Background:

A June 7, 2017 Assigned Commissioner Ruling (ACR) set a scope and schedule\(^1\) for continued long-term refinement (LTR) discussions on both Integration Capacity Analysis (ICA) and Locational Net Benefit Analysis (LNBA). This ACR includes pre-Working Group (WG) deliverables, status reporting, and final reporting milestones for continued long-term refinement discussions. This ACR groups the identified long-term refinement topics into four tiers, which front-loads work on topics of relatively high complexity and/or importance to the further development of ICA. The five Group II topics are as follows:

<table>
<thead>
<tr>
<th>Group II Topic</th>
<th>June 7 ACR Item #</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Expansion of ICA to single phase feeders (requires creation of network models for single-phase feeders)</td>
<td>ACR - A</td>
</tr>
<tr>
<td>2. Method for reflecting effect of potential load modifying resources on integration capacity</td>
<td>ACR - E</td>
</tr>
<tr>
<td>3. Develop non-heuristic approach to modeling operational flexibility</td>
<td>WG Report - 4</td>
</tr>
<tr>
<td>4. Consider how online maps could reflect queued projects on a given circuit (requires coordination with Rule 21 rulemaking and public interconnection queue)</td>
<td>WG Report - 6</td>
</tr>
<tr>
<td>5. DERs that serve peak load</td>
<td>Interim Report</td>
</tr>
</tbody>
</table>

The five Group III topics are as follows:

<table>
<thead>
<tr>
<th>Group III Topic</th>
<th>June 7 ACR Item #</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ways to make ICA information more user-friendly and easily accessible (data sharing)</td>
<td>ACR - B</td>
</tr>
<tr>
<td>2. Interactive ICA maps</td>
<td>ACR - C</td>
</tr>
<tr>
<td>3. Market sensitive information (B, C, and D include IT requirements for data sharing, access to market sensitive information, and expanding the functionality and range of data displayed on ICA maps)</td>
<td>ACR - D</td>
</tr>
</tbody>
</table>

4. Incorporate findings and recommendations from DRP Track 3 Sub-track 1 on DER and load forecasting into ICA as appropriate

5. Voltage regulating devices: If the Commission authorizes the IOUs to model voltage regulating devices as they did for Demo A in the initial system-wide ICA rollout, the ICA working group should work with software vendors to include this functionality as a long-term refinement topic

The three Group IV topics are as follows:

<table>
<thead>
<tr>
<th>Group IV Topic</th>
<th>June 7 ACR Item #</th>
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</thead>
<tbody>
<tr>
<td>1. Development of ICA validation plans, describing how ICA results can be independently verified (Need to solidify ICA methodologies for interconnection and planning use cases before developing valuation and QA/QC methods)</td>
<td>ACR - F</td>
</tr>
<tr>
<td>2. Definition of quality assurance and quality control measures (Need to solidify ICA methodologies for interconnection and planning use cases before developing valuation and QA/QC methods)</td>
<td>ACR - G</td>
</tr>
<tr>
<td>3. Explore divergences and tradeoffs between methods employed by SCE and PG&amp;E vs. SDGE to create load shapes at the feeder, transformer, and customer levels. WG reached consensus on utilizing IOUs’ Demo A load shape development methodologies for initial system-wide rollout</td>
<td>WG Report - 9</td>
</tr>
</tbody>
</table>

The Working Group has had two meetings on these topics. The meeting notes, webinar recordings, participant lists, and slides from those meetings are included as links in Appendix A of this status report.

The Working Group established a consensus method for discussing topics, developing written proposals, and receiving edits or comments on those proposals. These are detailed in the proposal document, found here. This interim status report identifies which parties have submitted proposals, which parties have submitted comments, and summarize discussion and next-steps to date. These proposals can be found in Appendix B and reflect the main work products of this WG to date, incorporate feedback and comments made during the in-person monthly meeting, and will assist the WG in developing the final WG report due January 2018.

Group II Topic 1 (ACR - A). Expansion of ICA to single phase feeders (requires creation of network models for single-phase feeders)

Overview: As part of the Demonstration Project A WG meetings, the Joint IOUs discussed a potential plan to test ICA on single phase line sections. The WG agreed that the location of single phase line sections should be identified on the ICA maps, but the value would not be identified. The IOUs discussed that a complete source of single phase information for network models does not currently exist; thus, determining accurate single phase ICA would require significant investment. There are additional limitations of the existing modeling tools, and concerns over accuracy of limitations represented on single phase laterals.

Initial proposals: The Joint IOUs proposed that the utilities evaluate one feeder to better understand a) what type of DER connects to single phase and b) what level of DER typically requires 3 phase, as well as how it can be accurately modeled within ICA. Conducting initial analysis on one feeder will also allow the IOUs to develop time and cost estimates of conducting a system-wide evaluation of single phase feeders. The analysis should commence in Q1 2018 with results to be delivered in Q2 2018. More detail of the evaluation are fully detailed in the IOU proposal. Additional WG discussion is needed on the potential use of single phase ICA values.

Edits and comments: ORA submitted comments and agreed that an initial analysis should help determine what methodological modifications may be required, and if single phase ICA is viable. However, ORA does not agree with the IOU proposal, stating that the IOUs should have already evaluated the scope and potential costs of implementing ICA across single phase line sections, based on existing CPUC guidance. Further, the IOU proposal provides limited details for how a single evaluation may yield accurate estimates for each IOU’s system. Third, ORA believes it is important to document the baseline condition of single phase circuits, including why IOUs lack fundamental information about these circuits and how it fulfills its obligations under PUC 451 without this information. The IOUs have explained that they lack information on single phase portions of its distribution system, but have not explained why this situation exists or how the lack of this information impacts planning and operations. Finally, additional study projects, such as a proposed EPIC project to determine phase information, should be identified and incorporated into IOU evaluations. The ORA proposal details a request for each IOU to separately provide a proposal detailing service territory-specific information related to single phase circuits by December 15. Additional detail on the proposal is fully detailed in ORA’s comments. The WG would then review the IOU proposals in time to provide comments into the final ICA WG report.

Timeline and next steps: The WG will consider ORA’s comments and determine how to address single phase line sections for the final ICA WG report.

Group II Topic 2 (ACR - E). Method for reflecting effect of potential load modifying resources on integration capacity

Overview: In the ICA WG formed for Demo A, some stakeholders expressed desire for the ICA to reflect the effect of load modifying resources (LMR). The final WG report included this item as a non-consensus item and was originally scoped by SoCal REN. That initial proposal stated that all DERs are load modifying resources, and that probabilistic modeling approaches, or non-engineering analysis, should be included within ICA.

Initial proposals: At the September meeting, the Joint IOUs recommended maintaining current ICA calculation methods and maintaining current methods for integrating existing DERs within the ICA, given that the existing method reflects the effects of load modifying resources in the existing load curves, which are then used in forecasting.

Edits and comments: ORA commented that it supports the IOUs’ conclusions. However, additional investigation of more robust methods to reflect the impact of LMRs are needed. The load modifying characteristics of DER included in current load profiles are static, include many assumptions to provide a single load curve per circuit, and that the value of DER as flexible LMRs may be underestimated using the current approach. ORA recommends that this issue be considered a long term issue to be addressed early in 2019 once the initial ICA has been deployed and stakeholders have had the opportunity to use it for each adopted use case.

Timeline and next steps: The WG should determine whether ORA’s additional proposal to include LMR as a further long term issue may be included in the final report as consensus.
Overview: The safety/reliability criteria limit in ICA includes consideration of operational flexibility and reverse power flow issues when DER is generating in abnormal circuit configurations. Demo A required two power flow scenarios; to meet the ACR, the IOUs tested both a no-reverse flow scenario, and an ICA value irrespective of power flow direction across SCADA devices. The WG recognized that the method used to determine operational flexibility may be overly conservative, and recommended that for the first system-wide roll out two ICA values are published (one with operational flexibility limitations, and one allowing reverse power flow up to the substation low-side busbar). For long-term refinement, many WG members placed high priority on developing a new approach to understanding operational flexibility results, enabled by an improved understanding of the ICA’s ability to evaluate a large number of scenarios and configurations or by a discussion of how the utilities study the operational flexibility impact of an interconnection application that requires such a study. This improved value is expected to replace Screen P (the Safety and Reliability Screen) within the Rule 21 process.

Initial proposals: At the September meeting, the Joint IOUs noted that there is no established method other than the existing method tested in Demo A, and that testing all abnormal switching conditions could be inefficiently, costly, and slow due to the multiple possible switching conditions. The IOUs continue to invite researchers and the vendor community to develop approaches to efficiently analyze abnormal conditions. The WG also discussed that the op flex constraint may be applied in an operational sense, particularly within a DERMS platform. The WG will work with the Rule 21 Working Groups to decide how the limit can help inform specific requirements that may be needed within the interconnection process.

Edits and comments: ORA’s submitted comments add further detail from the September meeting. During the EPRI presentation, it was discussed that it may be more practical to recalculate hosting capacity on a daily basis and use those results to potentially curtail DER. Some non-IOU working group members suggested that since abnormal circuit configurations exist for limited periods of time, other alternatives need to be considered including DER curtailment using Phase 3 smart inverter functions, and limiting circuit reconfigurations. ORA also recommends that each IOU catalog the SCADA devices in its distribution system that will be used in the short term OpFlex criteria and provide the results to the CPUC and ORA. Without this data, the CPUC will lack an understanding of how restrictive the OpFlex criteria is, and the level of added accuracy other alternatives provide relative to the short-term OpFlex criteria. This information will allow the benefit to be defined in cost benefit analyses which should accompany an evaluation of alternatives.

