

Smart Inverter Working Group

February 16, 2023

1:00 p.m. – 2:30 p.m.

Topic E: Implementation of Limited Generation Profiles Using Current Smart Inverter Functions

Energy for What's Ahead®



Background (Compliance Requirements)

D-20-09-035 OP 15, 51

- Requires the use of Limited Generation Profile (LGP) for exporting generators
- Different options of implementing the LGP are being considered
 - Use of a PCS with integrated scheduling capabilities
 - Standards are currently being developed (ETA for completion Q2, 2023). Not currently available
 - Use of CSIP Certified Gateway and Server [using Function 3(PLimit) and Function 8(Scheduling)]
 - Industry discussion determine possibilities of using this method. The discussion in subsequent slides summarizes the discussion
 - Options for compliance may be
 - Directly as generation output control
 - With use of a single point control for PCC control

Resolution E-5320

- Given the record for Issue 9, the Large IOUs are obligated to explore how to implement the LGP-option before standards are approved and establish a mechanism for validating proposed profiles.
- The Large IOUs shall determine which functional elements are already present in commercially available inverters, and which are not, to establish LGP functionality prior to the approval of standards. More specificity on how functions 3 and 8 will interact at this time

From Workshop 1 (February 1, 2023)

- The IOUs were directed to engaged industry subject matter experts to further explore elements already available to establish LGP functionality prior to the development of PCS standards

***IOU Note:* The slides below depict best understating on current equipment capabilities. Additional requirements may be necessary based on further understanding of the available technology**

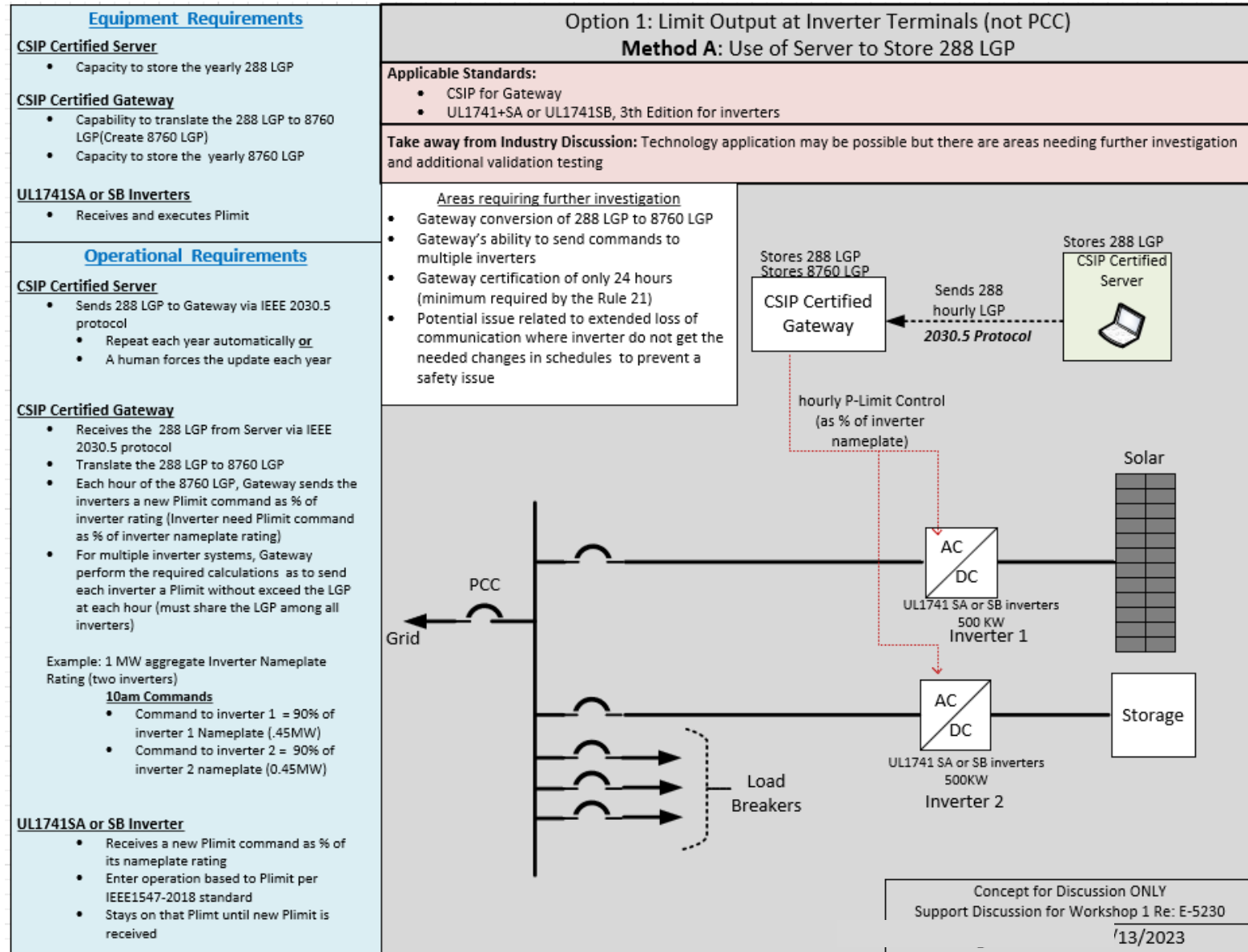
***Thanks:* IOU thanks industry member for their valuable input. Special thanks for Prasanth Gopalakrishnan, Brian Lydic, and John Berdner**

Summary of possible options to accomplish LGP with currently available products

Takeaway from discussion with various industry members

Operational Option #	LGP Method Type	Output Measurement Point	288 LGP Storage	8760 LGP Storage	288LGP to 8760LGP Translation/Creation	Applicable Standards	Industry Discussion Takeaway
1	Method A: Server stores 288 LGP and sends Gateway the 288 LGP automatically (or manually) on a yearly basis	Inverter Terminals	Server (Source) Gateway (From Source)	Gateway	Gateway	1) CSIP for Gateway 2) UL1741+SA or UL1741SB, 3th Edition for inverters	Technology application may be possible but there are areas needing further investigation and additional validation testing may be necessary
1	Method B: Server stores 8760 LGP and sends Gateway the 8760 LGP automatically (or manually) on a yearly basis	Inverter Terminals	Server	Server (Source) Gateway (From Source)	Server	1) CSIP for Gateway 2) UL1741+SA or UL1741SB, 3th Edition for inverters	Technology application may be possible but there are areas needing further investigation and additional validation testing may be necessary
1	Method C: Server stores 8760 LGP and sends Gateway the Plimit each hour of the 8760 LGP. Repeats each year unless a new 8760 LGP is uploaded	Inverter Terminals	Server	Server	Server	1) CSIP for Gateway 2) UL1741+SA or UL1741SB, 3th Edition for inverters	Technology application may be possible but there are areas needing further investigation and additional validation testing may be necessary
2	Method D: Server stores 288 LGP and sends Gateway the 288 LGP automatically (or manually) on a yearly basis	PCC	Server (Source) Gateway (From Source)	Gateway	Gateway	1) CSIP for Gateway 2) UL1741+SA or UL1741SB, 3th Edition for inverters 3)UL PCS CRD for UL PCS Device	Technology application may be possible but industry is not actively pursuing making products available. Further testing may be necessary
2	Method E: Server stores 8760 LGP and sends Gateway the Plimit each hour of the 8760. Repeats each year unless a new 8760 LGP is uploaded	PCC	Server	Server	Server	1) CSIP for Gateway 2) UL1741+SA or UL1741SB, 3th Edition for inverters	Technology application may be possible but industry is not actively pursuing making products available. Further testing may be necessary
2	Method F: Server stores 8760 LGP and sends Gateway the 8760 LGP automatically (or manually) on a yearly basis	PCC	Server	Server (Source) Gateway (From Source)	Server	1) CSIP for Gateway 2) UL1741+SA or UL1741SB, 3th Edition for inverters 3)UL PCS CRD for UL PCS Device	Technology application may be possible but industry is not actively pursuing making products available. Further testing may be necessary
3	Method G: Use of UL PCS with integrated schedule	PCC	PCS	PCS	N/A	2) UL1741+SA or UL1741SB, 3th Edition for inverters 3)UL PCS CRD for UL PCS Device	Standards being developed- Anticipated by Q2-2023

