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May 9, 2025

Arizona Public Service
400 N 5th Street
Phoenix, AZ 85004

RE: AriSEIA Comments on the APS Interconnection Manual Draft Rev. 10

Dear APS Interconnection Team,

As agreed, we are submitting this summary of the five specific handbook topics of present concern to AriSEIA in advance of APS filing the revised manual with the Commission. We would like to reach resolution prior to filing, if possible.

1. **Section 8.2, Utility Disconnect**

Supply side connections of non-residential systems and the use of the National Electrical Code (NEC)-required external Fused Service Disconnect as the approved Utility Disconnect – Rev. 9.0 to the manual allows the Fused Service Disconnects for customer GF supply side connections in section 8.2(A) to be used as the Utility Disconnect. This language was explicitly negotiated and agreed to by APS during the 2021-2022 manual revisions and was approved by the Commission in November 2022. The use of a Fused Service Disconnect also as a Utility Disconnect is ubiquitous across the country, with those requiring redundant disconnects being the exception rather than the rule. Notably, Tucson Electric Power (TEP) allows the Fused Service Disconnect to serve as the DG Disconnect (see TEP's Interconnection Manual for Distributed Generation, Section 9.2.1.b) as does Salt River Project (see SRP's DER Technical Requirements, Section 2.8.1.b). All California utilities also allow for Fused Service Disconnects to serve as the Utility Disconnect – see PG&E's Supply Side Interconnection Requirements for reference.

An additional Utility Disconnect for line-side/supply-side taps beyond a Fused Service Disconnect per NEC is redundant, arbitrary, and a costly requirement, and ARISEIA objects to the Rev. 10 proposed language that limits the dual-purpose potential of Fused Service Disconnects to residential single-phase systems. Moreover, the unilateral and retroactive enforcement of changes to the approved APS Interconnection Manual language, which were negotiated in good faith and approved by the Commission, is a significant oversight by APS management and has led to countless thousands of dollars of additional cost burdens on its customers since approval in 2022. APS staff should immediately adhere to the original intent of the language as previously approved, and attached to these comments are an exhibit demonstrating the written and clear intent to modify the language to remove unnecessary equipment from customer-owned GF installations (*See* Comment 3 and Response).

Furthermore, the verbal comments offered by APS that non-residential GF installations have greater public access than residential systems is specious, as requiring separate fused disconnects and utility disconnects results in double the number of devices the public can access and operate. Locking provisions are readily accessible for both residential and nonresidential versions of Fused Service Disconnects and are a simple solution to the otherwise costly approach administered by APS requiring an additional Utility Disconnect.

The NEC is the governing standard for the safe installation of electrical wiring and equipment in the United States. It is fundamentally a safety standard. Its primary purpose is to protect people and property from electrical hazards by preventing electrical fires, reducing risk of shock, setting clear installation standards, ensuring safe use of new technologies, promoting uniformity, and setting guidelines for inspections and permits. The NEC does *not* require a second utility disconnect for commercial-scale solar projects that are interconnected on the utility side of a customer's meter; the only equipment required for safety purposes is a single fused service disconnect in accordance with NEC 2017 230.82(6), 705.12(A), and 705.31. Therefore, an additional Utility Disconnect is not necessary for the safe operation of a solar photovoltaic system, and APS should align with its state and national utility counterparts by removing this requirement.

2. **Section 9.2, Production Metering Requirements**

APS requires production metering for Static Inverter based Energy Storage Systems unless they are co-located with a PV system and properly configured, or unless the customer agrees to provide equivalent data hourly. AriSEIA has consistently objected to metering battery discharge, including Rev. 9 of the manual which limited the requirement to standalone battery systems. Note that an Energy Storage System does not produce power at all, so the need for a "production meter" is nonsensical. This requirement will prove even more excessive as APS continues to progress toward adopting electric vehicles as an additional means of balancing the load on the electric grid. Meter disconnects further exacerbate the cost of this requirement. Short of an optional utility program to monitor or dispatch customer battery discharge and compensate customers, the customer's site meter is sufficient to support the financial transaction for exported energy from battery systems. Utilities do not need real time measurement of battery usage any more than for sub-metered loads turned on or off. AriSEIA recommends that section (C) be removed in its entirety.