Timeline and next steps: The WG should consider and provide comment on ORA’s recommendations regarding alternative considerations for abnormal circuit configurations and on cataloguing SCADA devices used in the short term OpFlex criteria, to provide better understanding of the OpFlex criteria.
Group II Topic 4 (WG Report - 6). Consider how online maps could reflect queued projects on a given circuit (requires coordination with Rule 21 rulemaking and public interconnection queue)

**Overview:** The Working Group made a consensus recommendation to consider how online maps could reflect queued projects on a given circuit and if an earlier-queued project has absorbed the stated available capacity since the most recent ICA update.

**Initial proposals:** Given that the IOUs have agreed to incorporate queued projects, no additional discussion is necessary within the Working Group.

**Edits and comments:** None.

**Timeline and next steps:** The June 7 ACR identifies that incorporation of queued projects within the online ICA map requires coordination with Rule 21 rulemaking and public interconnection queue
Group II Topic 5 (Interim Report). DERs that serve peak load

Overview: In the ICA WG formed for Demo A, stakeholders expressed desire for the ICA to identify peak load days, and to correlate the ICA curves to specific weather conditions. This would be integrated into the ICA tool through four additional load shapes. The WG was in non-consensus with the original approach and proposal written by SolarRetina.

Initial proposals: At the September meeting, the Joint IOUs proposed continuing to utilize the existing ICA load profiles and proposed that DER providers should utilize existing load profiles to determine ability to serve peak load. The existing ICA curves appropriately account for high and low load days. Further, much of the concern surrounding this issue may be mitigated through future operating tools, such as a DERMs platform, which will allow real time dispatch of DERs and allow DERs to load follow.

Edits and comments: IREC noted that further granularity in the load data would help customers further understand the possible operational configurations and interconnection parameters that might allow a customer to optimize the sizing and operation of their system without triggering significant upgrade costs. However, there are limitations to the modeling of the ICA that at this time would likely require projects to undergo some level of interconnection review if they are proposing operations designed to closely track past load curves. At this time, the Working Group determined that immediate work to increase the granularity of the peak load data was not a high priority, but it may be an issue that could be revisited over time as the ICA tool is deployed and its role in helping to optimize project siting and operations becomes more clear.

Timeline and next steps: The WG determined that no further modifications to the ICA are necessary for now but that this issue could be revisited over time.
Overview: During the development and review of Demo A, the Working Group agreed that the Joint IOUs should work to standardize the map and downloadable data set format for the first system rollout, and that additional enhancements to maps for the full system roll-out may be added by the utilities as allowed by their tools and respective limitations. All IOUs have made the following information available via downloadable data set from their Demo A projects: Demo A final report, ICA Translator, load profiles, customer type breakdown, and detailed ICA results by circuit. The WG agreed that the following attributes should be available across all three IOU maps: circuit, section ID, voltage (kV), substation, customer breakdown percentage (agriculture, commercial, industrial, residential, other), existing generation (MW), queued generation (MW), total generation (MW), ICA with uniform generation (MW), ICA with uniform load (MW), integration capacity of a generic PV system (MW). For additional enhancements, the WG was directed to discuss whether the additions may be included within the first system-wide rollout, as well as an estimate of associated IT requirements and potential costs. Further, WG members discussed the development of a Queryable API, a map key, and an ICA User Guide.

Initial proposals: At the October meeting, it was proposed that the IOUs will include refinements to load profiles display, color display, and range display within the first system roll out. These discussions were informed by the 10/11 webinar on ICA for DER developers, which solicited input on user friendliness.

Edits and comments: ORA supports the MTS proposal and states that the purpose of the ICA is to be as usable as possible by the developers, while not being prohibitively costly or complicated for Joint IOUs to implement. ORA is also continuing to support the position that only the necessary data be included as to protect confidential customer information. ORA will continue to be part of the discussions regarding the timing of the full rollout, as well as the additional requests for additional capabilities.

Timeline and next steps: WG members are asked to provide additional detail on exact desired enhancements to the ICA tool and contents of the User Guide to improve user friendliness and data sharing capabilities, including confirmation from the Joint IOUs on when enhancements may be available (as part of the first system roll out, or as a goal for long-term refinement). MTS, CALSEIA, and the Joint IOUs are setting up a follow-up conversation with DER developers to better inform the usability conversation, particularly around 1) whether the ICA map should demonstrate fixed or variable ranges, 2) what should be included in the ICA user guide, and 3) how to potentially develop an API and what data is necessary to include in that API.
Group III Topic 4 (WG Report - 3). Incorporate findings and recommendations from DRP Track 3 Sub-track 1 on DER and load forecasting into ICA as appropriate

Overview: ICA can assist with future planning decisions by using DER growth forecasts (DRP Track 3, Sub-track 1) to identify circuits needing upgrades to accommodate forecasted DER. In the March 2017 ICA Final Working Group report, IREC presented additional discussion questions regarding methodologies for determining growth scenarios that are integrated with ICA and ensuring that methodological options do not constrain how the ICA tool is used in future use cases, as well as how the ICA results can be used for planning and decision-making processes (including incorporating results from DRP Track 3 Sub-track 1. This discussion shares some overlap with the Group I topic on developing the planning use case.

Initial proposals: At the October meeting, the Joint IOUs presented how they envision using DER growth forecasts in the planning process. ICA results will help provide locations and characteristics of forecasted deficiencies in the system to accommodate expected DER growth, but does not identify a final set of projects – rather, this information is used by utility distribution planning teams to find solutions. The WG also discussed whether use of DER growth forecasts should also include wholesale forecasts (e.g., community solar programs). The Joint IOUs state that wholesale growth should not be used in analysis, given that the level of granularity for DER wholesale forecasts does not match the granularity needs for ICA, as well as concerns around cost sharing structures (continued conversation on cost sharing in R.17-07-007). Using either the iterative or streamlined method for ICA in the planning context does not exclude the use of wholesale forecasts in the future.

Edits and comments: IREC comments that there needs to be further discussion and analysis of which methodology should be used to run the planning scenarios, and presents some open discussion questions within the written comments. While the output of DER growth scenarios plus ICA tool does not identify final solutions, it is still necessary to have a reasonably accurate starting point for further analysis. With regards to wholesale forecasts, IREC would also like to acknowledge that ICA results are not likely to be as meaningful in terms of predicting where upgrades may be needed in a later decision making process.
ORA agrees that the ICA is useful for identifying where capacity is available within the distribution system, but should not by itself determine the specific solution to utilize that capacity. ORA recommends further study on the claim regarding the use of wholesale growth within the analysis, especially the potential impact of wholesale DER growth on any part of the circuit.

Timeline and next steps: The ICA will use the DER growth scenarios identified in DRP Track 3 Sub-track 1. The WG has identified that this topic has overlap with the planning use case discussion, and may continue discussion of DER growth forecasts within the policy scenario planning use case proposed by stakeholders (see ICA Group I interim status report).
Group III Topic 5 (WG Report). Voltage regulating devices: If the Commission authorizes the IOUs to model voltage regulating devices as they did for Demo A in the initial system-wide ICA rollout, the ICA working group should work with software vendors to include this functionality as a long-term refinement topic.

**Overview:** It was determined that if the Commission authorizes the IOUs to model voltage regulating devices as they did for Demo A in the initial system-wide ICA rollout, the ICA Working Group should work with software vendors to include this functionality as a long-term refinement topic.

**Initial proposals:** The Commission approved the IOUs to model the voltage regulator devices in the initial system-wide rollout as it did for Demonstration Project A. The IOUs are now currently working with software vendors to incorporate this function as part of the software modeling tools. The IOUs suggested that system implementation of this functionality should be done in a way that accounts for computing power and ability to meet the needs of ICA updates. This item was covered in the October WG meeting discussion. A written proposal was not developed.

**Edits and comments:** No comments were submitted at this time.

**Timeline and next steps:** The IOUs will report progress of this work in the system implementation Interim Reports.
Group IV Topic 1 (ACR - F). Development of ICA validation plans, describing how ICA results can be independently verified

Overview: This activity was outlined in the May 23, 2016 ACR as a long-term refinement item. A scoping proposal was presented by LNBL/LLNL, and discussed by the WG. The scoping proposal identifies that any of the concerns with the initial ICA methods have been addressed by moving to more of the iterative methods (i.e., direct simulation of the distribution grid using the commercial models), applying the analysis to all feeders, etc. Some questions regarding validation still remain, as highlighted in the scoping proposal such as i) What are the objectives of validation (e.g., believability, repeatability, applicability, etc.)?; ii) Which components need to be verified (input, methodology, tools)?; iii) How much uncertainty exists, how much is acceptable, and where can it be reduced?; and iv) What are the appropriate datasets to serve as a reference point for validation and third-party improvements to the method (e.g., IEEE 123, IEEE 8500, PG&E 12 representative feeders)?

Initial proposals: In the October meeting, the IOUs clarified that the purpose of independent validation is to provide transparency and confidence in the ICA results, which can be achieved either through comparative assessment across ICA tools or through evaluating how useful the ICA results are in streamlining interconnection. With regards to the first, comparative assessment efforts will continue to provide transparency into ICA methods, assumptions, and tools. The IOUs have identified that there is the most uncertainty around load allocation inputs to the model, and that the use of hourly metering data can help more appropriately allocate loading throughout the model. With regards to evaluating the results, as ICA is implemented in Rule 21, the IOUs will have a clearer understanding of the usefulness of the results. The IOUs established in the comparative assessment written proposal (Item 8) that the best starting reference point to align models is the IEEE 123 feeder. Ideally the independent validation, as part of comparative assessment, would be carried out by a third party (comparative assessment is a Group I topic included in the Group I interim status report).