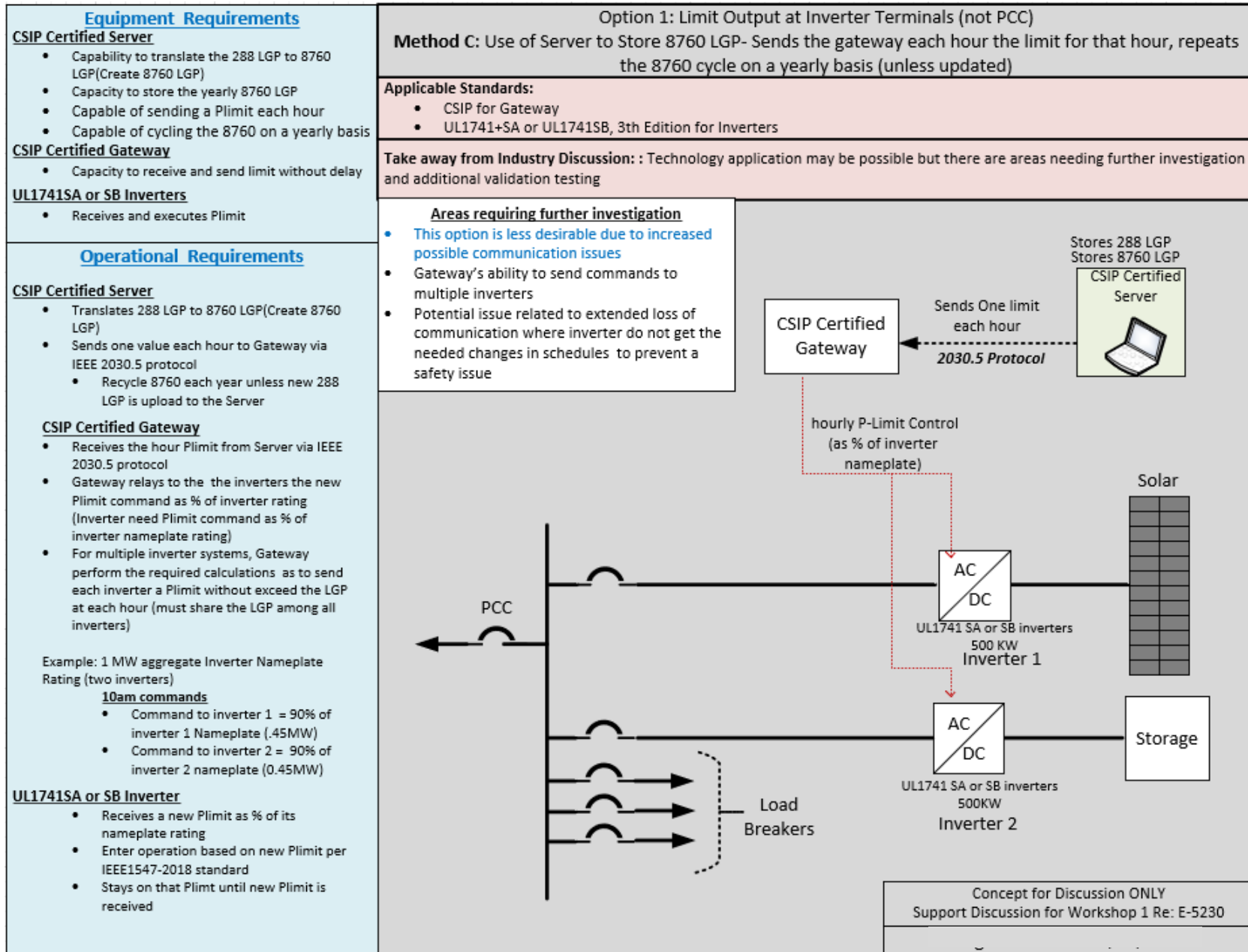
Option 1 – Method A: Limit Output at Inverter Terminals



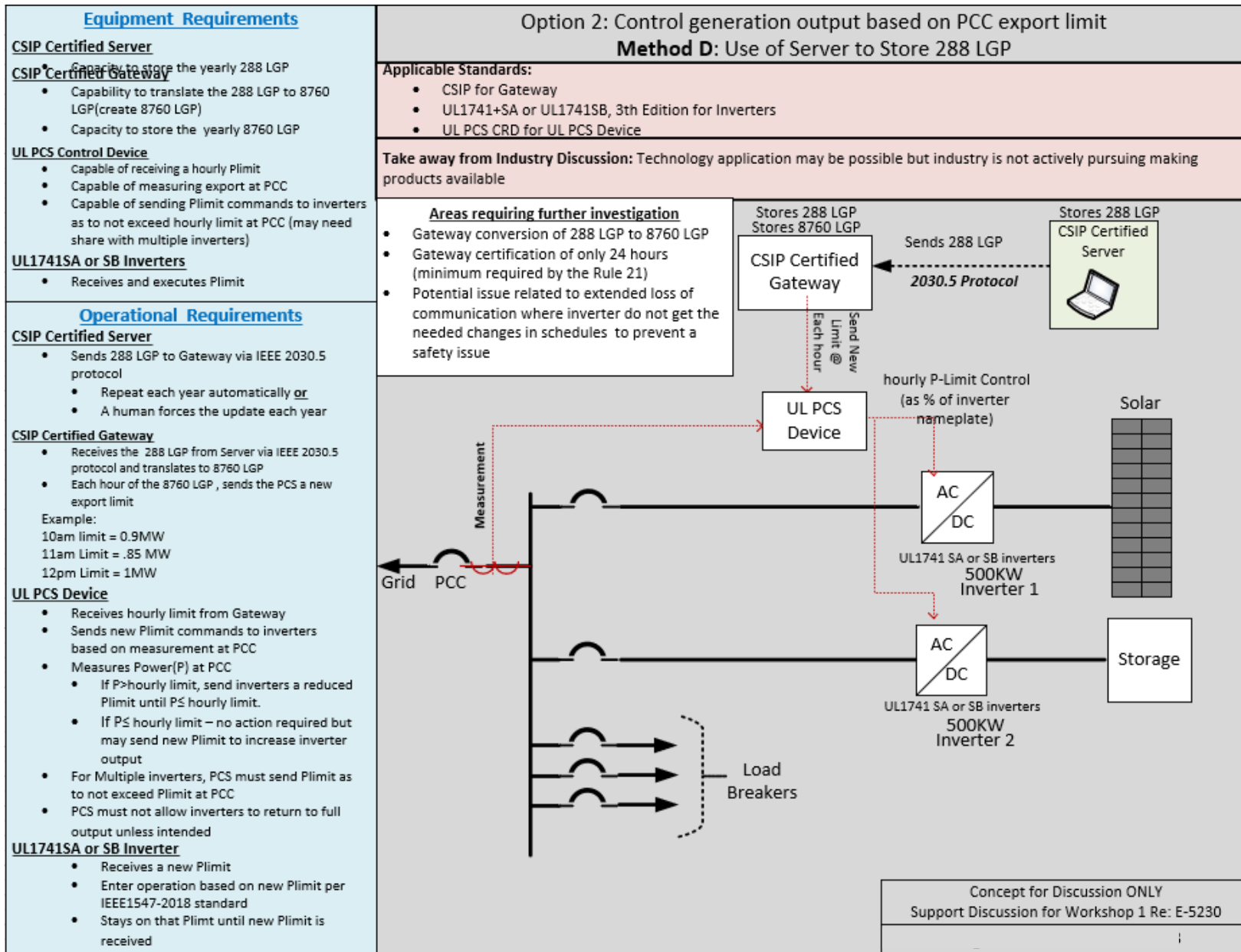
Option 1 – Method B: Limit Output at Inverter Terminals