3. **Section 10.4, Inadvertent Export or Active Power-Limiting Protection Requirements**

The second sentence says "For GF's with kVA rating greater than POI kVA rating protection requirements…" This sentence is missing a limiting kVA rating value separate from the POI rating. The value should be above the Commission limits that apply to Inadvertent Export Systems considered Fast Track.

4. **Section 4.1, Separate System**

The revision to include all Non-exporting systems as separate systems needs adjustments. Unlike backup systems, they do serve customer loads in parallel to the utility system on a continuous basis. The language confuses the issue of needing a Transfer Switch, which only applies to those Non-exporting systems incorporating a Backup System operating mode. The non-exporting feature can be provided by control systems and/or relays instead of a transfer scheme. Other sections deal with Non-exporting systems and appropriate exemptions from requirements for exporting systems. AriSEIA suggests limiting the Separate System definition to Non-exporting systems that can function as a Backup system. The new provisions of section 4.1(D) are appropriate for Non-Exporting systems regardless of the Backup capability, which should be clarified as part of the discussion.

5. **Section 2, Definitions**

The new definition for Point of Service describes the identical location as the current definition for Point of Interconnection, except without a GF operating in parallel. Is it needed in the Interconnection Manual? Also, the current definition claims the POI is also known as the Point of Common Coupling. In the industry, the POCC refers to the connection that could be at a different location than customer service equipment, such as a utility transformer. Even in the absence of a deregulated generation market, a change to this language could be useful for developers of APS distributed solar systems and future Community Solar systems.

Thank you for considering these comments. We would appreciate a response *before* filing the manual revision.

Sincerely,
/s/ Autumn T. Johnson
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ATTACHMENT

Ari-SEIA July 28, 2022 Comments & APS Response

Comments 1: Section 8, Interconnection Technical Requirements – There are many inconsistent references to systems greater than one megawatt that should be revised to recognize that Level 2 systems can be as great as 2 MW.

Section 8.1(B), Multiple Generators –multiple generators behind a single meter should not have to be connected to a single Disconnect. It should not be allowed only at APS' discretion. In college campuses, for example, this would require systems interconnected at services within the buildings at their array locations to run large conduits and wires to other buildings and even to an SES blocks or even miles away. This has not been the APS practice in the past and never should be. Even for two systems at the same interconnection point it always would result in providing a bigger disconnect corresponding to the combined size of both systems instead of just the second system. One disconnect for a switch that is rarely operated may be a "nice to have" for APS but a wasteful customer investment. The rules should clarify that interconnections and system disconnects in commercial facilities may be made at convenient locations not adjacent to the main utility meter and that APS has access to the equipment. Industry codes provide warning labels at services to safely facilitate this important flexibility.

Response: APS had intended to address this issue with the mark-up to the IRM shared with Ari-SEIA on July 20, 2022. With Ari-SEIA repeating this comment as previously expressed, APS has made further revisions to Section 8.1 of the APS IRM that hopefully address this issue.

Comment 2: Section 8.1 (C) , Transfer Trip and Section 11.1 – These sections need to be revised to clarify that Level 2 systems between 1 and 2 MW do not require this burdensome equipment. Inadvertent Export systems should also be exempt. Under ACC rules a study would not be allowed for such systems.

Response: APS had intended to address this issue with the mark-up to the IRM shared with Ari-SEIA on July 20, 2022. With Ari-SEIA repeating this comment as previously expressed, APS has made further revisions to Section 8.1 of the APS IRM that hopefully address this issue.

Comment 3: Section 8.1 (F)(1)(c) and 8.2 (A) & (D) - These sections together require commercial systems with supply side connections to install both a fused disconnect and an unfused utility disconnect. This imposes an unnecessary cost on customers. A single fused disconnect is sufficient. Utility requirements in this section 8.2 for the solar disconnects make them the most customized and expensive disconnect in most facilities. The utilities do not need exclusive access to the disconnect just as both customers and utilities can access service equipment other than areas where power theft is a concern.

APS mentioned that customer would have to contact APS to open the equipment for access to change fuses. This should be a flexibility the customer may elect to do if the fused section can't be provided with separate access.

Response: To address this comment, APS has proposed new language in Section 8.2(A), which provides an exception for the application of a single-fused disconnection switch.