Edits and comments: ORA mostly agrees with the Joint IOU proposal, and submits comments to highlight that comparison testing needs to be performed on circuits that are more complicated than the IEEE 123 circuit. The Joint IOUs should restate their conclusion point 1 (“continue to validate through actions in comparative assessment (item 8) across tools use learnings to inform validation and comparison across tools and stakeholders”) to provide more clarity on what the proposal actually means.

Timeline and next steps: The IOUs will use lessons learned from comparative assessment as well as interconnection studies using ICA results to inform validation. The IOUs will continue to align on the use of hourly metering data to reduce uncertainty (see Item 9 - Group IV topic). ORA has volunteered to reach out the LBNL/LLNL authors of the original proposal included in the Long Term Refinement Report submitted December 2016, to provide additional comment or potentially serve as a third party to conduct independent validation.
Overview: This activity was listed in the May 23 ACR, but the WG had decided to revisit this topic after Demo A results are published and after the planning use case methodology is solidified before identifying what QA/QC measures may be needed. This topic overlaps with both comparative assessment (Item 8 - Group I topic) and independent validation (Item F - Group IV topic).

Initial proposals: The IOUs’ presentation at the October meeting covered two discussion questions: 1) what QA/QC methods are necessary for ICA for both the interconnection and the streamlined use case, and 2) are there additional QA/QC verification needed, by either the software vendor or IOU? The IOUs propose to define interconnection QA/QC to mean: “effectiveness in providing appropriate answer to pass screens when compared to the results of the normal interconnection study process.” To evaluate this, the IOUs propose to utilize efforts from Item F (independent validation). Planning QA/QC is defined as: “the validation and replicability of results within different tools and stakeholders.” To evaluate this, the IOUs propose to utilize efforts in both Items 8 and F to compare and validate across software tools and stakeholders, to provide a common level of assurance and collective consensus.

Edits and comments: ORA supports the Joint IOUs’ proposals, and comments that the IOUs should develop QA/QC plans to ensure that ICA results are accurate and based on current and complete input data. The ORA-submitted comments clarify the main goal of QA/QC and is intended to supplement the IOU proposal. The definitions of QA / QC are otherwise appropriate. Similarly, the utilization of the other items’ efforts is the proper means to develop appropriate quality assurance/control of the ICA findings.

Timeline and next steps: Utilize efforts in Item F to evaluate effectiveness of results within interconnection process and utilize efforts in item 8 and F to compare and validate results across tools and stakeholders to provide a common level of assurance and collective consensus. Consider ORA recommendations to develop QA/QC plans as part of development and deployment of initial system-wide rollout, and provided in conjunction with the final status report required per D.17-09-026, Ordering Paragraph 9.
Group IV Topic 3 (WG Report - 9). Explore divergences and tradeoffs between methods employed by SCE and PG&E vs. SDG&E to create load shapes at the feeder, transformer, and customer levels.

Overview: The WG reached consensus in the ICA Working Group Final Report that the IOUs should use similar methodology to develop load shapes. During Demo A, the WG discussed these methodologies in detail and agreed upon their use in Demo A, but many stakeholders expressed desire to further explore reasons for divergence in methodology, as well as trade-offs between methods, as part of long-term refinement.

Initial proposals: The IOUs presented on this topic in October and clarified that they use similar methodology to develop load shapes. Load shape development uses the following consistent data: customer load profiles (developed from AMI data, aggregated at the service transformer); service transformer load profiles (aggregated customer profiles); circuit load profiles (developed from SCADA data); and substation load profiles (developed from SCADA data). The Joint IOUs recommend utilizing the same methods, data sources, and means to create load shapes within the system-wide rollout.

Edits and comments: ORA supports the Joint IOUs’ proposal. The utilization of the same load shape and data profiles as Demo A will continue to produce load shapes based on the same underlying data, and will continue to allow for appropriate comparison between the IOUs.

Timeline and next steps: The joint IOUs will continue to use the existing load shape methodology within the first system-wide rollout of the ICA.
Appendix A: ICA Summary of Meetings

<table>
<thead>
<tr>
<th>Meeting date</th>
<th>Meeting documents</th>
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<tbody>
<tr>
<td>September 19</td>
<td>Working Group meeting on Group II topics</td>
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<td>Meeting materials:</td>
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<td>● meeting notes forthcoming</td>
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<td>● webinar recording</td>
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<td>● slide deck</td>
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<tr>
<td>October 11</td>
<td>Introduction to ICA Webinar for DER developers</td>
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<td>Meeting materials:</td>
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<td>October 17</td>
<td>Working Group meeting on Groups III/IV topics</td>
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Appendix B: ICA Written Proposals and Submitted Comments

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<tr>
<th>Topic</th>
<th>June 7 ACR Item</th>
<th>Initial written proposals</th>
<th>Comments</th>
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<tbody>
<tr>
<td>I.3 Develop methods and tools to model smart inverter functionality in ICA calculations <em>included here to reflect additional shareholder responses received after the publish date of the ICA WG Group 1 Interim Status Report</em></td>
<td>WG Report 5</td>
<td>Joint IOUs</td>
<td>Comments: Joint stakeholder parties (CALSEIA, Clean Coalition, IREC) Response: Joint IOUs Response: CALSEIA and IREC</td>
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<tr>
<td>Section</td>
<td>Description</td>
<td>Resource</td>
<td>Authors</td>
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</table>
and quality control measures (Need to solidify ICA methodologies for interconnection and planning use cases before developing valuation and QA/QC methods)

| IV.3. Explore divergences and tradeoffs between methods employed by SCE and PG&E vs. SDGE to create load shapes at the feeder, transformer, and customer levels. WG reached consensus on utilizing IOUs’ Demo A load shape development methodologies for initial system-wide rollout | WG Report - 9 | Joint IOUs |
Smart inverters is a Group I topic. These two written responses were developed after the submission of the Group I status report.

Item 5: Smart Inverters

IOU Comments on Non-Utility Joint Initial Proposal
ICA Working Group
August 29, 2017

IOUs agree with stakeholders that the technical benefits of smart inverters should be incorporated to ICA as soon as practicable. However, in order to do so, the system modeling tools used to calculate the ICA must be updated to effectively and efficiently incorporate the Smart Inverter function to the ICA automated algorithms.

Currently the tools require that smart inverter functions, in particularly, the Volt/var function be performed manually for each power flow simulation. That is, at each node, it is require that the engineer assigns the volt/var curve for the DER specified at each node. Given the millions of electrical nodes which will have to be analyzed as part of ICA, it is imperative that the modeling tool incorporate the smart inverter volt/var function within the automated ICA modules. Without this automation being incorporated in the modeling tools, it would be an impossible task for engineers to perform this evaluation for all the electrical nodes.

Furthermore, in order to determine how the modeling tools need to be updated, more robust analysis must be performed. While in Demonstration Project A, limited ICA with volt/var curve was performed, that analysis was geared toward determining how the proposed volt/var curve would affect ICA values not how the tools would need to be modified to effectively incorporate. Also, in that analysis, the IOUs assumed that a reactive power would always be available (reactive power priority) and the IOUs did not take into account that smart inverters would be program as active power priority as currently allowed in Rule 21.

For the reasons specified below, the IOUs believe that a proper method of incorporating Smart Inverter’s Volt/var function into ICA is as outlined in the Joint IOU proposal:

- Performed more detail analysis to determine how the tools should be updated to performed an automated ICA process
- Work with modeling tool vendors to incorporate the required functions
- Update ICA with Smart Inverter ICA values when the volt/var functions has been incorporated in the modeling tools ICA modules
Item 5: Smart Inverters

CALSEIA and IREC reply to IOU response
ICA Working Group
October 27, 2017

Comments

In response to comments from non-utility parties on smart inverter functionality, the IOUs submitted comments to the Working Group on September 29. In those comments, the IOUs seemed to back away from their earlier proposal for extensive new studies on potential changes to the Volt/Var curve. Instead, they stated “the system modeling tools used to calculate the ICA must be updated to effectively and efficiently incorporate the Smart Inverter function to the ICA automated algorithms.” We agree this is the work to be done and that reactive power priority should be assumed for the smart inverter functionality.

In the response document, the IOUs offer three bullet points as steps forward:

1. Perform more detail analysis to determine how the tools should be updated to performed an automated ICA process.
2. Work with modeling tool vendors to incorporate the required functions.
3. Update ICA with Smart Inverter ICA values when the volt/var functions has been incorporated in the modeling tools ICA modules.

We agree with the second and third points, but the first point is still a vague statement about the need for more study: “Perform more detail analysis to determine how the tools should be updated to perform an automated ICA process.” In absence of clarity on what this analysis would entail and when it would be completed, the IOUs should simply be working with the software vendors to incorporate smart inverter functionality and use it in the ICA calculations. If there is a problem getting the modeling tools to converge on a solution when smart inverters are enabled, it can be addressed by the IOUs and the software vendors working together to refine the tools.

While we are not opposed to the IOUs doing ongoing internal research and analysis as they roll out the ICA, we believe that it is essential that the smart inverter functionality being deployed in California be included in the ICA. Without its inclusion the ICA results will be inaccurate and likely under-calculate available capacity.

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4 The IOU document was dated August 29, which was presumably a typo.
ACR Item A: Single Phase
Joint IOUs’ Initial Proposal
ICA Working Group

Summary of Recommendations

● Utilities to evaluate one feeder to use as baseline to estimate the following:
● Utilities to evaluate applicability of DER connecting to single phase DER
  ○ What type of DER connects to single phase
  ○ What level of DER typically requires 3 phase
● Analysis should commence in Q1 2018 with results to be delivered in Q2 2018

Introduction and Background

As part of the Demonstration Project A working group meetings, the possibilities to calculate single phase ICA was discussed. In those discussion, the IOUs agreed that ICA values for single phase radial nodes could be additional ICA data which may be provided but stated that accurate ICA values would be difficult to be determined because of the limitation of information for single phase radials and limitation of the modeling tools.