Option 1: Limit Output at Inverter Terminals (not PCC) Method B: Use of Server to Store 8760 LGP	
<p>Equipment Requirements</p> <p>CIP Certified Server</p> <ul style="list-style-type: none"> Capability to translate the 288 LGP to 8760 LGP (Create 8760 LGP) Capacity to store the yearly 8760 LGP <p>CSIP Certified Gateway</p> <ul style="list-style-type: none"> Capacity to store the yearly 8760 LGP <p>UL1741SA or SB Inverters</p> <ul style="list-style-type: none"> Receives and executes PLimit 	<p>Applicable Standards:</p> <ul style="list-style-type: none"> CSIP for Gateway UL1741+SA or UL1741SB, 3th Edition for Inverters <p>Take away from Industry Discussion: : Technology application may be possible but there are areas needing further investigation and additional validation testing</p>
<p>Operational Requirements</p> <p>CSIP Certified Server</p> <ul style="list-style-type: none"> Translates 288 LGP to 8760 LGP(Create 8760 LGP) Sends 8760 LGP to Gateway via IEEE 2030.5 protocol <ul style="list-style-type: none"> Repeat each year automatically <u>or</u> A human forces the update each year <p>CSIP Certified Gateway</p> <ul style="list-style-type: none"> Receives the 8760 LGP from Server via IEEE 2030.5 protocol Each hour of the 8760 LGP, Gateway sends the inverters a new PLimit command as % of inverter rating (Inverter need PLimit command as % of inverter nameplate rating) For multiple inverter systems, Gateway perform the required calculations as to send each inverter a PLimit without exceed the LGP at each hour (must share the LGP among all inverters) <p>Example: 1 MW aggregate Inverter Nameplate Rating (two inverters)</p> <p>10am commands</p> <ul style="list-style-type: none"> Command to inverter 1 = 90% of inverter 1 Nameplate (.45MW) Command to inverter 2 = 90% of inverter 2 nameplate (0.45MW) <p>UL1741SA or SB Inverter</p> <ul style="list-style-type: none"> Receives a new PLimit as % of its nameplate rating Enter operation based on new PLimit per IEEE1547-2018 standard Stays on that PLimit until new PLimit is received 	<p>Areas requiring further investigation</p> <ul style="list-style-type: none"> Gateway's ability to send commands to multiple inverters Gateway certification of only 24 hours (minimum required by the Rule 21) Potential issue related to extended loss of communication where inverter do not get the needed changes in schedules to prevent a safety issue
<p>Concept for Discussion ONLY Support Discussion for Workshop 1 Re: E-5230</p> <p>13/2023</p>	

Option 1 – Method C: Limit Output at Inverter Terminals



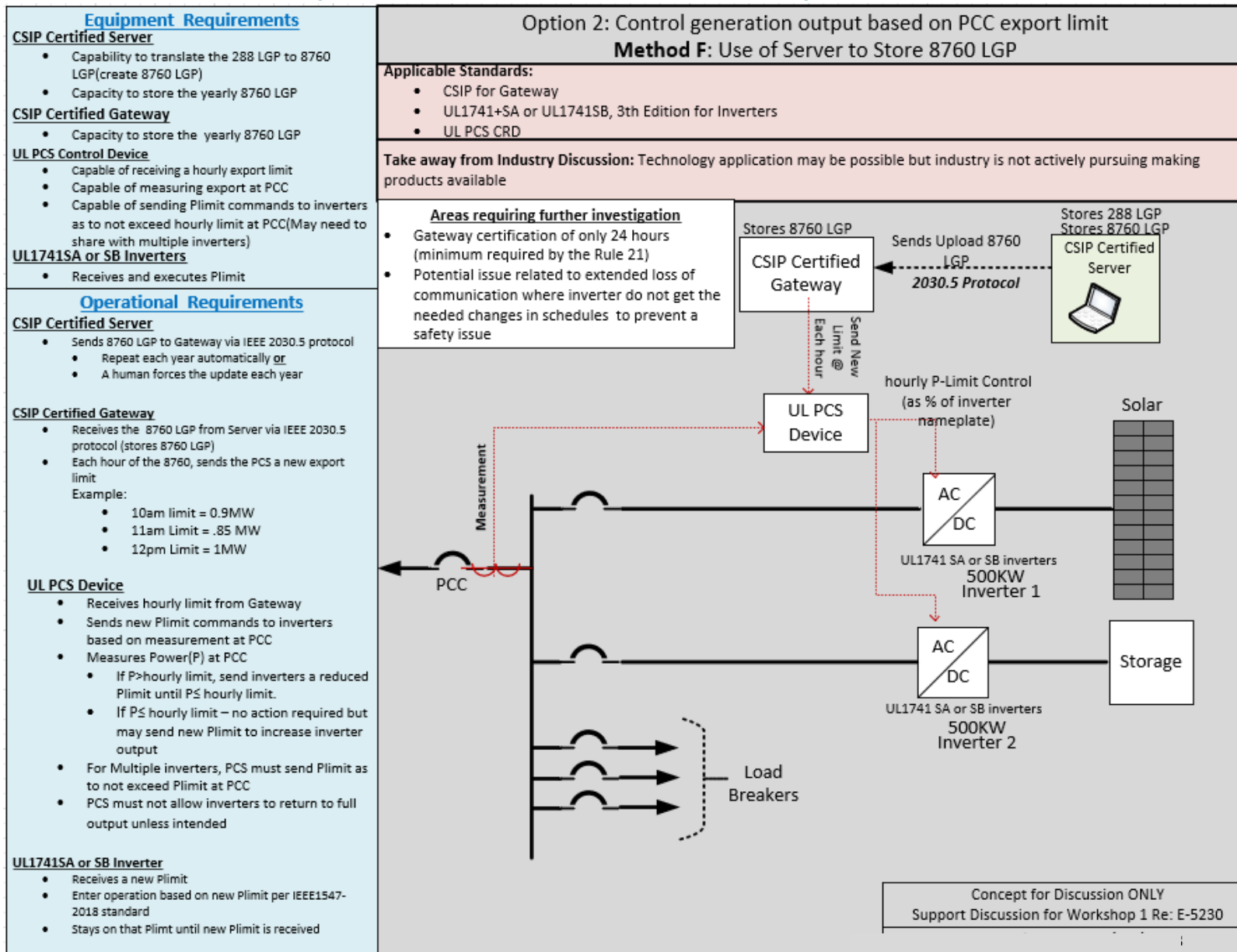
Option 2 – Method D: Limit Output at PCC