Comment 4: Section 8.1 (F)(4) - This section says that if APS provides utility equipment that has a lower capacity than the customer's service entrance and customer wants to install a solar system that is within the capacity of its service equipment but above the capacity of the undersized APS equipment, that the customer will have to pay for APS to provide the increased capacity. ARISEIA questions why APS should be allowed to install lower rated equipment in the first place. Customers should expect APS to install equipment matching the customer service equipment at no cost to the customer if the customer needs it upgraded due to either a distributed generation addition or merely increasing facility consumption. Also, the rating should be changed to be the Maximum Capacity to recognize the proper effect of Non Exporting and Inadvertent Export systems.

Response: APS has proposed to revise Section 8.4(F)(4) to refer to the generating facility's "maximum capacity." Otherwise, however, APS believes that the existing language in Section 8.4(F)(4) ought to remain as provided in the July 20, 2022 IRM mark-up the Company shared with Ari-SEIA. This language is consistent with R14-2-2605(h). In accordance with good utility practice, and to ensure reliable service that minimizes unnecessary ratepayer costs (across all APS customers, not just those interconnected distributed generation resources), APS sizes equipment based upon estimated *demand* loads using historical information both the Company's residential and commercial customer base. APS does not install equipment that is rated lower than what is necessary to meet these parameters (again, in accordance with good utility practice). In the event a customer's *load* causes a failure on any of the equipment APS installs, APS changes out and/or upgrades the Company's equipment to accommodate the new customer's load profile.

Comment 5: Section 8.2 (C) (3) – This requirement for the utility disconnect locations prohibits installation behind a gate, fence, wall or other barrier. Commercial installations are granted an exception if a lockbox is installed. Since APS has installed residential meters behind gates, fences and walls, and APS wants the disconnect and solar performance meter next to the meter, the requirement prohibiting installation behind fences, gates or walls should be dropped. Installing the disconnect and meter at a great distance from APS's chosen meter location adds substantial cost to systems and puts more

conduits and equipment in higher visibility locations in residential neighborhoods.

Response: APS has already proposed, in its July 20, 2022 markup of the IRM shared with Ari-SEIA, an exemption or variance mechanism to address this issue. Additional revisions in Section 8.2(C)(3), which further clarify this exemption, have also been proposed.

Comment 6: Section 8.3 (A) – This section imposes unnecessary utility transformer modification costs for installations of systems greater than 10 kW behind shared transformers. It is inconsistent with the ACC Interconnection Rules providing Fast Track status for residential systems up to 20 kW and for Level 2 commercial systems up to 2 MW and should be rewritten to align with R14-2-2615 Screen E, including Non-exporting and Inadvertent Exporting systems. Shared transformers do not increase risk to other customers to any greater extent than dedicated transformer configurations.

Response: Additional revisions to further clarify the applicability of these requirements have been proposed for Section 8.3(A).

Comment 7: Section 9.2 (C) & (D) – Part (C) is unclear about when a second meter is required (if ever) and needs to be clarified. A second meter for measuring battery output is not needed for DC coupled solar and battery storage systems since all system output is captured by the system performance meter and REC counting is preserved. The need for a meter for AC coupled systems is not justifiable from a customer standpoint, and ARISEIA believes it should be eliminated. This requirement in (D) for a production meter disconnect in addition to the adjacent utility system disconnect is wasteful and should be eliminated. Note that the APS residential example solar diagram does not show a production meter disconnect on both sides of the APS production meter; it only shows a customer combiner panel which wouldn't be present in a single inverter system.

Response: APS is considering revising this section, but needs additional time to develop solutions to address these concerns.

Comment 8: Section 10.1(D), Definition of Generator Class Sizes – This section should clarify that in addition to Non-exporting Systems being exempt from requirements in the section Inadvertent Export Systems shall also be exempt. There should be a general statement about Fast Track Systems being exempt from the requirements in other sections. (see 10.2(B)(2)d,e&f, 10.3(B)(3)d,e&f),

Response: Inadvertent export systems provide a fault current contribution to the APS system. A fault is when a short circuit is created on the system. A short circuit may be caused due to various reasons, such as physical contact

between lines that creates a short circuit path, momentary contact of animals or birds, contact due to wind and trees, or even a mylar balloon getting into the lines. In any of these situations, among others, a short in our system is created and that short is what we refer to as a *fault*. During a fault or short we see an increase in current. In order to protect our customers and our service personnel, as well as our system, during such an event, we use protective devices to clear a fault or de-energize that part of the system. The protective device operates when it sees a certain amount of current.

