP customer submits application with export, measured at the AMI meter, equal to the ICA-SG limit of 2.5 MW (since ICA-SG is calculated assuming 1 MW of load and no existing generation).
- Because PCS monitors on-site load, PCS allows generator to produce **3.5 MW (measured at inverter terminal)**.
- Due to increased flow (2.5 MW) on the circuit, the thermal constraint would be triggered.

Proposed Solution: Re-run the ICA values with a 1 MW load reduction. This will provide an updated ICA value (which is less than 2.5 MW).

Questions?

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