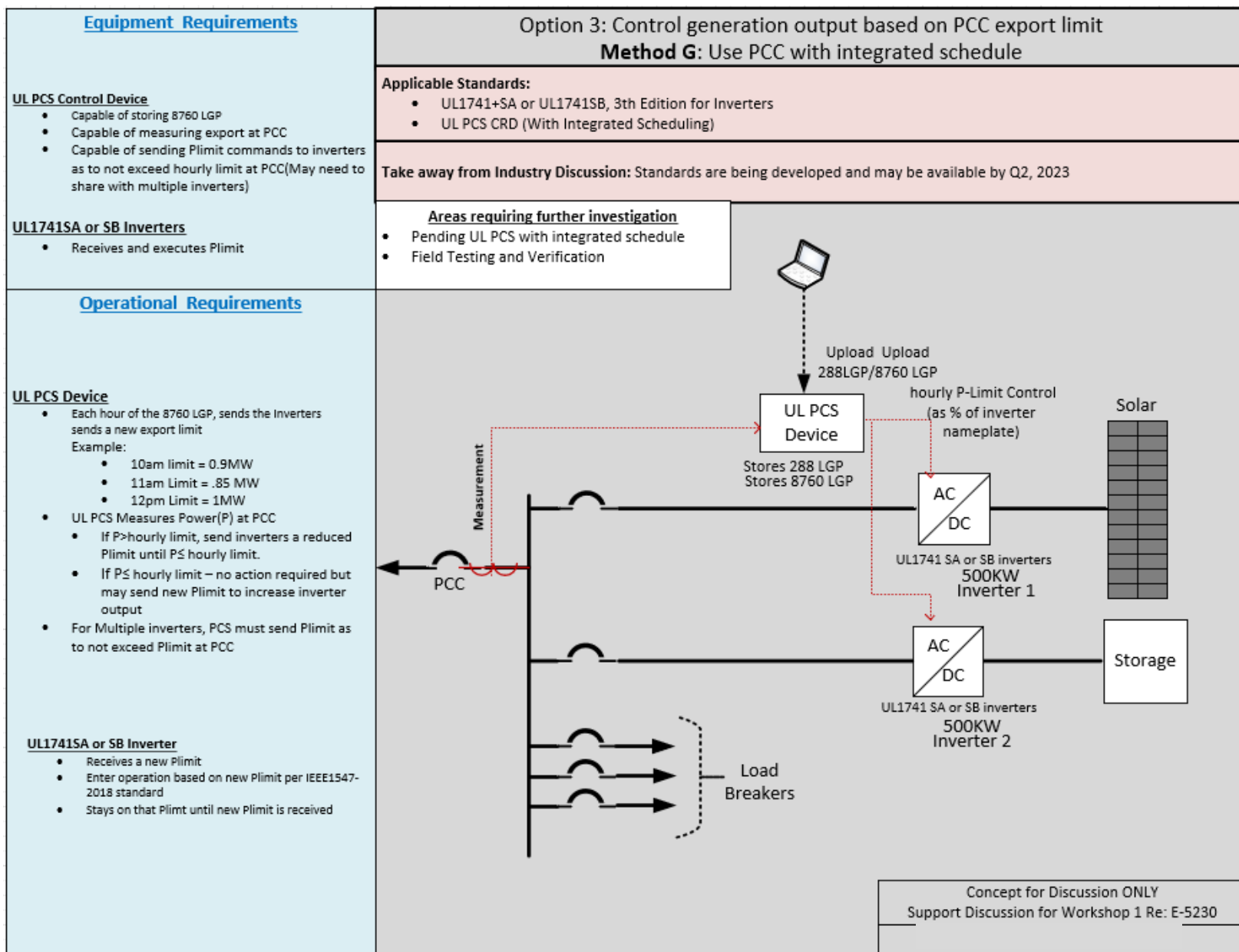
Option 2 – Method E: Limit Output at PCC

<p>Equipment Requirements</p> <p>CSIP Certified Server</p> <ul style="list-style-type: none"> Capacity to store the yearly 288 LGP Capability to translate the 288 LGP to 8760 LGP(create 8760 LGP) Capacity to store the yearly 8760 LGP <p>CSIP Certified Gateway</p> <ul style="list-style-type: none"> Capacity to receive and send limit without delay <p>UL PCS Control Device</p> <ul style="list-style-type: none"> Capable of receiving a hourly Plimit Capable of measuring export at PCC Capable of sending Plimit commands to inverters as to not exceed hourly limit at PCC (may need share with multiple inverters) <p>UL1741SA or SB Inverters</p> <ul style="list-style-type: none"> Receives and executes Plimit 	<p>Option 2: Control generation output based on PCC export limit</p> <p>Method E: Use of Server to Store 8760 LGP- Sends the gateway each hour the limit for that hour, repeats the 8760 cycle on a yearly basis (unless updated)</p>
<p>Operational Requirements</p> <p>CSIP Certified Server</p> <ul style="list-style-type: none"> Sends 288 LGP to Gateway via IEEE 2030.5 protocol <ul style="list-style-type: none"> Repeat each year automatically <u>or</u> A human forces the update each year <p>CSIP Certified Gateway</p> <ul style="list-style-type: none"> Receives the 288 LGP from Server via IEEE 2030.5 protocol and translates to 8760 LGP Each hour of the 8760 LGP , sends the PCS a new export limit <p>Example: 10am limit = 0.9MW 11am Limit = .85 MW 12pm Limit = 1MW</p> <p>UL PCS Device</p> <ul style="list-style-type: none"> Receives hourly limit from Gateway Sends new Plimit commands to inverters based on measurement at PCC Measures Power(P) at PCC <ul style="list-style-type: none"> If $P >$ hourly limit, send inverters a reduced Plimit until $P \leq$ hourly limit. If $P \leq$ hourly limit – no action required but may send new Plimit to increase inverter output For Multiple inverters, PCS must send Plimit as to not exceed Plimit at PCC PCS must not allow inverters to return to full output unless intended <p>UL1741SA or SB Inverter</p> <ul style="list-style-type: none"> Receives a new Plimit Enter operation based on new Plimit per IEEE1547-2018 standard Stays on that Plimit until new Plimit is received 	<p>Applicable Standards:</p> <ul style="list-style-type: none"> CSIP for Gateway UL1741+SA or UL1741SB, 3th Edition for Inverters UL PCS CRD for UL PCS Device <p>Take away from Industry Discussion: Technology application may be possible but industry is not actively pursuing making products available</p>
	<p>Areas requiring further investigation</p> <ul style="list-style-type: none"> This option is less desirable due to increased possible communication issues Potential issue related to extended loss of communication where inverter do not get the needed changes in schedules to prevent a safety issue <p>The diagram illustrates the system architecture. At the top right, a 'CSIP Certified Server' (represented by a laptop icon) stores 288 LGP and 8760 LGP. It sends a limit to a 'CSIP Certified Gateway' every hour using the 2030.5 Protocol. The Gateway then sends a 'New Limit @ Each hour' to the 'UL PCS Device'. The UL PCS Device performs 'hourly P-Limit Control (as % of inverter nameplate)' and sends commands to two 'UL1741 SA or SB Inverters' (500KW Inverter 1 and 500KW Inverter 2). Inverter 1 is connected to 'Solar' and Inverter 2 is connected to 'Storage'. Both inverters are connected to a common bus that leads to 'Load Breakers' and the 'Grid PCC'. A 'Measurement' point is shown at the Grid PCC. A dashed red line indicates the measurement point for the UL PCS Device. A box at the bottom right states: 'Concept for Discussion ONLY Support Discussion for Workshop 1 Re: E-5230'.</p>

Option 2 – Method E: Limit Output at PCC



Option 3 – Method G: Limit Output at PCC (With PCS)



Implementation of LGP

- Rule 21 needs to be updated to reflect the technical, operational, and contractual requirements of LGP
 - The topics are being discussed in the various workshops:
 - Workshop 1 – February 1, 2023
 - Workshop 2 – February 21, 2023
 - Workshop 3 – March 14, 2023
 - Other workshops as may be necessary
 - IOUs will submit an updated AL for implementing LGP (based on all the workshop discussions)
 - PUC will approve AL and Rule 21 updated
- Implementation of LGP 9 months after the approval of the AL

CPUC Energy Division
 April 19, 2021
 Page 8

	OP 15	OP 51	IREC Proposal
Timing for updates to Rule 21 once certification standards are approved	Update within 60 days	Update within 90 days	Update within 60 days
Implementation timeline once certification standards are approved	No timeline provided	9 months	9 months

OP 15 requires IOUs to modify Rule 21 to use Limited Generation Profiles within “60 days of adoption of a certification scheme for the Limited Generation Profile,” but OP 51 requires the IOUs file a Tier 2 Advice Letter addressing the same Rule 21 modifications within 90 days of the same.¹⁶ To reconcile these different dates for the same requirement, the Energy Division should instruct the IOUs to file a Tier 2 Advice Letter modifying Rule 21 to allow the use of Limited Generation Profiles within 60 days of adoption of a certification scheme for the Limited Generation Profile. No modification to D.20-09-035 would be necessary if the IOUs fully comply with the requirement within 60 days.

Topic C: Overview of Proposals: Including technical requirements, "Monthly" scheduling (See Topic 5), Nameplate capacity (Topic 2); Should include alignment of language (Section D of Res) and incorporate all topics in Resolution

Overarching Framework Discussion For Section C

@ pg. 24/57

"The Large IOUs shall also differentiate between "export power" and "output power" and make clear that the LGP option is intended to manage the amount of export power to the electric grid and not output power that may be consumed on-site."