When a DER is interconnected in parallel to our grid—i.e., inadvertent systems are connected in parallel—that DER becomes an additional source of current to feed into that short circuit. The amount of current a DER contributes is not dependent on operating characteristics (i.e., kw output); instead, it is the characteristics of the electronics. So, even though an inadvertent export system may have its operating characteristics set to have a near zero kW export to the system, it can impact the current that our protective devices detect and our ability to de-energize or stop feeding into a fault. If we don't clear a fault or fail to clear it fast enough, it can cause a fire, damage equipment, or cause severe harm to a person working on the line. It should be noted that, from a feeder capacity standpoint, the inadvertent export system is recognized as exporting 0 kW across the POI, but for the reasons above, it is recognized as a source of current.

As such, APS must continue to evaluate this impact as part of the system impact study process and all inverter-based systems shall meet the requirements as noted on Table 10.2. Rotating machines have additional safety impacts to the APS system, and as such require more generator protection, also noted on Table 10.2. Nonetheless, APS has proposed to clarify the subsection to provide that: "A redundant over/under voltage and over/under frequency relay (single microprocessor based relay) may be required for static inverters based on the results of a System Impact Study."

Comment 9: Section 10.2(B)(2)d and f – The new requirements in this revision for redundant protection relays and utility monitoring equipment for inverter based systems greater than 250 kW is wasteful and should be deleted. This is another example of a needed exemption for Fast Track systems though it is an unnecessary barrier for Study Track systems as well.

Response: APS has proposed to clarify these subsections to provide that: "A redundant over/under voltage and over/under frequency relay (single microprocessor based relay) may be required for static inverters based on the results of a System Impact Study."

Comment 10: Section 10.2(B)(2)e & (3)e & (4)d – These new items have added provisions for APS to potentially require a ground fault detection capability for certain

systems that "will not supply current to a ground fault on the utility system". This is certainly wasteful and unnecessary and should be deleted. There will still be circuit breakers/fuses to stop fault currents. It is also inconsistent with the statement exempting Non-exporting systems from the section's requirements.

Response: These requirements are necessary to protect the safety of the generating facility, ensure reliability of the APS system, and to protect customers and customer property. Ungrounded systems, such as an ungrounded delta system, may not clear in the event of a fault condition. Based on the rationale articulated in response to Comment 8, protection requirements are necessary in these circumstances. As such, there are safety reasons for these requirements.

Comment 11: Section 10.2(B)(3)d and f – The new requirements in this revision for redundant protection relays and utility monitoring equipment for inverter based systems greater than 250 kW is wasteful and should be deleted. This is another example of a needed exemption for Fast Track systems though it is an unnecessary barrier for Study Track inverter systems as well.

Response: APS has proposed to clarify these subsections to provide that: "A redundant over/under voltage and over/under frequency relay (single microprocessor based relay) may be required for static inverters based on the results of a System Impact Study."

Comment 12: Table 10-2 – The "*" note should be adjusted to conform with the resolution to the comments on 10.2(B)(2) and (3).

Response: APS had intended to address this issue with the mark-up to the IRM shared with Ari-SEIA on July 20, 2022. With Ari-SEIA repeating this comment as previously expressed, APS has made further revisions to Table 10-2 of the APS IRM that hopefully address this issue. Consistent with APS's responses to Comments 8 and 11, APS proposes to include in the table clarification that: "A redundant over/under voltage and over/under frequency relay (single microprocessor based relay) may be required for static inverters based on the results of a System Impact Study."

Comment 13: Section 11 - Additional Requirements for GF's Greater than or equal to 1 MW – This entire section needs to be revised to exempt ACC Interconnection Rule Level 2 systems up to 2 MW from these requirements. Also revise Section 16.7 for the same issue. In addition to exempting Non Exporting systems, Inadvertent Export Systems less than 20 kW should also be exempt.

Response: APS had addressed this issue in its July 20, 2022 markup of the IRM shared with Ari-SEIA. APS has nonetheless proposed further modifications to 11 that should address this concern.

