



February 10, 2023

The Honorable Chair and Members
of the Hawai'i Public Utilities Commission
Kekuanao'a Building, First Floor
465 South King Street
Honolulu, Hawai'i 96813

Subject: Docket No. 2017-0352 – To Institute a Proceeding Relating to a Competitive Bidding Process to Acquire Dispatchable and Renewable Generation Request to Incorporate IEEE 2800-2002 Into Stage 3 RFP for O'ahu, Maui, and Hawai'i Island

Dear Commissioners:

In the updated Exhibit 1 filed by the Hawaiian Electric Companies¹ on January 31, 2023 (“Exhibit 1 Update”) in the subject proceeding, the Companies indicated that they are in the process of reviewing the Standard for Interconnection and Interoperability of Inverter-Based Resources Interconnecting with Associated Transmission Electric Power Systems (“IEEE 2800-2022”) released by the Institute of Electrical and Electronics Engineers (“IEEE”) for inclusion as a requirement to the Stage 3 Request for Proposals (“RFP”) Power Purchase Agreements (“PPAs”). In accordance with the Companies’ commitment in the Exhibit 1 Update, and the Commission’s letter dated February 7, 2023, issued in the subject proceeding, the Companies respectfully request Commission approval for the following:

1. To incorporate certain specific elements from IEEE 2800-2022 in the project performance standards in the model Renewable Dispatchable Generation and Energy Storage PPA Project Specific Addendums (“PSAs”) of all Stage 3 RFP PPAs; and
2. An extension of time to receive bids in the Stage 3 Hawai'i Island RFP.

Since the release of IEEE 2800-2022, there has been increasing understanding and awareness, both industry-wide and within the Companies, of the critical importance in adopting the minimum requirements identified in the standard. Adopting this standard now for the Stage 3 RFPs is critically important to ensure the latest standards for performance are incorporated into projects that will contribute significant generation to the Companies’ system grids for the next 20-30 years. One primary driver highlighting the need for these standards is the findings from disturbance

¹ Hawaiian Electric Company, Inc. (“Hawaiian Electric”), Hawai'i Electric Light Company, Inc. (“Hawai'i Electric Light”), and Maui Electric Company, Limited (“Maui Electric”) are collectively referred to as the “Hawaiian Electric Companies” or “Companies”.

reviews involving inverter-based resources, such as the major Odessa Events in 2021 and 2022.² While the transmission operator in the area, ERCOT, had a performance based requirement already, disturbance reviews found that more detailed requirements with additional specificity similar to IEEE 2800-2022 and NERC Reliability Guidelines are needed, and that several of the IEEE 2800-2022 requirements address specific issues involved in the loss of various inverter-based resources (“IBR”) and resulting in a major disturbance. According to NERC’s 2022 Odessa disturbance report, several IBR plant performance related issues are identified which are not currently addressed in the Companies’ PSAs, but are addressed in IEEE 2800-2022. These issues could also cause similar or even worse system disturbances on the Companies’ systems. Examples of specific issues identified from the Odessa disturbance investigation include the following:

1. Inverter instantaneous overvoltage tripping – According to the NERC 2022 Odessa disturbance report, this is a “persistent and recurring cause” of unexpected tripping of an IBR plant. This issue has also been observed in a recent stability study of Hawaiian Electric’s system. In the current Stage 3 PSA, there is no spelled out requirement to address this issue in the performance standards. However, in IEEE 2800-2022, there is a transient overvoltage ride-through requirement and an instantaneous overvoltage protection requirement, which provides clarity to performance requirements to address this inverter instantaneous overvoltage tripping issue.
2. Inverter instantaneous overcurrent tripping – This is another major unexpected tripping cause of IBR in the Texas Odessa event. Currently, in the Companies’ Stage 3 RFP PSAs, there is no performance requirement regarding the instantaneous overcurrent protection. With adopting the IEEE 2800-2022 AC overcurrent protection requirement, the possibility of incorrect operation of AC instantaneous overcurrent protection will be minimized. Also, IBR plant developers will be required to coordinate with Companies regarding the AC instantaneous overcurrent protection inside the plant.
3. Monitoring data – Monitoring data, collected both at the plant point of interconnection and inside the plant, are critical for IBR plant performance validation and root cause analysis during future system event investigation. NERC recommends comprehensive monitoring both at the point of interconnection and inside the plant. The Companies currently impose an industry leading practice of requiring digital fault recorders monitoring voltage and current at the plant point of interconnection, but do not currently have requirements for inside plant monitoring. IEEE 2800-2022 provides a set of detailed requirements regarding monitoring data which address NERC’s recommendations.