- IOUs confirm that the LGP option is intended to manage the amount of export power to the electric grid at the Point of Common Coupling (PCC)
- IOUs also make available the option of applying LGP at the output of the inverters (additional discussion as part of Topic E)

@ 24/57

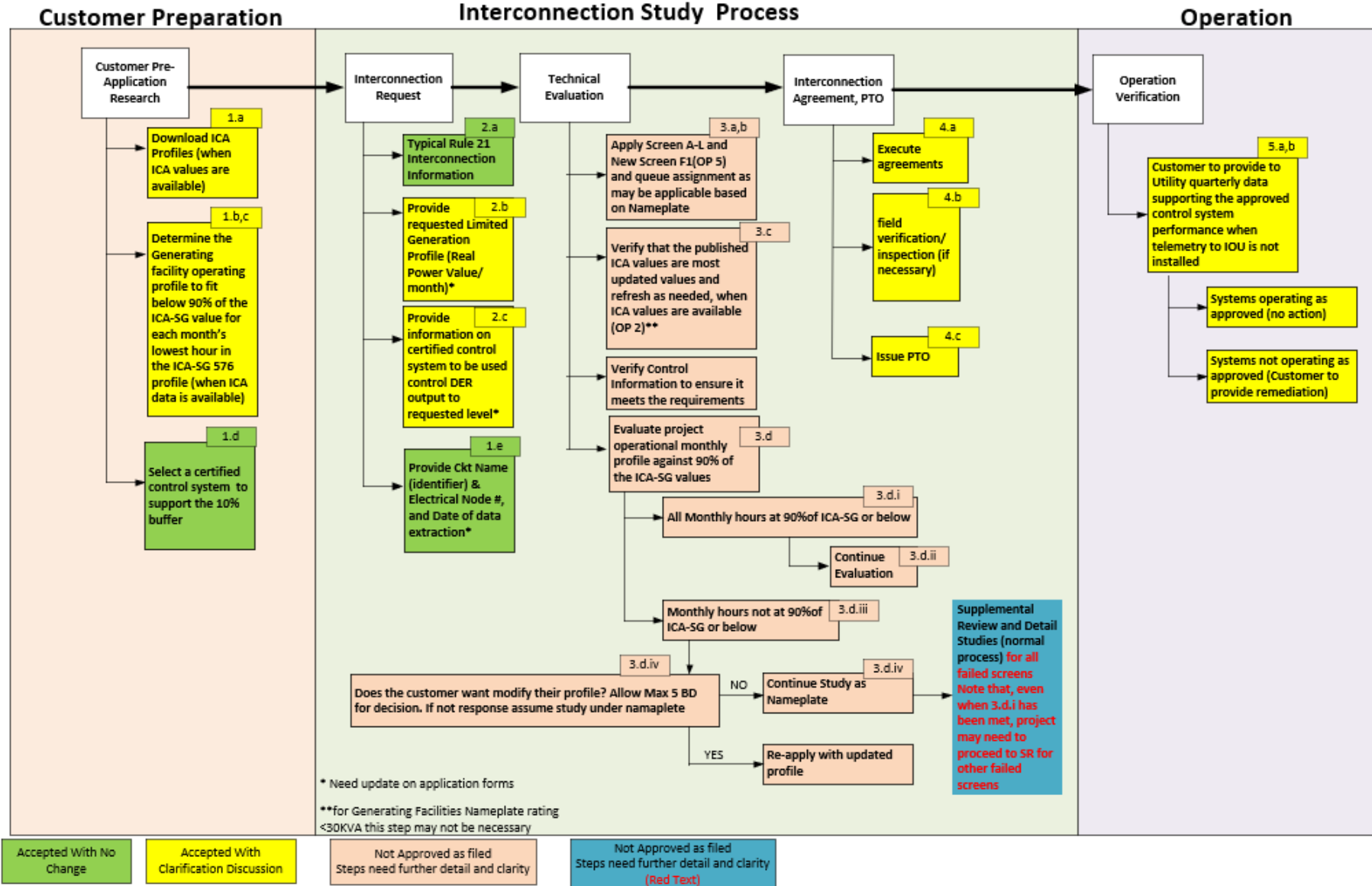
"In consideration of the significant time that has passed since the filing of the ALs, the Large IOUs **shall discuss any updates to the proposals that their subsequent experiences indicate may be warranted.**"

- While significant time has passed since filing of the AL, joint IOUs have not yet utilized any version of LGP and thus IOU experience is limited to the use of UL Certified PCS for a single value
- IOUs are currently working with industry to gain more knowledge on the technology capable and necessary to support LGP

"The Large IOUs are **directed to go over the proposal to address any questions stakeholders may have and determine whether each step is appropriate and complete**"

- The framework as outlined in Appendix A (Depicted by Figure 1) remains appropriate with the clarification to be provided via this workshop for several elements of the proposals
- IOUs will review in detail each of the steps in the framework. The review and discussion will include:
 - Any direction for clarification or discussion as specified directly in the Resolution
 - Steps for which the Resolution did not require specific requirements for clarification or discussion

Original Overarching Framework Discussion For Section C Background



- Decision D.20-09-035 OP 15 required that IOUs to discuss with SIWG the implementation of LGP per IOUs counter outlined Rulemaking 17-07-007 Working Group Two Final Report
- IOUs presented and discussed the implementation framework on the January 21, 2021, and February 18, 2021 SIWG meetings
- Figure 1 is the outcome of the February 18 SIWG meeting and source for IOUs Tier 3 ALs modified to reflect direction from Resolution E5230
- In the subsequent slides, IOUs will further discuss steps which:
 - Have been accepted with no changes
 - Have been identified in the Resolution as needing additional clarification or discussion

Figure 1 – Original LGP implementation Framework updated to reflect direction from Resolution E-5230

Detailed Discussion of Section C (LGP Framework)

Phase 1. Customer Preparation Phase:

1.a

Download ICA Profiles (when ICA values are available)

The discussion below clarifies what is meant by the term 'three-phase electrical nodes,' applicability of a three-phase electrical node and the meaning of "monthly"

Step	Resolution Question	IOU Response
1.a	1)The Large IOUs refer to "three-phase electrical node." For transparency, and for those not familiar with the ICA, the Large IOUs shall clarify the use of three-phase electrical nodes and any planned changes to the ICA that may expand the ICA to single phase nodes.	<ul style="list-style-type: none"> Consistent with D.17-09-026, the IOUs currently perform ICA and publish ICA results where the distribution system is composed of three phase conductors. There are no planned changes to expand ICA to single-phase nodes. In the IOUs ICA maps, line segments inherit the ICA results of the associated three-phase electrical node. Customers would identify the ICA line segment near their proposed site and review the ICA results for that line segment Three phase electrical nodes are electrical points in the grid used for connecting three phase electrical services (for load or generation). These would be commercial, industrial, and large generating facilities (typically >50KVA). Residential services are mostly connected at single phase nodes
1.b	2)the Large IOUs shall clarify the term "monthly" and specify the schedule upon which a LGP profile must be updated.	The IOUs clarified the use of the term "monthly" in LGP Workshop 1, which is defined as a profile containing 24 values per month (where all hourly values for a given month are the same) for each of the 12 months, totaling 288 data points. See slide titled "Required Format for LGP." See Joint Advice 4941-E, for explanation of how the IOUs propose to address LGP profile updates.

Detailed Discussion of Section C (LGP Framework)

Phase 1. Customer Preparation Phase:

1.b,c

Determine the Generating facility operating profile to fit below 90% of the ICA-SG value for each month's lowest hour in the ICA-SG 576 profile (when ICA data is available)

- Download the ICA hourly profile
- Examine and conform the downloaded data to inform the minimum LGP monthly values
- Ensure each hour of the LGP is at or below 90% of the ICA-SG Value for that hour
- Provide IOU the proposed LGP using agreed on template via IOU interconnection process

1.d

Select a certified control system to support the 10% buffer

- Customer to select a certified control system to support the LGP
- IOUs are currently investigating with Industry members the availability of technology to support LGP.
 - UL PCS with scheduling functionality is not yet available, standards are currently being developed and potentially ready for use by Q2, 2023
 - A combination of CSIP certified gateway and server may be available but requires further investigation

Customers shall capture the name of the Distribution Feeder (circuit) name, the three-phase electrical node identifier (PG&E: CSV Line Section) (SCE and SDG&E: Node ID), and the date of when the data extraction took place. This information will be needed when the customer submits the Interconnection Request.