Comment 14: Section 14.2 – The additional startup requirements for systems greater than 1 MW should recognize an exemption for Inadvertent Export Systems, which will comply with the general requirements.

Response: APS has proposed revisions to Section 14.2 to address these concerns. Nonetheless, startup requirements for inadvertent export systems are still necessary to ensure that software controls function as intended.

Comment 15: Section 15.4, Operations and Maintenance – This section allows APS to charge customers for O&M costs to maintain interconnection equipment, though no definition of the principles for determining this charge and no hourly rates, markups, overhead definition or other pricing guidance is provided. The ACC should regulate these costs so it would make sense to establish schedules of O&M costs for various equipment additions (in a later revision) or at least the pricing principles. We note that 15.4 (F) exempts behind the meter residential distributed systems.

Response: To address this comment, APS has clarified the language regarding the application of Section 15.4. Please recognize that this section is for generators interconnecting to a dedicated feeder or gen-tie line that serves only *their* generation, and the cost of building, operating, and maintaining the gen-tie line would be estimated and agreed to as part of interconnection facilities study and negotiated between the developer/customer and APS.

Comment 16: Section 16.2 (C) and 16.3–Requiring a copy of the building permit for commercial systems prior to application approval should be deleted as it can delay the interconnection approval process unnecessarily, as utility and AHJ reviews should be allowed to happen in parallel. This provision would unnecessarily extend commercial project schedules by generally at least a month and perhaps several months. The reference in 16.3 waiving permits to systems above 1 MW should delete the exception as provided in "16.3(C)" per the previous comment for 16.2(C). be

Response: To address these concerns, APS has proposed further revisions to Section 16.2(C) and 16.3.

Comment 17: Section 16.7 – There is no mention in this section on the Interconnection Application of the Expedited Review process of R14-2-2623 available to certain systems. It should be added here and in the process guide.

Response: APS has proposed revisions to Section 16.7 to address this issue.

Comment 18: Section 16.8 – This interconnection process discussion needs to identify the Supplemental Review as an alternative for applications that fail a Fast Track screen.

Response: APS has proposed revisions to Section 16.8 to address this issue.

Comment 19: Appendix A-1 – The requirement for not allowing copyrighted drawings is unreasonable. AHJ's accept them and APS should too. They are standard features of architect and engineering firms' drawing sets.

Response: APS has proposed revisions to Appendix A-1 to address this issue.

Comment 20: Appendix C-1 – The table of fees and deposits should not have different amounts for Supplemental Review Fees as the work to study the utility minimum daytime load doesn't vary by system. A fee of $500 should easily cover a utility's cost to provide it. The Feasibility Study should not have a charge, since it is a limited initial review that benefits both the utility and customer by potentially avoiding projects with poor feasibility. The System Impact Study and Facility Study should not have deposits of over $1,500 for systems under 2 MW based on actual utility costs we have observed.

Response: Appendix C-1 does <u>not</u> definitively determine the costs to be imposed in the actual circumstances covered therein. It is purely intended to provide illustrative estimates in order to guide customer expectations. Having the information is, in this respect, useful for customers and increases transparency as part the interconnection process.

Comment 21: Appendix D, Rate Schedules – This is a new section in this revision containing inappropriate system size limiting provisions not included in ACC rules. Provision 1.b limits systems to 125% of connected load, which depends on Customer maximum demand in the last 12 months divided by 0.6. This measurement typically results in unnecessarily reducing system sizes for customers desiring to self-generate all of their consumption with clean power. Electric codes and the net metering limit of 100% of the previous 12 months usage provide sufficient guidance on system sizing. Also customers often have lower loads than their equipment was designed for due to the retrofit of higher efficiency lighting, air conditioning and other equipment. For Non Exporting and Inadvertent Export systems this provision is irrelevant and should be excluded. Provision 2.a which presumably limits the DC system rating to the AC rating divided by 0.85 is inappropriate. The relative DC size to AC size is greater than this ratio quite often and is a developer and Customer decision which has no implications on utility interconnection considerations.

Response: This EPR-6 requirement was established in APS's 2019 Rate Case, Decision No. 78317. This order requires APS to include this definition in its

Interconnection Manual, so the Company does not have discretion to remove this requirement. Short of a subsequent Commission order that would reconsider this aspect of Decision No. 78317, APS cannot accommodate this change.