In addition to reviewing reports and attending webinars from NERC, ESIG, and EPRI, the Companies reached out to several transmission operating areas including MISO, ERCOT, FPL,

² Major NERC events including the Odessa events can be found at <https://www.nerc.com/pa/rrm/ea/Pages/Major-Event-Reports.aspx>.

and ISO-NY, all of which are currently evaluating IEEE 2800-2022 requirements, and discussed their preliminary plans regarding incorporation of the standard into their interconnection and operational performance requirements. The goal of adoption is to facilitate increasing levels of IBR without degrading reliability and stability.

IEEE 2800-2022 is a design capability standard. The Companies' approach has been to evaluate IEEE 2800-2022 capabilities in comparison to the present operational performance requirements and identify areas where the standard requirements exceed their operational performance requirements, provide additional specificity, or are important requirements not addressed in the current model PSAs.

The Company performed an initial high-level review of IEEE 2800-2022 in preparation of the Hawai'i Island Stage 3 RFP. Some provisions in the Hawai'i Island and Maui PSA already make reference to IEEE 2800-2022 (note that both islands use the same PSA). Upon more extensive review in preparation for the O'ahu and Maui Stage 3 RFPs, the Companies have recognized that additional referencing of IEEE 2800-2022 would provide additional clarity of functional requirements and capabilities of IBR performance for reliable bulk system operation in addition to existing provisions. This is especially important for the Companies' systems as their resource plans starting in the near term will rely on IBR for system reliability, stability, and energy. The reliable and stable operation of IBR in each islands' grid is necessary to realize these goals as the Companies replace conventional resources with IBR and envision periods of operation with very few or no synchronous sources. The Companies' performance standards contained in Section 3 of Attachment B of the PSAs are currently largely based on: (a) the NERC "Reliability Guideline, BPS-Connected Inverter Based Resource Performance"³ ("NERC Guideline") (except where updates to reference to IEEE 2800-2022 have already been made in the Hawai'i Island and Maui PSAs), and (b) other IEEE standards, as well as being informed by system studies of the individual island grids. IEEE 2800-2022 builds upon the NERC Guideline in much greater detail and specificity of how bulk power system ("BPS") connected IBR is expected to perform in order to contribute to a safe, stable, and reliable BPS operation. This is especially important as BPS become more and more reliant on the performance of IBR as the Companies and others are already starting to, and only envision, increased experience for the Companies' island systems.

Specifically, the Companies believe that incorporating specific IEEE 2800-2022 requirements into projects at this time is necessary to allow the Companies to leverage the full ability of the inverters for grid reliability and stability, which otherwise would require future mitigation measures and/or supplemental resources, to allow for stable and reliable operation and to avoid major disturbances such as those experienced in Texas. IEEE 2800-2022 is the first comprehensive interconnection standard for utility scale IBR. By incorporating IEEE 2800-2022 requirements, the Companies are closing gaps in its PSAs that have come to light in their reviews and in the industry disturbance reports. While the Companies' PSAs already contain many

³ https://www.nerc.com/comm/RSTC_Reliability_Guidelines/Inverter-Based_Resource_Performance_Guideline.pdf

performance standards to ensure a safe and reliable operation of the grid, identifying technical and operational requirements for BPS connected IBR is a new and developing area in the industry. Without adopting such requirements, the Companies will remain at risk of major disturbances such as those that occurred in Texas and California.