Detailed Discussion of Section C (LGP Framework) - Continue

Phase 2. Interconnection Request Phase:

Typical Rule 21 Interconnection Information

2.a

Provide requested Limited Generation Profile (Real Power Value/month)*

2.b

Provide information on certified control system to be used control DER output to requested level*

2.c

Discussion below covers interconnection tools, common LGP format, and alternative method for applicable IOUs

Step	Resolution Question	IOU Response
2.b	1a) The Large IOUs use the terminology "Limited Generation Values." We ask the Large IOUs, for consistency and clarity, to use the term "Limited Generation Profile values" or other agreed upon term.	The IOUs agree to make the terminology change to "Limited Generation Profile values"
2.b	1b) The Large IOUs shall clarify if a common scheduling format may be used to supply this information, and if not, the reasons for it	The IOUs agree to use the common scheduling format proposed by the IOUs. An initial proposal for a common scheduling format was presented by the IOUs at LGP Workshop 1 (see slide titled "Required Format for LGP.") Specific terminology may vary across IOUs.
	1b cont.)Additionally, the Large IOUs shall clarify what is meant by "alternative method."	<ul style="list-style-type: none"> By alternative method, SCE clarifies that if SCE's interconnection portals are not capable of accepting (.CSV) files at the time of LGP implementation and thus SCE may need to rely on customers emailing the (.CSV) files to SCE as part of the interconnection request. SCE would inform its stakeholders once the interconnection portals have been upgraded to accept the files. PGE is currently updating the interconnection portal to allow LGP application submittal. These updates are intended to allow interconnection customers to upload their LGP in an IOU's acceptable format. If these updates allowing file uploads are not completed when LGP projects begin, PGE will accept an emailed LGP file. SDG&E currently plans to accept CSV file uploaded via its interconnection portal.

Detailed Discussion of Section C (LGP Framework) - Continue

Phase 2. Interconnection Request Phase:

Provide information on certified control system to be used control DER output to requested level* 2.c

Discussion below covers clarification of selection of equipment for LGP applications IOUs are currently investigating with Industry members the availability of technology to support LGP.

- UL PCS with scheduling functionality is not yet available, standards are currently being developed and potentially ready for use by Q2, 2023
- A combination of CSIP certified gateway and server may be available but requires further investigation

Step	Resolution Question	IOU Response
2.c.i	2a) More clarity is needed with regards to the statement provided by SCE and SDG&E that "additional requirements for control information will be determined and provided." SCE and SDG&E should clarify whether this information is part of the technical specifications discussed in Issue 5. Should PG&E also adopt this or similar language, PG&E shall meet these requirements. The Large IOUs shall provide this information via revisions to Rule 21 within the ALs which are required to be filed 60 days following the publication of a certification scheme, per OP 15 of D.20-09-035.	<ul style="list-style-type: none"> • SCE and SDG&E align with PG&E's methodology of listing certified UL PCS that customers can select during the application process. Alternatively, joint IOUs can leverage CEC listing when available. • Based on experience interconnecting customers using UL-certified PCS devices, SCE and SDG&E view that there is no need to add additional technical requirements beyond listing of UL-certified Power Control Systems. • The IOUs believe these are not part of the technical requirements requested by IREC. As discussed in Issue 5, IREC requested that IOUs publish technical requirements. IREC should discuss what additional technical requirements may be needed beyond listing of UL certified Power Control Systems. • Certification for UL PCS has not yet been published.
2.c.i	2b) SDG&E defines "PCS" as "Power Control Settings." SDG&E shall align this language to reflect "Power Control Systems."	SDG&E confirms it will define "PCS" as "Power Control Systems"
2.c.i	2c)It is unclear if these requirements are part of the technical requirements the Large IOUs have committed to publishing as discussed in Issue 5. The Large IOUs shall clarify the difference.	See response to 2.a.

Detailed Discussion of Section C (LGP Framework) - Continue

Phase 3. Technical Evaluation Phase:

3.a,b
 Apply Screen A-L and New Screen F1(OP 5) and queue assignment as may be applicable based on Nameplate

Discussion below provides clarification on which screens are based on nameplate (3.a), queuing methods, and impacts to subsequent projects.

Step	Resolution Question	IOU Response
3.a	1.a) the Large IOUs propose to apply all the Initial Review Screens (A-L) based on the Nameplate capacity. This shall be clarified and updated as applicable; the Large IOUs shall abide by the requirements set forth in this Resolution.	Utilities agree some screens would be based on nameplate and others would be based on export. The topic will be covered in SIWG topic B.2.
3.b	2.a) More clarity shall be provided with regards to what this implies for the interconnection queue and specific details on how it would function. This step shall be updated based on results of workshop discussions as directed in Resolving Issue 2. The Large IOUs shall also discuss if exceptions need to be made for certain studies.	<ul style="list-style-type: none"> The interconnection queue as published will only contain the nameplate for LGP projects. Projects that request interconnection after an LGP project will be evaluated using updated ICA values that include the LGP project. As indicated above, power flow impacts (such as voltage and thermal) will be based on the LGP while other aspects (such SCD) will be based on Nameplate Per D.20-06-017, no projects would be allowed to move ahead of other projects in the queue, however, in some cases where need to obtain updated LGP profile (per Section 3.d.iii in Appendix A), the timing of subsequent projects may be affected
3.b	2.b) SCE and SDG&E state that the nameplate capacity will be used as a baseline for subsequent impact studies, monthly ICA updates and other studies. This step shall be updated based on results of workshop discussion as directed in Resolving Issue 2. The Large IOUs shall also discuss if exceptions need to be made for certain studies.	The IOUs will update this step as needed based on discussions related to Resolving Issue 2 (Use of Gross Nameplate Rating)

Detailed Discussion of Section C (LGP Framework) - Continue

Phase 3. Technical Evaluation Phase:

3.c

Verify that the published ICA values are most updated values and refresh as needed, when ICA values are available (OP 2)**

Discussion below provides clarification as how ICA values are to be used and the need to refresh outdated ICA values

@ 26/57

The Large IOUs shall discuss the associated timing to conduct the Technical Evaluation to avoid conflict with the updates to the ICA values. We remind the Large IOUs that per OP 4 of D.20-09-035:

- Given that ICA values are updated on a monthly basis, Technical evaluation will be based on the most updated ICA values
 - In some cases, the published ICA values are outdated due a grid change (new generation, new load, new circuit configuration, etc.)
- The timing of the Fast Track initial review would be per established requirements (15 business days from application deemed complete) – Changes to this timing for LGP projects which do not meet the 90% of the LGP for each hour will be discussed in subsequent slides

[The Large IOUs] shall track when the Integration Capacity Analysis outdated values lead to Interconnection Requests failing the Initial Review... [and] shall also track the costs associated with the updates necessitated by the outdated values and provide the data in ... [a] reporting document ...