Discussion

In order to accurate determine ICA at single phase laterals, it is necessary accurately model the conditions are currently in the field. Two major sets of information are required in addition to that of what is required for 3phase ICA calculations:

1. Phasing information. This information depicts how the electrical single phase and its single phase load (aΦ, bΦ, cΦ) is connected to the 3 phase system. In the modeling of the network, it is important that the each of the laterals accurately represents to which phase it is connected in the field. Not having the proper phasing information may potentially yield inaccurate ICA values

2. Single Phase fusing information. This information depicts how the single line radials are protected. In order to calculate the ICA value for protection, the fuse size is required as to insure that the ICA value does not exceed what ratings of the protection fuse

This information above is depicted in figure 1
In addition to the data stated above (phasing and fusing), the ICA tool needs to be modify to take into account limitation such as voltage imbalance, load imbalance, protection limitation on imbalance load, etc.

**Conclusion and Next Steps**

The IOUs proposed to evaluate one feeder to approximate the following areas what would be required for system wide roll-out.

- Single phase radials will be displayed in the IOU’s interconnection maps as part of the 2018 system wide rollout of ICA.
- Level of complexity to accurate determine the properties of each single phase lateral including phasing, fusing (protection) and other related characteristics
- Cost of having to verify each single phase radial
- Time required to be able to complete system wide evaluation
- The capabilities of the existing modeling tools to account for impacts of single phase DER installations such as single phase limits caused by balancing
- Potential use of single phase ICA values
- Commence evaluation Q1 2018
- Deliver results Q2 2018
ACR Item A: Single Phase

ORA’s Initial Proposal
ICA Working Group

Summary

- Given prior CPUC direction regarding ICA and single phase circuits, the IOUs’ evaluation of expanding ICA analysis should be well underway.
- The IOU proposal to provide a simplistic evaluation beginning in 2018 is unreasonable.
- ORA proposes that a more detailed evaluation, as discussed below, be completed by December 1, 2017.

Introduction and Background

For the initial ICA deployment, ICA values will be calculated and presented for all three phase circuits, but only the location of single phase circuits will be shown on ICA maps.\(^5\) The proportion of distribution circuits that are single phase is significant. For example, they represent 34% of circuit miles and feed 50.0% of customers for PG&E.\(^6\) SCE has indicated that most DER connected under NEM are on single phase circuits. The IOU presentation to the Working Group on September 19 and the IOU initial proposal provided reasons why expanding the ICA analysis to all circuits would be difficult:

- The information for single phase laterals is not as accurate as that of three phase systems,
- Single phase laterals have significant limitations based on capacity, load imbalance, and fusing,
- Limitation of the modeling tools.

The status and limitations of single phase circuit hosting capacity were discussed at the September 19 meeting, and WG members noted the ICA methodology details must account for the limits of these circuits. For example, if a small rooftop PV is the primary source of DER on single phase circuits, iterative ICA using a 500 kW increment may have limited value. The IOUs’ initial proposal offers to evaluate “one feeder” to determine the feasibility and cost of performing ICA on single phase circuits, and lists the scope and schedule of the evaluation.

Discussion

ORA agrees that the feasibility of extending ICA to single phase circuits needs to be evaluated, and that if deemed viable, whether methodological modifications are required based on the unique characteristics of single phase circuits and the loads and DER connected to them. However, ORA does not agree with the IOU proposal. First, system level conclusions cannot be gleaned from evaluation of a

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\(^5\) Cite to D.17-09-026.
\(^6\) PG&E response to data request ORA-PG&E-3, Q2. 33% of overhead circuit miles and 39% of underground circuit miles are single phase. This data is valid as of September 24, 2015.
single circuit. Moreover, the IOUs should have already evaluated the scope of the issue and potential mitigation costs based on existing CPUC guidance. Second, the IOU proposal provides limited details for a single evaluation on one circuit than detailed evaluations that will yield accurate estimates for each IOU’s system.

Third, ORA believes it is important to document the baseline condition of single phase circuits, including why IOUs lack fundamental information about these circuits and how it fulfills its obligations under PUC 451 without this information. The IOUs have explained that they lack information on single phase portions of its distribution system, but have not explained why this situation exists or how the lack of this information impacts planning and operations. A similar situation existed for three phase circuits, but in that instance, the issue pertained to compiling and verifying data that already existed. In contrast, the IOUs’ presentation and initial proposal implies that data on phasing of loads, fuses, and conductors for single phase circuits is inaccurate or non-existent. This lack of information on single phase circuits is troubling considering that the IOUs state that single phase circuits are “designed with levels of load as to not create significant imbalance - Imbalance creates circuit overloads, operational issues, voltage issues.” It is unclear how the IOUs currently are able to manage these issues without accurate information on phasing, fusing, and physical characteristics of the circuit, such as the type of wire or conductor.

Finally, PG&E stated in the meeting that it was currently evaluating a method of determining phase information through an EPIC project. This and other similar projects should be defined, and the timing of results should be incorporated into IOU evaluations of this issue.

Conclusion and Next Steps

The IOU initial proposal is inadequate and untimely. ORA proposes the following next steps

- Single phase radials will be displayed in the IOU’s interconnection maps as part of the 2018 system wide rollout of ICA.
- Each IOU should separately provide a proposal based on the specific situation within its service territory including the following by December 1, 2017:
  - Scope of single phase or other types of circuits (e.g. two phase, network, etc.) currently excluded from the ICA in terms of circuit miles and customers served,
  - Summary of the types of customers currently connected to non-three phase circuits,
  - Summary of the types of DER currently connected to non-three phase circuits,
  - Detailed information on the type of required circuit data that is not currently available, and the scope of the lack of data (hypothetical example: SDG&E lacks accurate phasing data for all single phase circuits feeding single family residences)

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7 Inaccuracy of wire/conductor type is indicated on page 10 of the ICAWG September 19, 2017 slide deck.
8 Page 11 of the ICAWG September 19, 2017 slide deck.
9 Electric Program Investment Charge (EPIC) project #2.14 “Automatically Map Phasing Information.” Per PG&E, this project is scheduled to be completed in December 2017.
- Detailed information on the quality of existing data, and the steps required to convert the data into model inputs consistent with ICA requirements,
- An explanation of why the required data does not currently exist, and how the IOU meets the requirements of PUC 451 without this data. This explanation should include discussion of planning and operational procedures that are used in lieu of this data.
- Existing challenges the IOU is experiencing because of the lack of data,
- A detailed evaluation plan describing how it will determine an accurate system wide cost and schedule for collecting and validating the required data, and making the data available to the ICA calculation process,
- Results of discussions to date with ICA software vendors regarding the technical challenges, estimated cost, and timing of extending ICA to single phase circuits,
- List of related pilot, demonstration, or other RD&D projects and current estimate of completion.

WG members should review the IOU proposals by December 15, 2017 and provide a review to include in the final ICA WG report. This report should also address the potential use of single phase ICA values.
ACR Item E: Method for Reflecting the Effect of Potential Load Modifying Resources on Integration Capacity

Joint IOUs’ Initial Proposal
ICA Working Group

Summary of Recommendations

- Maintain current ICA calculation methods
- Maintain current methods for integrating existing DERs within the ICA

Introduction and Background

In the ICA Working Group (WG) formed for Demo A, some stakeholders expressed desire for the ICA to reflect the effect of load modifying resources (LMR). The final WG report included this item as a non-consensus item and stated that all DERs are load modifying resources. With this in mind, the ICA WG long term scoping document rescoped this item to include probabilistic modeling approaches and LMR impact on key indicators and historical and forecast load profiles.

Discussion

ICA as an interconnection and planning tool is intended to provide DER developers the hosting capacity at each electrical node that will not result in distribution upgrades. With this value, the developer can enter the interconnection queue and have a reasonable amount of certainty that an upgrade will not be triggered if the project is below the ICA limits.

A probabilistic approach to ICA would determine the limits for each criterion based on a range of values for load and DER. The calculated ICA limits would then also be a range, and not provide the certainty required for the interconnection study process. Upon submitting an interconnection application, a DER project would then trigger a study by the IOUs, which would run counter to the goals of the ICA, which is to streamline the interconnection process. Further, depending on how the study is performed, upgrades may be identified for the project even if it is sized within the identified ICA range. For these reasons, the IOUs propose to maintain the current ICA method, which provides more certainty within the interconnection study process.

In addition to probabilistic approaches, stakeholders expressed concern that existing DERs are not added into the load profiles that are used within the ICA. Without including the impact of existing DERs, the thought is that the ICA may overestimate the available capacity. At the September 19th ICA WG meeting, the IOUs explained that the load profiles used within the ICA are inclusive of both the existing load and DER installed on the distribution system. in this manner, the impact of existing DERs is already accounted for when calculating the ICA limits.
Conclusion and Next Steps

- Probabilistic ICA calculations can degrade the usefulness of the ICA for interconnection and planning.
- The ICA currently reflects the effects of LMR in the existing load curves which are then used in forecasting.
- No modifications are necessary to incorporate LMR.
ACR Item E: Method for Reflecting the Effect of Potential Load Modifying Resources on Integration Capacity

ORA Proposal
ICA Working Group

Summary of Recommendations

- ORA supports recommendations from the IOU initial proposal.
- Investigation of more robust methods to reflect the impact of Load Modifying Resources (LMRs) on hosting capacity should be retained as a long-term issue to be considered after stakeholders have had the opportunity to use results from the initial ICA deployment and critique both the results and methodology used.