While the Companies acknowledge these requirements were raised at an inconvenient time – prior to finalization of the Stage 3 RFPs – the Companies find this a prudent and necessary brief delay to the Hawai'i Island Stage 3 RFP process, where grid needs are less urgent than for Maui and O'ahu, as the procurement requirements being set today will impact the system for the next thirty-plus years. Further, while the delay will allow more time for bid proposals because the need-by date in the RFP, i.e., 2030, is so far in the future, the Companies do not anticipate changing this date. The Companies further acknowledge that any unwarranted delay to the RFPs, even minor ones, should not be considered without good reason and are therefore limiting their request for a brief delay to the Hawai'i Island Stage 3 RFP only. The Companies do not anticipate and are not asking for any delays to the Maui or O'ahu Stage 3 RFPs. The performance standards in the current model PSAs were built on industry working group products such as NERC Guideline, which was the most advanced work in the area of BPS connected IBR performance at the time, until the development of IEEE 2800-2022. While in essence, most of the PSA is already in alignment with minimum requirements of IEEE 2800-2022 since IEEE 2800-2022 is also built upon similar industry working group products, there are several areas where the minimum standards exceed the Companies' requirements, provide more specificity, or define performance requirements that are not addressed in its current PSA. The Companies do not see addressing these capabilities as necessarily additive, but rather clarifying and aligning to areas in the performance standard that may currently be missing or unclear. Addressing these capabilities also build upon years of development of the IEEE standard, which includes electric power system industry, research, academic, and inverter original equipment manufacturer ("OEM") representatives. Waiting to adopt the standard until the Companies' next procurement could result in another round of projects being added to the grid for 20 to 30 years without meeting the robust interconnection and operational functionalities needed to ensure reliability.

The Commission's letter specifically requested that the Companies address seven enumerated items. The items and Hawaiian Electric's responses are as follows:

1. A complete list of specific revisions that must be made to the RFP specifications as a result of requiring IEEE 2800-2022.

IEEE 2800-2022 is a comprehensive and detailed standard defining minimum capabilities from IBR, developed through the collaboration of the electric power industry at a time when standardizing the performance of IBR is so critical as it will become a dominant resource of BPS. The Companies are currently undergoing a detailed review of the standard to identify the specific sections where the company will retain additional or different requirements from those minimum requirements in the standard, needed for reliable operation of our island grids. This is an approach

many NERC entities are also currently undertaking.⁴ These additional or different requirements will be retained in the current model PSAs to mitigate issues on the Companies' high-IBR grids. The Companies will not be able to complete this detailed review on every section of the standard, which includes test and analysis to ensure the provision is compatible with the Companies' island grids in time to incorporate into the Stage 3 RFPs. The Companies envision this more detailed incorporation will occur for the next round of procurement after Stage 3.

The Companies have, however, identified and verified several sections they request to incorporate into the Stage 3 RFPs to address functional gaps in project requirements. A complete list of these sections is attached hereto as Exhibit A. The table reflects the following:

1. The label of "Incorporating in Stage 3" marked as "Yes" are those sections (and subsections) that are being proposed to be incorporated into the Stage 3 PPA. Conversely, those marked as "No" were identified in conflict with the existing PPA and are not recommended for inclusion in the Stage 3 PPA;
2. The label of "new capability" in Exhibit A is intended to reflect capabilities that go beyond the current performance requirements of the Companies' PSA;
3. If there is no "new capability" label, the sections listed for incorporation are represented already in some fashion in the Companies' PSAs, but the standard provides additional clarification or fills in gaps in the Companies' PSAs;
4. If subsections to the sections listed are not included, this indicates that the Companies intend to incorporate the entire section listed; if subsections are listed, the Companies intend to only incorporate those subsections for the section listed; and
5. The Companies do not intend to specifically adopt Sections 1-4. These sections, however, provide context for the sections the Companies intend to incorporate. For example, they may provide definitions or explanations that are needed to adopt the standards suggested for incorporation. However, these definitions may conflict with definitions in the Companies' PPA and PSA and as they are used in other contexts and therefore are being referenced solely for the purpose of understanding the definition within the context of the specific IEEE 2800-2022 references.

As IEEE 2800-2022 is the new industry standard for IBR, the Companies envision that manufacturers will soon start developing equipment to this standard and that the equipment purchased for Stage 3 projects would likely be able to comply with many of the provisions. Therefore, to the extent that the Companies are able to complete their detailed review and would like to have provisions beyond what is listed in Exhibit A, during PPA negotiations, the Companies would ask developers if they are willing to voluntarily agree to any of these additional standards. The Companies recognize that they would not be able to unilaterally enforce provisions beyond those listed in Exhibit A and which are approved by the Commission. However, the

⁴ https://www.ercot.com/files/docs/2022/07/08/EPRI_ERCOT%20IBRTF%20Meeting%20July%208-2022_PUBLIC.pdf

Companies would invite proposers to specify in their proposal their willingness to do so if the equipment they procure can meet such specifications.