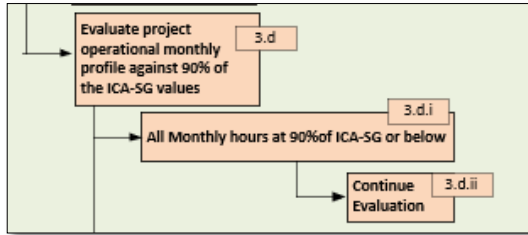
- Per OP 2, IOUs will utilize updated ICA values when the ICA values are not up to date.
- IOUs will comply with Decision requirements related to outdated values, associated cost tracking for updating the outdated ICA values, and reporting requirements

Detailed Discussion of Section C (LGP Framework) - Continue

Phase 3. Technical Evaluation Phase:

3.a,b
Apply Screen A-L and New Screen F1(OP 5) and queue assignment as may be applicable based on Nameplate

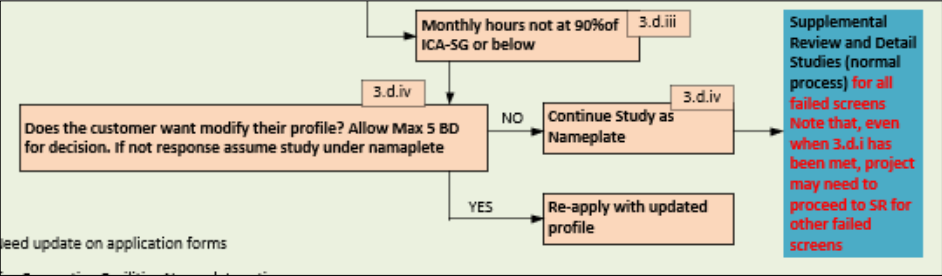
Discussion below provides clarification on the study process for evaluation of Screens A-L, and screen M using LGP values



Step	Resolution Question	IOU Response
3.d.i	3) the Large IOUs state that if the export request for each of the 12 months is at or below the 90% of each month's minimum ICA-SG value then the project can continue with its evaluation. This step shall be updated as needed based on discussions related to Resolving Issue 2.	The IOUs will compare each hour of the customer's proposed LGP profile with 90% of the ICA-SG profile. The IOUs will update this step as needed based on discussions related to Resolving Issue 2 (Use of Gross Nameplate Rating)
3.d.ii	4) the Large IOUs state "If all Initial review screens (A-L) are met including 3.d.i (all requested values are below 90% of each month's ICA values)" then the project will pass the Rule 21 Fast Track screens. This step shall be updated as needed based on discussions per Resolving Issue 2.	<ul style="list-style-type: none"> The IOUs will update this step as needed based on discussions related to Resolving Issue 2.(Use of Gross Nameplate Rating)

Detailed Discussion of Section C (LGP Framework) - Continue

Phase 3. Technical Evaluation Phase:

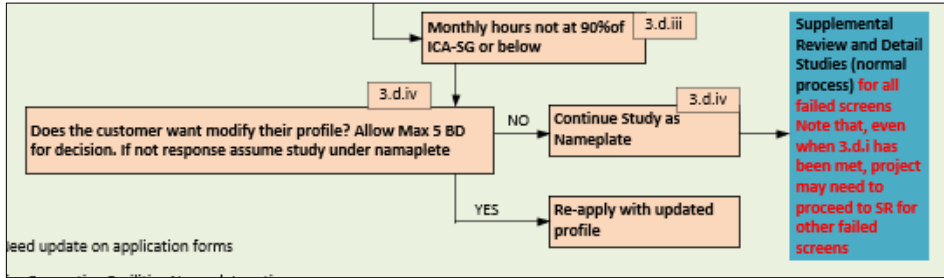


Discussion below provides clarification how customer will be given an opportunity to update the LGP values if one or more does not comply with 90%, the process, and timing of the communication with customer

Step	Resolution Question	IOU Response
3.d.iii	<p>5) "the Large IOUs propose to inform the customer if the export request for one or more of the 12 months of LGP is not at or below the 90% ICA-SG limit. The Large IOUs shall clarify how this will be communicated, within what timeline in the review process it will be communicated, and agree on a format for communicating the appropriate values to be utilized in order to expedite the response from the customer and streamline interconnection process. The Large IOUs shall discuss the significance to the queue position and if the customer will preserve their queue position under these circumstances. The Large IOUs shall also clarify how future grid conditions that warrant a change to the LGP will be communicated to the customer and the time required to change the LGP. This step shall also be updated as needed based on workshop discussions.</p>	<ul style="list-style-type: none"> • After further research, IOU's identified that section F(2)(b) of the tariff allows modifications that obviate the need for Supplemental Review. To be fair to all other Rule 21 projects (including those currently using ICA), IOU's propose failing Screen M in initial review whenever the LGP does not comply with 90% ICA-SG profile. • IOU's will allow LGP customers to provide an updated LGP as allowed under R21 section F(2)(b). • LGP updates needed based on future grid conditions were discussed in Joint AL: 4941-E, 6816-E, 4138-E

Detailed Discussion of Section C (LGP Framework) - Continue

Phase 3. Technical Evaluation Phase:

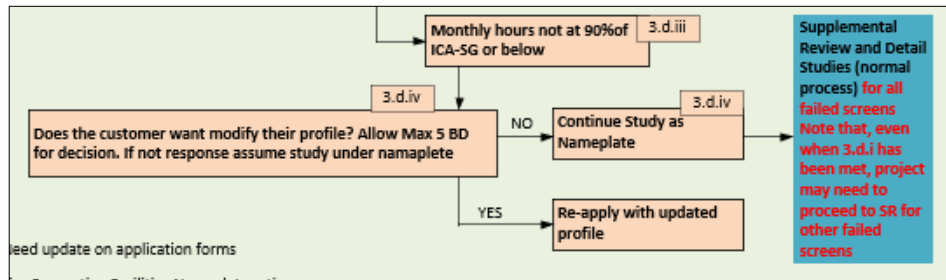


Discussion below provides clarification a how a project is studies if customer does not respond within 5 BD of being notified that a the provided LGP does not comply with the 90% at each hour

Step	Resolution Question	IOU Response
3.d.iii	6) SDG&E shall correct its language to reflect “at or below 90%” instead of only “below 90%.”	SDG&E confirms that it will make the change.
3.d.iv	7) the Large IOUs state that if the customer does not respond within 5 business days of the notification to update the LGP so that all values are at or below the 90% ICA-SG profile values the project will be evaluated using full nameplate capacity without monthly limits. We interpret this step to mean that unless a new LGP is proposed by the customer upon notification by the Large IOU to stay within the ICA-SG values, the application will default to a non-LGP option application and the studies will be conducted as a regular interconnection request without LGP and the customer will be responsible for any electric grid updates if they proceed with the application. The Large IOUs shall clarify this in the workshop discussions and include this clarification in the subsequent ALs.	IOUs assert the statement to be correct, will discuss at workshop, and clarify on the upcoming AL
3.d.iv	7 cont.)The Large IOUs shall also clarify any additional changes required for this step based on the outcome of discussions towards Resolving Issue 2, and abide by previous direction regarding material modifications.	<ul style="list-style-type: none"> No additional changes required in reference to Issue 2 (applicability of Gross Nameplate Rating for certain Rule 21 screens) Material modifications allowances per Rule 21 are not proposed to be changed

Detailed Discussion of Section C (LGP Framework) - Continue

Phase 3. Technical Evaluation Phase:

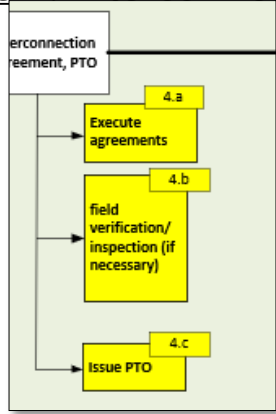


Discussion below provides clarification when customer does not respond within the 5 BDs but still requests LGP interconnection and justification of the 5 BDs

Step	Resolution Question	IOU Response
3.d.iv	7 cont.) Additionally, the Large IOUs shall discuss the timeline for review of the screens, and consequences if the customer does not respond to notice within the time allowed. Among the topics to be discussed: Would the customer lose the queue position if the customer still requested LGP treatment? Does this timeline allow the developer to reasonably be able to contact equipment manufacturers and get clarity on technical questions around inverter capabilities? The Large IOUs shall justify the need for such a short response period, and how it aligns with other similar Rule 21 timeline requirement.	<ul style="list-style-type: none"> No changes are proposed to the timeline to review the interconnection screens One notification will be provided, customer must respond within 5 BDs of being notified Customer's queue will not be impacted when customer is requested to update their profile and customer responds within 5BDs If customer does not respond within the 5BD and subsequently still requests LGP, the customer must submit a new interconnection request and its queue will be based on the timing of the new interconnection request. Allowing more days for customer to respond can cause impact to subsequent projects which may be waiting in the queue to be studied Developers should be well versed on the capabilities of their system and should not need to contact manufacturer for capabilities of equipment 5 BD is used for other part of the Rule 21 where customer is required to provide additional information (Example: E.5.b.ii)
3.d.v	8) PG&E shall provide clarity on whether the tools are PG&E tools or the customer's tools, and justify such needs. Should the SCE and SDG&E adopt this statement, this requirement will also apply.	<ul style="list-style-type: none"> New tools will have to be developed to efficiently evaluate LGP projects. These tools are necessary to efficiently extract the most updated ICA-SG profile, import the customer provided LGP profile, compare each hour of the profile, and determine if the project meets the criteria at each hour Additional enhancements to planning tools and ICA process may be needed to enable efficient and automated integration of LGP into the interconnection process. In addition, distribution modeling enhancement would be necessary to reflect the LGP projects. Once an LGP project connects, a unique output profile must be stored, maintained, and referenced in system planning, interconnection, and ICA studies.