Introduction and Background

Please refer to IOU initial proposal.

Discussion

ORA agrees with the recommendations of the IOU proposal that current calculation methods are appropriate and should be maintained for the initial deployment and the near-long-term. However ORA understands that the load modifying characteristics of DER included in current load profiles are static, include many assumptions to provide a single load curve per circuit, and that the value of DER as flexible LMRs may be underestimated using the current approach. ORA agrees with the concerns expressed by the IOUs, but does not agree that the current treatment is the best one for the long-term. ORA, therefore, recommends that this issue be considered a long term issue to be addressed early in 2019 once the initial ICA has been deployed and stakeholders have had the opportunity to use it for each adopted use case.

Conclusion and Next Steps

- ORA supports the conclusions from IOU initial proposal.
- Investigation of more robust methods to reflect the impact of LMRs on hosting capacity should commence in early 2019.
WG Report Item 4: Develop Non-Heuristic Approach to Operational Flexibility

Joint IOUs’ Initial Proposal
ICA Working Group

Summary of Recommendations

- IOUs will display ICA with and without Operational Flexibility using the “reverse flow” method
- There is no established method other than performing power flows on various possible switching scenarios
- The IOUs continue to invite researchers and the vendor community to develop approaches to efficiently analyze abnormal conditions

Introduction and Background

The intent of the safety/reliability constraint is to ensure that all operational flexibility is preserved when DERs are added to the grid. Because the ability of the grid to tolerate reverse flow depends on the configuration, by prohibiting reverse flow at these points, the ICA determines the DER adoption that produces no reverse flow in any configuration. The WG recognized that the method used to determine operational flexibility is heuristic in nature and encouraged further discussion to determine non-heuristic methods to analyze operational flexibility.

The WG agreed and recommended that the operational flexibility criterion based on no reverse power flow across SCADA-operated devices is a reasonable short-term solution to the preservation of operational flexibility. The WG recommended that in the first system-wide rollout of ICA results, two sets of values be published, one with Operational Flexibility as a constraint and the other without.

Discussion

The IOUs will display ICA with and without “Reverse Flow” Operational Flexibility for implementation of ICA. No additional analytical approaches were provided to the working group other than what utilities have performed using reverse flow. Because of this the IOUs will start working with the vendor and research community on best methods to analyze abnormal switching conditions.

While the IOUs look to implement this approach, there will be challenges to face in performing it in a completely non-heuristic manner:

- There is no efficient method to create abnormal switching conditions in vendor tools other than manually opening and closing switches
- There could be hundreds of switching scenarios for a circuit so we must find a way to limit and decide which will be the most applicable configurations
• Calculation times and computing costs will significantly increase due to the multitude of possible switching conditions

EPRI was invited to speak on recent work that they have been performing on Operational Flexibility. They believe that the best procedure to determine absolute minimum hosting capacity for feeders is to analyze each individual state. Because of this EPRI believes that:

1. Planning Margins for a reduction in hosting capacity would be difficult to mandate
2. Operational Flexibility may be impractical to pre-calculate and better applied in operations on an as configured as needed basis.

The working group seems to generally agree with these two statements. We are in line with point 1 with our implementation of displaying ICA with and without the operational flexibility constraint applied. As for point 2, the working group also generally agrees that while informative, this constraint may be better applied in an operational sense within a Distributed Energy Management System. Operational flexibility could be too constraining to be applied as a planning margin within interconnection. However, the working group will work with the Rule 21 working groups to decide how the limit can help inform specific requirements that may be needed within the interconnection process.

**Conclusion and Next Steps**

• IOUs will display ICA with and without Operational Flexibility using the “reverse flow” method
• IOUs will work with vendor and research community on efficient and reasonable techniques to perform ICA on abnormal switching conditions.
• Coordinate with Rule 21 ICA Working Group on best application of “Operational Flexibility” within the interconnection rules and process.
WG Report Item 4: Develop Non-Heuristic Approach to Operational Flexibility
Joint IOUs’ Initial Proposal, with ORA edits
ICA Working Group

Summary of Recommendations

- IOUs will display ICA with and without Operational Flexibility (OpFlex) using the “reverse flow” method
- There is no established method other than performing power flows on various possible switching scenarios
- The IOUs continue to invite researchers and the vendor community to develop approaches to efficiently analyze abnormal conditions
- The IOUs will catalog SCADA operated devices in their systems and provide them to the CPUC and ORA

Introduction and Background

The intent of the safety/reliability constraint is to ensure that all operational flexibility is preserved when DERs are added to the grid. Because the ability of the grid to tolerate reverse flow depends on the configuration, by prohibiting reverse flow at re-configuration points the OpFlex ICA values determine the DER adoption level that produces no reverse flow in any configuration. The WG recognized that this method used to determine operational flexibility is heuristic in nature and encouraged further discussion to determine non-heuristic methods to analyze operational flexibility and its impact on hosting capacity.

The WG agreed that it was acceptable to use this heuristic approach for the initial ICA deployment and further recommended that this operational flexibility criterion should be based on no reverse power flow across SCADA-operated switches and voltage regulators on the distribution circuits. Based on Demo A results, the OpFlex/safety criteria has a significant impact of overall ICA values. The WG recommended that in the first system-wide rollout of ICA results, two sets of values be published, one with Operational Flexibility as a constraint and the other without.

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10 Other parties are not included here due to data confidentiality and security issues. This is not intended to define actual distribution of this data based on the outcome of overarching discussions of data in the DRP context.
11 OpFlex/safety was the limiting criteria (in other words, the criteria that determined the overall ICA value) as follows based on Demo A final reports issued by each utility on December 27, 2016: for PG&E, 52% of rural DPA circuits and 33% of urban DPA circuits (see Figure 30, page 74); SDG&E provided a snapshot of two circuits in which safety set the ICA value in 17 of 24 scenarios using the streamlined ICA methodology (see Tables 3 and 4 in Section 5); SCE did not provide quantified impacts, but stated “while removing the OpFlex ICA limitation category would significantly increase the Integration Capacity...” (see page 73.)
Discussion

The IOUs will display ICA with and without “Reverse Flow” Operational Flexibility for initial implementation of ICA. No additional analytical approaches were provided to the working group other than what utilities have performed using reverse flow. Because of this the IOUs will start working with the vendor and research community on best methods to analyze abnormal switching conditions. While the IOUs look to implement this approach, there will be challenges to face in performing it in a completely non-heuristic manner:

- There is no efficient method to create abnormal switching conditions in vendor tools other than manually opening and closing switches
- There could be hundreds of switching scenarios for a circuit so we must find a way to limit and decide which will be the most applicable configurations
- Calculation times and computing costs will significantly increase due to the multitude of possible switching conditions

EPRI was invited to speak on recent work that they have been performing on Operational Flexibility. They believe that the best procedure to determine absolute minimum hosting capacity for feeders is to analyze each individual state. Because of this EPRI believes that:

1. Planning Margins for a reduction in hosting capacity\textsuperscript{12} would be difficult to mandate,\textsuperscript{13}
2. Operational Flexibility may be impractical to pre-calculate and better applied in operations on an as needed basis to evaluate reconfiguration options,
3. It might be more practical to recalculate hosting capacity on a daily basis and use those results to potentially curtail DER.

The working group seems to generally agree with these statements. We are in line with point 1 with our implementation of displaying ICA with and without the operational flexibility constraint applied. As for point 2, the working group also generally agrees that while informative, this constraint may be better applied in an operational sense within a Distributed Energy Management System. Operational flexibility could be too constraining to be applied as a planning margin within interconnection. However, the working group will work with the Rule 21 working groups to decide how the limit can help inform specific requirements that may be needed within the interconnection process. Regarding point 3, some non-IOU working group members suggested that since abnormal circuit configurations exist for limited

\textsuperscript{12} “Planning Margin” in this case is establishing a hosting capacity value lower than baseline value to account for circuit reconfiguration. For example, if the hosting capacity for a circuit using an ICA without OpFlex criteria is 10 MW, a 50% planning margin would yield a hosting capacity of 5 MW.

\textsuperscript{13} The difficulty is not mandating a planning margin per se, but establishing a margin that is accurate for all circuits, loads, DER penetration, and reconfiguration options. A fixed planning margin like 50% could be too restrictive for DER is some cases, and insufficient to mitigate safety and reliability concerns in others.
periods of time, other alternatives need to be considered including DER curtailment using Phase 3 smart inverter functions, and limiting circuit reconfigurations.\(^\text{14}\)

As part of the investigation of alternatives to non-heuristic safety criteria, ORA recommends that each IOU catalog the SCADA devices in its distribution system that will be used in the short term OpFlex criteria and provide the results to the CPUC and ORA. Without this data, the CPUC will lack an understanding of how restrictive the OpFlex criteria is, and the level of added accuracy other alternatives provide relative to the short-term OpFlex criteria. This information will allow the benefit to be defined in cost benefit analyses which should accompany an evaluation of alternatives. For example, outage costs are highest for commercial and industrial (C&I) customers, so evaluation of alternative methods would benefit from information on the level of SCADA automation on predominantly C&I circuits. ORA acknowledges that there is an open issue of how this information will be shared beyond the CPUC and ORA. While this is an important issue, ORA believes it is out of scope of the current discussion.

**Conclusion and Next Steps**

- IOUs will display ICA with and without Operational Flexibility using the “reverse flow” method.
- IOUs will work with vendor and research community on efficient and reasonable techniques to perform ICA on abnormal switching conditions.
- Coordinate with Rule 21 ICA Working Group on best application of “Operational Flexibility” within the interconnection rules and process.
- The IOUs will catalog SCADA operated devices in their systems and provide them to the CPUC and ORA.