As noted in the Exhibit 1 Update, there are no changes proposed to the bodies of the Stage 3 RFPs or the evaluation process of the bid proposals that are received in response to the Stage 3 RFPs. All proposed changes will be contained to the PSAs of the model RDG PPA (for both solar and wind resources) and model ESPA for all islands, most likely in Attachments A and B of the PSAs. The Companies are currently working on making the required PSA updates, which should be completed by February 28, 2023.

2. The estimated costs for proposers and the estimated costs for Hawaiian Electric resulting from the requirement of IEEE 2800-2022 compliant equipment. These costs should account for the additional cost for equipment, Nationally Recognized Testing Laboratory certifications, and all additional costs related to this requirement.

Since the equipment upon which proposers base their bid proposals vary, the Companies are unsure at this time if there will be additional costs to proposers, and whether such costs, if any, may vary by proposer. Some proposers may propose equipment that already plans to support IEEE 2800-2022 functions, whereas others may need to reconsider their supplier if they are proposing equipment that have no intentions to meet these needs. As Hawaiian Electric's Stage 3 RFPs already require grid forming and ride-through requirements, along with the control interfaces, the Companies are hopeful that the equipment under consideration by proposers can meet these requirements with zero to minimal additional costs. Further, as noted above, manufacturers are constantly updating their models and developing equipment to the most recent standards. The Companies and developers from Stage 1 and Stage 2 projects have seen this occurrence on numerous occasions which required equipment changes during the development process. Therefore, the Companies anticipate that by the time materials are procured for the Stage 3 RFP projects, it is likely that many of the models available will already be built to the IEEE 2800-2022 functionality.

3. The timeline associated with the impact for each item (as compared to not requiring the standard); please also discuss where in the schedule these activities related to this requirement will occur and the impact, if any to the current RFP schedule.

The Companies do not believe that this will add time to the development of projects. However, the Companies recognize that developers for the Hawai'i Island RFP may need additional time to evaluate their proposed equipment and update their proposals in light of the Companies' request. The proposed updates to the model PSAs of all Stage 3 RFPs will not be completed until February 28, 2023. This date conflicts with the current schedule for the Stage 3 Hawai'i Island RFP, which has an IPP Proposal Due Date of February 24, 2023. To give Hawai'i

Island RFP proposers additional time to review the proposed updates to the model PSAs and to make any necessary changes to project proposals, the Companies request pushing all remaining items on the Stage 3 Hawai‘i Island RFP schedule out to line up with the current schedules for the Stage 3 O‘ahu and Maui RFPs as shown in the proposed schedule below:

Proposed RFP Schedule for Stage 3 Hawai‘i Island RFP⁵

Milestone	Schedule Dates
(13) Hawaiian Electric and Affiliate Proposal Due Date	February 23, 2023 at 2:00 pm HST April 19, 2023 at 2:00 pm HST
(14) IPP Proposal Due Date	February 24, 2023 at 2:00 pm HST April 20, 2023 at 2:00 pm HST
(15) Selection of Priority List	May 10, 2023 July 6, 2023
(16) Hawaiian Electric and Affiliate BAFO Due Date	May 17, 2023 July 13, 2023
(17) IPP BAFO Due Date	May 18, 2023 July 14, 2023
(18) Selection of Final Award Group	August 31, 2023 October 27, 2023
(19) IRS and Contract Negotiations Begin	September 7, 2023 November 3, 2023

This change in schedule will give proposers approximately 50 days to review the revised provisions and adjust their proposals as necessary. The Guaranteed Commercial Operations Date (“GCOD”) requirement in the Stage 3 Hawai‘i Island RFP is no later than December 1, 2030, so the Companies do not see any impact to project schedules from this change nor any need to extend the GCOD requirement.

4. Identification of any requirements in IEEE 2800-2022 that cannot be clearly specified at this time.

IEEE 2800-2022 is a design capability standard. Instead of wholesale adoption, the Companies’ approach is to incorporate IEEE 2800-2022 capabilities into specific Company operational performance requirements. As noted in the response to Item 1, Hawaiian Electric has not yet completed its thorough review and testing of the standard. The Companies’ approach to avoid a situation where there are not yet clearly specified requirements is to limit the revisions to

⁵ See Table 1 in Section 3.1 of the Stage 3 Request for Proposals for Renewable Dispatchable Generation and Energy Storage, Hawai‘i Island filed on November 7, 2022 in Docket No. 2017-0352 for the originally proposed RFP schedule.

only the provisions referenced in Exhibit A. The redline PPAs to be provided by February 28, 2023 will specify these requirements.