Detailed Discussion of Section C (LGP Framework) - Continue

Phase 4. Interconnection Agreement/PTO Phase:

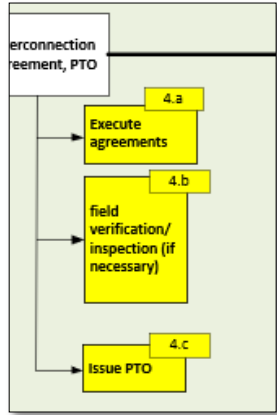


Discussion below provides clarification conditions where a PTO may need to be revoked due to non-compliance to LGP requirements in the Interconnection agreement

Step	Resolution Question	IOU Response
4.a.ii	1a.) The Large IOUs shall provide clarity regarding how this may affect future interconnection applications by the same customer, including whether the customer would be allowed, after termination of the agreement, to interconnect again under the LGP option and, if so; any additional requirements imposed due to not having followed operating specifications before. The Large IOUs shall also provide clarity on the details of the process, and timing to revoke PTO and how disconnection of the non-complying system will occur.	<ul style="list-style-type: none"> For conditions which do not immediately causing a safety and/or reliability concern, the customer would be notified by the utility. Customer would be required to make the correction within 15 BDs of notification. If corrections are not made within 15BD from being notified, the PTO will be revoked. IOUs reserve the right to confirm the generator has not reconnected For conditions which do impose an immediate safety and reliability, IOUs will take immediate action to disconnect the project from the grid until the correction has been made. If corrections are not made within 15BD from being notified (or being disconnected), the PTO will be revoked. IOUs reserve the right to confirm the generator has not reconnected IOUs are not intending to impose additional requirements for customers who had a revoked PTO. Customer can request interconnection under any PUC approved procedures
4.a.ii	1b) The Large IOUs shall detail the terminology that will be used to “clarify that utility may take actions.” Details should include what actions will be taken, the timeline for such action, and relevant Rules (e.g., Rule 2) that are applicable in such a situation.	<ul style="list-style-type: none"> The revocation of PTO will be based on executed interconnection agreement specifying an approved LGP. If such LGP is not followed even after being notified, then IOUs have the right under the Interconnection Agreements to Revoke PTO and terminate the agreement. IOUs will update the IA with parameters from response above (a).

Detailed Discussion of Section C (LGP Framework) - Continue

Phase 4. Interconnection Agreement/PTO Phase:



Discussion below provides clarification from PGE &E related to “multiple instances”. Also clarifies that 4.a.iii has been addressed

Step	Resolution Question	IOU Response
4.a.ii	1c) PG&E uses the term “if multiple instances.” PG&E shall clarify this term, including how the term “multiple” is defined and the timeframe of the recurrence. If SCE and SDG&E also adopt this type of language in aligning the language of the processes, they shall abide by this requirement.	<ul style="list-style-type: none"> PG&E clarifies that the LGP Customer would be required to make the correction within 15 BDs of being notified of an issue. If corrections are not made within 15BD from being notified, the PTO will be revoked. IOUs reserve the right to confirm the generator has not reconnected
4.a.iii	2) the Large IOUs require customers to provide quarterly reporting data. The Large IOUs shall update this step based on the outcome of the discussions set forth in this Resolution	<ul style="list-style-type: none"> This has been addressed. Where IOUs will use AMI data and telemetry (for projects ≥ 1MW) to verify LGP performance requirements

Detailed Discussion of Section C (LGP Framework) - Continue

Phase 4. Interconnection Agreement/PTO Phase:

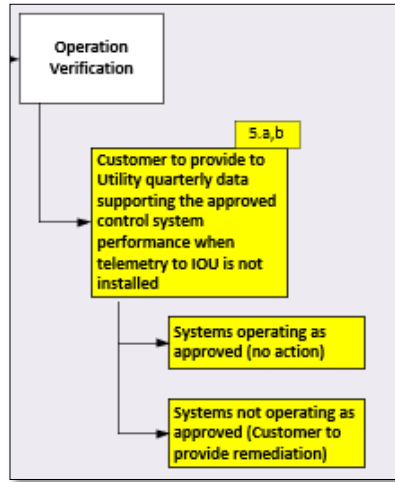
4.b
field verification/inspection (if necessary)

Discussion below provides clarification the requirements for field performance verification, relationship to certification testing and process for developing commissioning test procedures

Step	Resolution Question	IOU Response
4.b	3) The Large IOUs shall clarify the purpose and need for field performance verification and commissioning testing, and the difference between the testing performed by the Large IOUs as opposed to that required by certification to a standard and how it fits into current Rule 21 requirements. This requirement shall be applied to any step where mention of such verification or testing is needed by the Large IOUs. The Large IOUs shall also discuss other possible methods to verify this, including using a remote inspection and using IEEE 2030.5 to verify performance.	<ul style="list-style-type: none"> IOUs field performance verification/commissioning tests verify operational performance for ensuring that the installed equipment has been set up to meet the intended need The IOU field performance verification/commissioning tests defer from certification testing in that these are operational tests for equipment that has been installed in the field as opposed to lab tests used by NTRLs to verify that the equipment being tested meets the requirement of the standard (such as IEEE1547.1-2020/UL1741SB) While IOUs reserve the right to verify performance on any project prior to issuing PTO, in practice IOUs will only perform field verification on projects which are using new methods or new equipment. Once IOUs become familiar with the methods and equipment, IOUs may not require to be the witness of the operational performance and commissioning tests (which should always be performed with or without IOUs witnessing)
4.c	4) The Large IOUs shall clarify if this step will ensure that during the field performance verification/commissioning testing phase the generating facility complies with the LGP requirements. They should also specify whether this will make the proposed quarterly reporting unnecessary.	<ul style="list-style-type: none"> Field performance verification/commissioning tests will ensure that project is set up to comply with LGP requirements. The issue of quarterly reporting has been addressed. IOUs will use AMI data and telemetry (for projects ≥ 1MW) to verify LGP performance requirements.
4.b.ii	5) PG&E states that it will review, discuss, and agree on the verification procedures. More clarity is needed whether this is solely at PG&E's discretion or if it involves the customer. Should SCE and SDG&E also adapt similar language when aligning the process language, they shall also abide by this requirement.	<ul style="list-style-type: none"> Per Rule 21 Section L.5.a, IOUs may require a written Commissioning test procedure to be provided by the Interconnection Customer 10 days in advance of the Commissioning Test. IOUs will coordinate with customer on the development of the commissioning test procedure.

Detailed Discussion of Section C (LGP Framework) - Continue

Phase 5. Operation Performance Phase:



Topic no longer necessary

Step	Resolution Question	IOU Response
5.a.	1) The Large IOUs shall clarify whether they are seeking to impose this as a requirement, or if the Large IOUs are merely reserving the right to implement this step. ... If seeking to impose this as a requirement, the Large IOUs shall provide an estimate of the scope of backend system and infrastructure expansion required in the subsequent AL, costs associated with it, and estimate the length of time required for full deployment of these systems to provide to the Commission information on potential scale of such work.	This topic is no longer necessary, IOUs agree to use AMI data in combination with telemetry (for Generating Facilities ≥ 1MW) to verify performance.
5.b	2) the Large IOUs require customers to provide quarterly reporting data. The Large IOUs shall update this step based on the outcome of the discussions set forth in this Resolution	

Questions

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