\(^{14}\) WP members acknowledge that limiting circuit reconfigurations would result in outages impacting more customers or outages with longer duration, but suggest that this undesirable “cost” must be compared to the costs and benefits of other alternatives.
WG Report Item 5: DERs That Serve Peak Load
Joint IOUs’ Initial Proposal
ICA Working Group

Summary of Recommendations

- Continue to utilize the existing ICA load profiles
- DER providers should utilize existing load profiles to determine ability to serve peak load

Introduction and Background

In the ICA Working Group (WG) formed for Demo A, stakeholders from Solar Retina expressed desire for the ICA to identify peak load days, and to correlate the ICA curves to specific weather conditions. Within the working group long term scoping documents, this issue was further clarified to evaluate a proposal to add four additional load shapes to the ICA.

Discussion

Stakeholders from Solar Retina expressed the desire to have additional ICA profiles that would allow the scheduling of DERs to meet the demands of hot days, while self-restricting generation on cold days so as not to exceed the ICA limits. The published ICA limit was thought to be too restrictive, and that significant capacity is left on the table that could be utilized by a DER system if properly operated such that it does not violate any ICA limit.

The IOUs note that applicants to Rule 21 and WDAT are not restricted on the size of the system they can install, rather, their respective interconnection agreements spell out dispatch limitations. If a DER provider wants to install a larger system, and have it restricted to a lower dispatch to meet distribution system limitations, they are free to do so, so long as they don’t cause voltage, thermal, or other criteria violations. The current ICA curves give a very good indication as to the size of DER required to meet those high load conditions, while also providing the dispatch limit it is likely to see during low load conditions.

Regardless of the granularity of the ICA, it remains a tool to be used in interconnection study, not an operating tool. Additional curves would not guarantee that a DER could reach a certain level of dispatch on a hot day. Due to system conditions, that DER could be limited by factors not considered in the ICA, such as abnormal circuit configurations. The DER’s interconnection agreement would still identify that the DER may be dispatch limited due to operating constraints, regardless of the value calculated in the ICA.
The IOUs expect that much of the concern surrounding this issue will be mitigated when new tools and systems such as DERMs are deployed that will allow real time dispatch instructions to be issued to DERs. The proliferation of smart inverters will also allow DERs to schedule dispatch based on day ahead schedules, as well as real time signals. In this manner, DERs will be able to load follow, taking advantage of those high load days will ensuring system integrity during low load days.

Conclusion and Next Steps

- Existing ICA curves appropriately account for high and low load days
- No modifications to the ICA are necessary to size a DER system to serve peak load
- Future operating tools and systems (such as DERMS) will enable DERs to load follow
- When the limiting ICA value is a protection limitation, the ability to increase the size of DER behind the ICA may not be available.
Item 5: DERs That Serve Peak Load
Joint IOUs’ Initial Proposal with IREC edits
ICA Working Group

Summary of Recommendations
- Continue to utilize the existing ICA load profiles
- DER providers should utilize existing load profiles to determine ability to serve peak load

Introduction and Background
In the ICA Working Group (WG) formed for Demo A, stakeholders expressed desire for the ICA to identify peak load days, and to correlate the ICA curves to specific weather conditions. Within the working group long term scoping documents, this issue was further clarified to evaluate a proposal to add four additional load shapes to the ICA.

Discussion
Stakeholders expressed the desire to have additional ICA profiles that would allow the scheduling of DERs to meet the demands of hot days, while self-restricting generation on cold days so as not to exceed the ICA limits. The published ICA limit was thought to be too restrictive, and that significant capacity is left on the table that could be utilized by a DER system if properly operated such that it does not violate any ICA limit.

The IOUs note that applicants to Rule 21 and WDAT are not restricted on the size of the system they can install, rather, their respective interconnection agreements spell out dispatch limitations. If a DER provider wants to install a larger system, and have it restricted to a lower dispatch to meet distribution system limitations, they are free to do so, so long as they don’t cause voltage, thermal, or other criteria violations. The current ICA curves give an indication as to the size of DER required to meet those high load conditions, while also providing the dispatch limit it is likely to see during low load conditions.

Further granularity in the load data would help customers further understand the possible operational configurations and interconnection parameters that might allow a customer to optimize the sizing and operation of their system without triggering significant upgrade costs. However, there are limitations to the modeling of the ICA that at this time would likely require projects to undergo some level of interconnection review if they are proposing operations designed to closely track past load curves.

The IOUs expect that much of the concern surrounding this issue will be mitigated when new tools and systems such as DERMIs are deployed that will allow real time dispatch instructions to be issued to DERs. The proliferation of smart inverters will also allow DERs to schedule dispatch based on day ahead schedules, as well as real time signals. In this manner, DERs will be able to load follow, taking advantage
of those high load days will ensuring system integrity during low load days. At this time, the working group determined that immediate work to increase the granularity of the peak load data was not a high priority, but it may be an issue that could be revisited over time as the ICA tool is deployed and its role in helping to optimize project siting and operations becomes more clear.

Conclusion and Next Steps

- Existing ICA curves appropriately account for high and low load days
- No modifications to the ICA are necessary to size a DER system to serve peak load
- Future operating tools and systems (such as DERMS) will enable DERs to load follow
- When the limiting ICA value is a protection limitation, the ability to increase the size of DER behind the ICA may not be available.
ACR Items B, C, and D: Ways to make ICA information more user friendly and easily accessible (data sharing), Interactive ICA maps, and Market sensitive information

More Than Smart summary, for WG review
ICA Working Group

Summary of Recommendations

- IOUs will include refinements to 1) load profiles display, 2) color display, and 3) range display within the first system roll out.
- CALSEIA will arrange another conversation with DER developers and the Joint IOUs on the functionality and usability of the ICA tool, to inform the user guide, map display, and potential development of an API.
- Stakeholders will provide additional information on what should be included in the ICA User Guide. It is not yet determined whether the User Guide will be available by the first system roll out.

Introduction and Background

During the development and review of Demo A, the Working Group agreed that the Joint IOUs should work to standardize the map and downloadable data set format for the first system rollout, and that additional enhancements to maps for the full system roll-out may be added by the utilities as allowed by their tools and respective limitations.

All IOUs make the following information available via downloadable data set from their Demo A projects: 1) Demo A final report; 2) ICA Translator; 3) load profiles; 4) customer type breakdown; 5) detailed ICA results by circuit. The WG agrees that the following attributes should be available across all three IOU maps: 1) circuit; 2) section ID; 3) voltage (kV); 4) substation; 5) system15; 6) customer breakdown percentage (agriculture, commercial, industrial, residential, other); 7) existing generation (MW); 8) queued generation (MW); 9) total generation (MW); 10) ICA with uniform generation (MW); 11) ICA with uniform load (MW); 12) integration capacity of a generic PV system (MW).

For additional enhancements, the Working group should discuss whether the addition may be included within the first system-wide rollout, as well as an estimate of associated IT requirements and potential costs.

Discussion
The Working Group discussed these three ACR combined items at the October in-person meeting. In addition to identified asks from stakeholders, the conversation was informed by a one-hour “Introduction to ICA” webinar aimed at DER developers, which gave additional insight on what modifications may make the ICA maps and downloadable data sets more user friendly.

The following items have been identified so far as additional refinements to increase data sharing and usability of the ICA tool, within the interconnection use case:

Development of an Queryable API

DER developers and some Working Group members have identified the development of a queryable application programming interface for the ICA tool to support search functions and possible integration with other tools. It is suggested that a good first step would be to understand what type of data developers are looking for, and in what format, before the Joint IOUs determine feasibility with their respective IT departments. The WG should also consider the applications of this request within the Rule 21 proceeding.

Map key and other map enhancements

WG members agreed that the Joint IOUs should use the same key and color scheme to represent integration capacity on the maps. First, the color ranges used to indicate hosting capacity ranges should be uniform across the IOUs. The Working Group discussed that red should represent a lower ICA (closer to the limit) and green should represent a higher ICA. The range that the colors represent should also be uniform. The Working Group discussed whether a fixed (e.g., MW increment) or relative range (e.g., 20% increments over the specific circuit) would be more useful. While the WG did not come to a conclusion, it agreed to pose the question to DER developers for input.

In addition to the map key, WG members identified several additional enhancements. First, Joint IOUs are asked to standardize how load profiles are displayed on the maps, using the same labelled axis units. The WG discussed how the primary criteria violation is identified and whether it should be shown on the map as well as within the downloadable data set. It was discussed that displaying the primary violation directly on the map interface may be too misleading or simplistic, and that the way it is displayed now in the downloadable Excel file may be sufficient. The Joint IOUs also discussed that some of the load profile information may fall under customer confidentiality issues. It was suggested that, for data that can’t be published, the ICA map should make a note of why the data is unavailable rather than showing a blank. Finally, stakeholders requested that the RAM map be available either as a toggle or a separate tab as part of the ICA map interface.

It was suggested that these changes may be included within the first system-wide roll out.

ICA User Guide
WG members agreed that an ICA User Guide should be created to facilitate the use of the ICA tool by developers. This user guide should cover the following:

- How to access and understand the downloadable Excel file
- Explanation of the operational flexibility ICA number
- How to use the ICA Translator tool

(Time estimate of when this will be available?)