5. Clear guidance on how Hawaiian Electric wants the proposers to meet each requirement (i.e., what it will consider as an acceptable solution). For example, if a proposer desires to use a device that is not currently certified, but may be in the future.

IEEE 2800-2022 provides performance requirements for IBRs. It will be IEEE P2800.2 Recommended Practice for Test and Verification Procedures for Inverter-based Resources Interconnecting with Bulk Power Systems (“IEEE P2800.2”) that will provide the testing and certification guidance to ensure equipment conformance to the standard, which is still in working group development.⁶ In light of this, the Companies are not requiring certification, but will continue to rely on modeling, contract terms, testing, and field performance to verify the minimum requirements defined, which provide many additional details and capabilities than are presently in the model contracts and are viewed as essential for systems to operate reliably with high levels of IBR. This is the same practice the Companies follow today to ensure projects meet the performance standards set forth in the PSAs. Having the capabilities defined within the contract provides the flexibility to utilize these capabilities for reliable operation with changing resources over the PPA term without requiring costly after-the-fact contractual changes or supplemental technologies.

6. Whether Hawaiian Electric will fund certifications or provide a list of acceptable equipment to be used for cost estimating purposes, and, if not, an explanation as to why not.

Since the Companies are not requiring certification, the Companies do not expect proposers to incur additional costs for certification. The Companies intend to use the current IEEE 2800-2022 standard to further inform previously developed baseline Performance Standards of IBR projects, as well as inform newly established requirements for IBR performance. As the model PSAs have always allowed, it is ultimately the results of the System Impact Studies (conducted as part of each project’s Interconnection Requirements Study) that will establish the specific Projects’ non-default values in the PSAs to define Project specific Performance Standards for the utilization and parametrization of these functional capabilities at the time of project commissioning. As noted above, this has always been the Company’s approach to BPS Performance Standard equipment testing and verification. This approach is to: (a) model the Facility equipment; (b) inform the equipment parameters and performance requirements in the form of Performance Standards to ensure a stable operation through faults and contingencies when operating parallel with the Company System, (c) perform a Control Systems Acceptance Test (“CSAT”) during plant commissioning to validate performance to the extent performance can be formally tested; and (d)

⁶ <https://standards.ieee.org/ieee/2800.2/10616/>

monitor performance while in operations throughout the life of the contract to ensure continued compliance or potential need for any Performance Standard revision. Given this approach to equipment performance testing and verification, the Company does not expect any additional costs to be incurred by proposers or the Company in informing the PSA Performance Standards with IEEE 2800-2022, as the Company will not be requiring certified compliant equipment but will be utilizing the already provisioned methods described above to ensure performance. Depending on the timing of the adoption of the IEEE P2800.2, the Company may consider at some point in the future to potentially request IEEE 2800.2 compliant simulation models of equipment already procured through this RFP if such models are available. This would be expected to be at minimal incremental cost to the proposer as the OEM would be expected to be producing these models to support the future marketability of their product either way.

7. A redline markup reflecting the aforementioned clarifications and revisions.

While the Companies acknowledge the Commission's request for a redline by February 10, 2023, the Companies have not yet been able to complete this request as they are still undergoing a complete review of the standards. As noted above (and in the Exhibit 1 Update), the Companies intend to file the redline on February 28, 2023. As acknowledged above, this is after the current date for submittals for the Hawai'i Island Stage 3 RFP and therefore the Companies are requesting additional time for responses to all proposers to evaluate the changes. Also as noted above, the Companies anticipate these changes will be limited to the model RDG PPAs and model ESPA, likely further limited to only the attachments, though as the changes are still being evaluated, additional sections of these PPAs may change. However, it is not anticipated that the body of the RFP itself or any other attachments to the RFP will change.