**Conclusion and Next Steps**

- More Than Smart looks forward to comments from WG members to refine and include any additional desired enhancements to the ICA tool to improve user friendliness and data sharing capabilities, including from Joint IOUs on affirming timeline of when enhancements may be available (i.e., as part of the first system roll out, or as a goal for long-term refinement).
- CALSEIA will work with the Joint IOUs to schedule a follow up conversation with DER developers to better inform the usability conversation, particularly around 1) whether the ICA map should demonstrate fixed or variable ranges, 2) what should be included in the ICA user guide, and 3) how to potentially develop an API and what data is necessary to include.
WG Report Item 3: Incorporate Learnings from Track 3 DER Growth

Joint IOUs’ Initial Proposal
ICA Working Group

Summary of Recommendations

- Follow related proposals in Planning use case around using DER Growth
- Relating Growth to ICA will determine forecasted needs, but not necessarily upgrade solution

Introduction and Background

The ICA planning use case envisions that ICA will assist with future planning decisions. ICA, combined with DER growth forecasts (discussed under DRP Track 3, Sub-track 1), can be used to identify circuits that require upgrades to accommodate forecasted DER. This activity will take findings and recommendations from the Revised Frameworks and Assumptions document and/or the ACR Ruling on DER Growth Scenarios and incorporate any necessary changes into ICA, as appropriate.

The Interstate Renewable Energy Council (IREC) additionally presented discussion questions regarding methodologies for determining growth scenarios that are integrated with ICA, and how the ICA results can be used for planning and decision-making processes (including recommendations and results from the DRP Track 3 Sub-Track 1 workshops on DER growth scenarios). These questions are summarized from the original scoping proposal below:

a. An evaluation of the results of the ICA analysis integrated into the growth scenarios (and if the methodologies used provide accurate results that can be used for planning purposes, including annual distribution planning and informing assessments proposed for grid modernization).
b. Are the results actionable over a useful time period, and accurate and granular enough to identify where upgrades will be needed? Do the results inform which type of action that can be taken, or should they?

Discussion

As discussed within the Planning use case discussions, the growth can be used to help determine forecasted areas of system deficiency. Item 1 established some of the framework of which this would work and what technical considerations have to be considered. The details of the three points can be found in the Item 1 proposal and will follow the discussion there. They are:

1. Granularity of DER Growth Forecast projections
2. Application of ICA results in comparison to DER Growth Forecast
3. Which DER Growth to consider due to granularity and applicability in tariffs

As for the mentioned questions, the IOUs see the results of the analysis using ICA and growth scenarios to be sufficient in identifying possible deficiencies. Using the DER growth in conjunction with the ICA results will help provide locations and characteristics of forecasted deficiencies in the system to accommodate the expected DER growth. This assessment does not however provide a final solution set of identified projects to use in the GRC. This data set can then be provided to the distribution planning teams to continue with finding a solution to solve the deficiency. These solutions would be solved for and identified in conjunction with projects associated with loading to ensure a coordinated effort to solve the deficiencies.

The IOUs see usefulness and applicability to using the results to help inform the planning process. However, the results from the ICA process are not intended to be a solution set, but only an identification of available capacity. Thus the direct results of comparing DER growth and ICA will not directly result in needed upgrades and/or projects. It will simply be a point of information on deficiencies to host forecasted DERs which will be fed into the planning process to find coordinated solution sets with other planned work on the system.

The use of the forecasts was discussed to limit the inclusion of wholesale forecasts at this time. As time progresses, the wholesale forecasts will need to become more granular for use within the tools and processes to properly use. Also, the current cost sharing structure does not make it practical to include wholesale in the specific planning use case. That being said, cost sharing structures is a topic in the R.17-07-007 proceeding. These discussions will be followed and considered as appropriate.

Conclusion and Next Steps

- Use the Track 3 DER growth scenarios to compare/utilize with ICA to determine forecasted deficiencies to host DER for further study
- Do not use wholesale growth in analysis due to (1) lack of granularity/certainty of placement and (2) rules require them to mitigate and pay for the issues that they cause
Item 3: Incorporate Learnings from Track 3 DER Growth
IREC’s Proposal
ICA Working Group

Summary of Recommendations
- Follow related proposals in Planning use case around using DER Growth
- Relating Growth to ICA will determine forecasted needs, but not necessarily upgrade solution

Introduction and Background
The ICA planning use case envisions that ICA will assist with future planning decisions. ICA, combined with DER growth forecasts (discussed under DRP Track 3, Sub-track 1), can be used to identify circuits that require upgrades to accommodate forecasted DER. This activity will take findings and recommendations from the Revised Frameworks and Assumptions document and/or the ACR Ruling on DER Growth Scenarios and incorporate any necessary changes into ICA, as appropriate.

The Interstate Renewable Energy Council (IREC) additionally presented discussion questions regarding methodologies for determining growth scenarios that are integrated with ICA, and how the ICA results can be used for planning and decision-making processes (including recommendations and results from the DRP Track 3 Sub-Track 1 workshops on DER growth scenarios). These questions are summarized from the original scoping proposal below:

a. An evaluation of the results of the ICA analysis integrated into the growth scenarios (and if the methodologies used provide accurate results that can be used for planning purposes, including annual distribution planning and informing assessments proposed for grid modernization).
b. Are the results actionable over a useful time period, and accurate and granular enough to identify where upgrades will be needed? Do the results inform which type of action that can be taken, or should they?

Discussion
As discussed within the Planning use case discussions, the growth can be used to help determine forecasted areas of system deficiency, but it has not yet been determined or demonstrated which methodology is best suited to accomplish this goal or how accurate the results will be at identifying grid deficiencies (even assuming the forecast was completely accurate). Item 1 is currently under consideration and may provide some direction as to the manner in which the ICA combined with the growth forecasts may be used. The details of the three points can be found in the IOUs Item 1 proposal and will follow the discussion there. They are:

1. Granularity of DER Growth Forecast projections
2. Application of ICA results in comparison to DER Growth Forecast
3. Which DER Growth to consider due to granularity and applicability in tariffs

As for the mentioned questions, the IOUs see the results of the analysis using ICA and growth scenarios to be sufficient in identifying possible deficiencies. IREC does not believe there have been any results
published to support this conclusion at this time. There needs to be further discussion and analysis of which methodology should be used to run the planning scenarios. Some of the open questions include: If the forecasts are done only at the substation or circuit level, how does that impact the results of the ICA which is currently run on a nodal level? Is the iterative method the appropriate tool to run in conjunction with forecasts if the specific locations of the DER are not known (they likely never will be since the forecasts are a prediction only)? Are the results produced when combining a growth forecast with the ICA sufficiently accurate to guide decision making? Is the streamlined tool or a stochastic approach better suited to provide more meaningful results in light of the imprecise nature of the DER locations in any forecast?

Using the DER growth in conjunction with the ICA results could help provide locations and characteristics of forecasted deficiencies in the system to accommodate the expected DER growth. This assessment does not however provide a final solution set of identified projects to use in the GRC. This data set can then be provided to the distribution planning teams to continue with finding a solution to solve the deficiency. These solutions would be solved for and identified in conjunction with projects associated with loading to ensure a coordinated effort to solve the deficiencies. However, even though the DER growth + ICA results will not result in the final decision on what solutions are needed, it is still necessary to have a reasonably accurate starting point. Otherwise areas where needs might arise will be missed, or needs might be forecasted that won’t arise and unnecessary efforts could be expended to determine this.

The IOUs see usefulness and applicability to using the results to help inform the planning process. IREC also is optimistic that the ICA can be used in conjunction with the growth scenarios to guide decision making. However, the results from the ICA process are not intended to be a solution set, but only an identification of available capacity. Thus the direct results of comparing DER growth and ICA will not directly result in needed upgrades and/or projects. It will simply be a point of information on deficiencies to host forecasted DERs which will be fed into the planning process to find coordinated solution sets with other planned work on the system. However, this does not mean that relative accuracy of those results is not important since it will be a first step in determining where to analyze further.

The use of the forecasts was discussed to limit the inclusion of wholesale forecasts at this time. As time progresses, the wholesale forecasts will need to become more granular for use within the tools and processes to properly use. Also, the current cost sharing structure does not make it practical to include wholesale in the specific planning use case. That being said, cost sharing structures is a topic in the R.17-07-007 proceeding. These discussions will be followed and considered as appropriate. While IREC agrees that there are challenges associated with incorporating wholesale projects into the forecasts, it should also be recognized that, for those same reasons, the results are not likely to be as meaningful in terms of predicting where upgrades may or may not be needed if wholesale projects are left out. There is a risk that this could mask opportunities for cost sharing and use of DERs to defer upgrades as well. The Commission should be aware of this as it considers actions based upon the ICA results.

**Conclusion and Next Steps**

- Further discussion and analysis may be needed to understand how to ensure sufficiently accurate ICA results when layering on forecasts which are not precise regarding DER locations.
• Use the Track 3 DER growth scenarios to compare/utilize with ICA to determine forecasted deficiencies to host DER for further study
• Do not use wholesale growth in analysis due to (1) lack of granularity/certainty of placement and (2) rules require them to mitigate and pay for the issues that they cause. Consider how this may impact the meaning of the results in later decision making processes.
Item 3: Incorporate Learnings from Track 3 DER Growth

Joint IOUs’ Initial Proposal with ORA tracked revisions
ICA Working Group

Summary of Recommendations
- Follow related proposals in Planning use case around using DER Growth
- Relating Growth to ICA will determine forecasted needs, but not necessarily upgrade solution

Introduction and Background
The ICA planning use case envisions that ICA will assist with future planning decisions. ICA, combined with DER growth forecasts (discussed under DRP Track 3, Sub-track 1), can be used to identify circuits that require upgrades to accommodate forecasted DER. This activity will take findings and recommendations from the Revised Frameworks and Assumptions document and/or the ACR Ruling on DER Growth Scenarios and incorporate any necessary changes into ICA, as appropriate.

The Interstate Renewable Energy Council (IREC) additionally presented discussion questions regarding methodologies for determining growth scenarios that are integrated with ICA, and how the ICA results can be used for planning and decision-making processes (including recommendations and results from the DRP Track 3 Sub-Track 1 workshops on DER growth scenarios). These questions are summarized from the original scoping proposal below:
  a. An evaluation of the results of the ICA analysis integrated into the growth scenarios (and if the methodologies used provide accurate results that can be used for planning purposes, including annual distribution planning and informing assessments proposed for grid modernization).
  b. Are the results actionable over a useful time period, and accurate and granular enough to identify where upgrades will be needed? Do the results inform which type of action that can be taken, or should they?

Discussion
As discussed within the Planning use case discussions, the growth can be used to help determine forecasted areas of system deficiency. Item 1 established some of the framework of which this would work and what technical considerations have to be considered. The details of the three points can be found in the Item 1 proposal and will follow the discussion there. They are:

1. Granularity of DER Growth Forecast projections
2. Application of ICA results in comparison to DER Growth Forecast
3. Which DER Growth to consider due to granularity and applicability in tariffs

As for the mentioned questions, the IOUs see the results of the analysis using ICA and growth scenarios to be sufficient in identifying possible deficiencies. Using the DER growth in conjunction with the ICA results will help provide locations and characteristics of forecasted deficiencies in the system to accommodate the expected DER growth. However, given known and unknown uncertainties in circuit
This assessment does not however provide a final solution set of identified projects to use in the GRC and other uses identified in the ICA planning use case. This data set can then be provided to the distribution planning teams to continue with finding a solution to solve the forecast deficiency. These solutions would be solved for and identified in conjunction with projects associated with loading to ensure a coordinated effort to solve the deficiencies.

The IOUs see usefulness and applicability to using the results to help inform the planning process. However, the results from the ICA process are not intended to be a solution set, but only an identification of potentially available capacity. Thus the direct results of comparing DER growth and ICA will not directly result in needed upgrades and/or projects. It will simply be a point of information on deficiencies to host forecasted DERs which will be fed into the planning process to find coordinated solution sets with other planned work on the system.

The use of the forecasts was discussed to limit the inclusion of wholesale forecasts at this time based on the assumption that wholesale DER is not included in the IEPR forecast. As time progresses, the wholesale forecasts will need to become more granular for use within the tools and processes to properly use. Also, the current cost sharing structure does not make it practical to include wholesale in the specific planning use case. That being said, cost sharing structures is a topic in the R.17-07-007 proceeding. These discussions will be followed and considered as appropriate.

**Conclusion and Next Steps**

- Use the Track 3 DER growth scenarios to compare/utilize with ICA to determine forecasted deficiencies to host DER for further study
- Do not use wholesale growth in analysis due to (1) lack of granularity/certainty of placement and (2) rules require them to mitigate and pay for the issues that they cause
ACR Item F: Develop ICA Validation Plans
Joint IOUs’ Initial Proposal
ICA Working Group

Summary of Recommendations

- Continue to validate through comparative assessments across tools
- Evaluate effectiveness in streamlining interconnection process when implementing in Rule 21
- Continue to drive alignment on IEEE 123 feeder (Item 8) and use learnings to inform validation and comparison across tools and stakeholders
- Continue alignment of use of hourly metering data to reduce the main driver of uncertainty in the model (Item 9)

Introduction and Background

This activity was outlined in the May 23, 2016 ACR as a long-term refinement item. A scoping proposal was presented by LNBL/LLNL, and discussed by the WG. The scoping proposal identifies that any of the concerns with the initial ICA methods have been addressed by moving to more of the iterative methods (i.e., direct simulation of the distribution grid using the commercial models), applying the analysis to all feeders, etc. Some questions regarding validation still remain, as outlined below, and more fully in the scoping proposal.

The original scoping proposal developed a number of questions – a summary of the types of questions are included here. The WG should refer to the original proposal when it begins discussion of this topic.

i) What are the objectives of validation (e.g., believability, repeatability, applicability, etc.)?
ii) Which components need to be verified (input, methodology, tools)?
   i. With regards to input data, what steps should be taken by IOUs, and how well are capabilities and impacts of DER captured in the hourly profile?
   ii. Within the methodology, are methods/assumptions transparent, and can results be compared across ICA methods (e.g., EPRI, Sandia, NREL)
   iii. With regards to verifying the tools, how do results compare across tools (e.g., CYME, Synergi, OpenDSS, GridLab-D)?
iii) How much uncertainty exists, how much is acceptable, and where can it be reduced?
iv) What are the appropriate datasets to serve as a reference point for validation and third-party improvements to the method (e.g., IEEE 123, IEEE 8500, PG&E 12 representative feeders)?

Discussion
There is much overlap with the comparative assessment item and thus will utilize recommendations from that proposal where appropriate.

The main objective of the validation is to provide transparency and confidence on the results. The IOUs see two main ways to approach validation. The first is to continue down the path of industry engagement and comparison across tools as being explored in Item 8. The second is to evaluate usefulness of results towards application in the interconnection process. As ICA is implemented into Rule 21, the IOUs can start to see how well it helps streamline the process.

As far as the input components, the IOUs always strive to ensure data is adequate to serve the analytical need and continue to increase precision of data to help make better models where feasible and cost effective. The main component to which the IOUs see great importance to its impact to the analysis is the load allocation inputs to the model. As performed in Demo A, the IOUs are making sure to use the hourly metering data that is available to help allocate loading throughout the model more appropriately. As for transparency of methods/assumptions/tools, the IOUs can rely on the continuation of comparative analysis (Item 8) and reporting of methods and assumptions already provided to the working group. The IOUs see the most uncertainty being in the loading of the circuits and how it is allocated in the model. The use of hourly metering data drastically helps reduce uncertainty around loading in the model.

As established in Item 8 the best starting reference point at the moment is the IEEE 123 feeder. The comparative assessment will ensure to align and compare on that model and then progress to more complex models.

**Conclusion and Next Steps**

- Continue to validate through actions in comparative assessments (item 8) across tools use learnings to inform validation and comparison across tools and stakeholders
- Evaluate and compare with interconnection studies during implementation
- Continue alignment of use of hourly metering data to reduce the uncertainty in the model (Item 9)
ACR Item G: Definition of QA/QC of ICA
Joint IOUs’ Initial Proposal
ICA Working Group

Summary of Recommendations

● Utilize efforts in Item F to evaluate effectiveness of results within interconnection process
● Utilize efforts in item 3 and F to compare and validate results across tools and stakeholders to provide a common level of assurance and collective consensus

Introduction and Background

This activity was listed in the May 23 ACR, but the WG had decided to re-visit this topic after Demo A results are published and after the planning use case methodology is solidified before identifying what QA/QC measures may be needed.

i) What QA/QC methods are necessary for ICA, for both use cases?
ii) Are there additional QA/QC verification needed by either the software vendor or IOU?

Discussion

QA/QC for Use Cases

As with Item F, this item has much overlap with item 8 as well as item F itself. As mentioned in item F, the main concern is transparency and confidence around results. This is achieved through (1) discussing methods and assumptions with and across stakeholders, (2) comparing independent results with stakeholders, and (3) relating to operational data point of intended use.

Point 3 has the most applicability to QA/QC so we can explore that further. The most relevant data point to help inform QA of ICA is the interconnection process. Evaluating effectiveness of ICA in the interconnection process from item F can be used to help this item. Interconnection is relatively deterministic in comparison to a planning assessment and thus has more applicability of this method. Since the planning use case is generally doing the same analysis, then it will get informed by this effort as well. However, there is some probabilistic nature within the planning assessments that won’t be properly informed by comparing to interconnection applications. Since we cannot perform assessments of randomly placing DERs across the utility grid and switching them on and off, we must rely on the scientific method to help us. Using item 3 and F by comparing across stakeholders and tools helps provide a scientific method of reaffirming that what we are doing is the most appropriate method.

Proposed Definitions
• **Interconnection QA/QC** will be defined as effectiveness in providing appropriate answer to pass screens when compared to the results of the normal interconnection study process

• **Planning QA/QC** will be defined as the validation and replicability of results within different tools and stakeholders

**Conclusion and Next Steps**

• Utilize efforts in Item F to evaluate effectiveness of results within interconnection process

• Utilize efforts in item 3 and F to compare and validate results across tools and stakeholders to provide a common level of assurance and collective consensus
WG Report Item 9: Load Shapes
Joint IOUs’ Initial Proposal
ICA Working Group

Summary of Recommendations

- The IOUs utilize a similar approach to gather data to create load shapes as in Demo A.
- Recommend utilizing the same methods, data sources and means to create load shapes as this is similar and consistent amongst the IOUs.

Introduction and Background

- This activity originated from the ICA working group (WG) scoping document with the objective that the WG will revisit the means the IOUs develop load shapes, first fully understanding the differences and tradeoffs between those methods used in Demo A, then discussing proposed improvements.
- The WG discussed these methodologies in detail and agreed upon their use in Demo A, but further explored reasons for divergence in methodology, as well as trade-offs between methods, as part of long-term refinement.

Discussion

- All IOU’s gather data and create Load shapes from the following profiles:
  - Customer Load Profiles
    - Developed from AMI Data
    - Aggregated at the service transformer
  - Service Transformer Load Profiles
    - Aggregation of customer profiles
  - Circuit Load Profiles
    - Developed from SCADA data
  - Substation Load Profiles
    - Developed from SCADA data

Conclusion and Next Steps

- The means the IOUs use to develop load shapes are similar and consistent amongst the IOUs.