As previously noted, an initial high-level review of IEEE 2800-2022 prior to the filing of the Stage 3 Hawai'i Island RFP final documents resulted in readily adaptable provisions already being included in the Hawai'i and Maui PSA. As Hawaiian Electric reviewed these changes in preparation for the filing of the O'ahu (and Maui) Stage 3 final documents it triggered this request to perform this more thorough review to consider a more comprehensive update to align to the standard beyond the provisions already included in the Hawai'i Island and Maui PSA. After such review and considerable deliberation and discussion involving the Companies' executives and subject matter experts, the Companies made the decision to bring this request to the Commission because IEEE 2800-2022 and the important standards contained therein are critically important to future secure, reliable, and operable power systems, such as that envisioned for the Companies' grids, that will rely heavily on significant contributions from IBR. The Companies are not intending to add delays to the Maui or O'ahu RFPs, and have suggested only a slight delay to the Hawai'i Island RFP. In order to minimize the need for review, as noted above, the Companies have limited the provisions of IEEE 2800-2022 it intends to incorporate for Stage 3, with the hopes that proposers may voluntarily choose to adopt further standards identified by the Companies in the future.

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The Companies respectfully ask the Commission to consider the benefits of these requests against the risks of not incorporating the limited but critically important provisions of IEEE 2800-2022 into the Stage 3 PPAs, which will have 20 year or longer terms, and approve the above requests.

The Companies intend to respond to the Commission's guidance on its injection studies by the week of February 13, 2023.

Sincerely,

/s/ Rebecca Dayhuff Matsushima

Rebecca Dayhuff Matsushima
Vice President
Resource Procurement

cc: Division of Consumer Advocacy

IEEE 2800-2022 Sections to be incorporated into the Stage 3 PPA

Section	Title	Incorporating in Stage 3	New Capability?	Comments/Clarifications
5	Reactive power-voltage control requirements within the continuous operation region	Yes		
6	Active power - frequency response requirements			
6.1	Primary frequency response (PFR)	Yes		Modified with existing PPA parameters
6.2	Fast frequency response (FFR)	Yes	new capability	Modified with existing PFR droop parameters (from PPA)
6.2.1	FFR capability	Yes		
6.2.2	FFR performance	Yes		
6.2.3	Fast frequency response from wind turbine generator (WTG)-based IBR plant	No		Not applicable.
7	Response to TS abnormal conditions			
7.1	Introduction	Yes		
7.2	Voltage	N/A		
7.2.1	Voltage protection requirements	Yes		
7.2.2	Voltage disturbance ride-through requirements	n/a		
7.2.2.1	General requirements and exceptions	No		PPA requirements more stringent.
7.2.2.2	Voltage disturbances within continuous operation region	No		
7.2.2.3	Low- and high-voltage ride-through within mandatory operation region	n/a		
7.2.2.3.1	General	Yes		
7.2.2.3.2	Low- and high-voltage ride-through capability	Yes		
7.2.2.3.3	Low and high-voltage ride-through performance	Yes		IBR should not operate in current blocking mode. PPA clarifies this.
7.2.2.3.4	Current injection during ride-through mode	Yes		
7.2.2.3.5	Performance specifications	Yes		Requirements should not conflict with short-term overcurrent capability specified in PPA.
7.2.2.4	Consecutive voltage deviations ride-through capability	Yes		
7.2.2.5	Dynamic voltage support	Yes		
7.2.2.6	Restore output after voltage ride-through	Yes		Would need to configure response time to less than 1 sec.
7.2.3	Transient overvoltage ride-through requirements	Yes	new capability	
7.3	Frequency	Yes		
7.3.1	Mandatory frequency tripping requirements	Yes		
7.3.2	Frequency disturbance ride-through requirements	N/A		
7.3.2.1	General requirements and exceptions	Yes		PPA has more stringent requirements (larger range for frequency)
7.3.2.2	Continuous operation region	Yes		
7.3.2.3	Frequency disturbances within the mandatory operation region	N/A		
7.3.2.3.1	Low-frequency ride-through capability	No		Not in conflict with PPA.
7.3.2.3.2	Low-frequency ride-through performance	No		Not in conflict with PPA.
7.3.2.3.3	High-frequency ride-through capability	No		Not in conflict with PPA.
7.3.2.3.4	High-frequency ride-through performance	No		Not in conflict with PPA.
7.3.2.3.5	Rate of change of frequency (ROCOF) ride-through	Yes		
7.3.2.4	Voltage phase angle changes ride-through	No		PPA has more stringent requirements.
7.4	Return to service after IBR plant trip	No		Not applicable. Company returns to service (vs. developer)
8	Power Quality	Yes		
9	Protection	Yes		
10	Modeling data	Yes		Requirements overlap with PPA requirements
11	Measurement data for performance monitoring and validation	Yes		
12	Test and verification requirements	No		Too early to adopt