



Edward Randolph, Director  
Energy Division  
California Public Utilities Commission  
505 Van Ness Avenue, Room 4004  
San Francisco, CA 94102

April 29, 2019

Subject: Comments on Petition of the California Solar & Storage Association for Modification of Resolution E-4832 and Resolution E-4898 and Subsequent Responses to Petition.

Director Randolph,

With this letter and the attached comments, the SunSpec Alliance (SunSpec) hereby submits its comments regarding the California Solar and Storage Association (CALSSA) petition to the California Public Utilities Commission (Commission) to modify Resolution E-4832 and Resolution E-4898 (Resolutions) and the subsequent responses to the CALSSA petition from others.

Resolution E-4832 approved Advice Letter 3023-E from San Diego Gas & Electric (SDG&E), Advice Letter 3532-E from Southern California Edison (SCE), and Advice Letter 4982-E from Pacific Gas and Electric (PG&E), implementing Phase II smart inverter requirements (Phase II Advice Letters). Resolution E-4898 approved SDG&E Advice Letter 3106-E, SCE Advice Letter 3647-E, and PG&E Advice Letter 5129-E, implementing Phase III smart inverter requirements (Phase III Advice Letters).

Rather than responding on a point-by-point basis to the CALSSA petition and responses from others, SunSpec has taken the opportunity to address the issues raised in the petition by reiterating some of the key details contained in the technical documents governing CA Rule 21, in particular the Common Smart Inverter Profile (“CSIP”) and the IEEE 2030.5 standard.

Respectfully,

A handwritten signature in black ink, appearing to read 'Thomas Tansy', written in a cursive style.

Thomas Tansy  
Chairman

cc: Service Lists for R.11-09-011 and R.17-07-007  
MCaulson@semprautilities.com  
AdviceTariffManager@sce.com  
Karyn.Gansecki@sce.com  
[PGETariffs@pge.com](mailto:PGETariffs@pge.com)

**Comments on Petition of the California Solar & Storage Association  
for Modification of Resolution E-4832 and Resolution E-4898**

<b>1. TECHNICAL CONSIDERATIONS.....</b>	<b>1</b>
1.1 RULE 21 COMMUNICATIONS REQUIREMENTS.....	1
1.1.1 Utility Interface.....	1
1.1.2 DER Interface .....	2
<b>2. TESTING REQUIREMENTS.....</b>	<b>2</b>
2.1 TEST PROCEDURES.....	3
2.1.1 Utility Interface.....	4
2.1.2 DER Interface .....	4
2.2 IEEE 1547.1 FUNCTIONALITY.....	4
<b>3. RECOMMENDATIONS.....</b>	<b>5</b>
3.1 DEPLOYMENT.....	5
3.2 INTERFACE TESTING.....	6
3.2.1 IEEE 2030.5/CSIP .....	6
3.2.2 DER With Proprietary Protocol.....	6
3.2.3 IEEE 1547.1 .....	6
<b>4. ADDITIONAL OBSERVATIONS.....</b>	<b>6</b>
4.1 PRODUCT DEVELOPMENT .....	6
4.2 COMMUNICATION SYSTEM COMMISSIONING .....	7
<b>5. CONCLUSION.....</b>	<b>7</b>

## 1. Technical Considerations

The technical considerations for Rule 21 Phase 2 deployment have generated many assertions and counter-assertions. We think it is useful to recognize that there is a governing document in place that specifies the utility communication interconnection requirements, titled “Common Smart Inverter Profile<sup>1</sup>” or “CSIP,” and that it is the source of the common technical requirements for CA Rule 21.

It has been pointed out that the policy considerations and requirements have not kept pace with the development of the technical requirements. A desire has also been expressed to start deploying the technical capabilities to allow the upcoming policy decisions to be implemented as broadly as possible. With this in mind, we think it is useful to restate the core elements of what has been developed in the Rule 21 process and offer a recommendation of how to proceed based on the work that has been accepted to date while additional consensus-based requirements are developed.

### 1.1 Rule 21 Communications Requirements

Rule 21 interface requirements focus on those for the Utility and the DER. Aggregator requirements are incorporated as part of the Utility interface definition.

#### 1.1.1 Utility Interface

Rule 21 states that the default communications interface from DER systems to utilities is IEEE 2030.5-2018 as specified in the Common Smart Inverter Profile. The CSIP specification represents the culmination of the efforts of the Smart Inverter Working Group (SIWG) and the California Investor Owned Utilities (IOUs) to specify the current Rule 21 communication requirements. The CSIP specification development was led by the IOUs with input and review

---

<sup>1</sup> Common Smart Inverter Profile version 2.1, March 2018, available at <https://www.sunspec.org>.

by interested stakeholders, including several members of the SIWG, and is the governing technical document.

The CSIP specification provides two connection scenarios:

*Scenario 1:*

The IEEE 2030.5 interface is located on site. The interface may be integrated in the DER or external to the DER. If the interface is external to the DER, the communications path between the IEEE 2030.5 interface and the DER is out of scope.

*Scenario 2:*

The IEEE 2030.5 interface is located off site in an aggregator. The communications path between the aggregator and DER is out of scope.

As allowed by the IEEE 2030.5 standard, the CSIP document states that an aggregator acting for the DER shall be able to store the required scheduling events.

### 1.1.2 DER Interface

Inverters must be capable of communicating information/settings for the following functions: Monitor Key Data, Disconnect/Reconnect, Limit Maximum Power, Frequency Watt Mode, Volt Watt Mode, and support of Volt-Var, Fixed Power Factor, and Volt-Watt through scheduling.

## 2. Testing Requirements

Communication testing requirements should be mandated at interfaces only. Ideally all the interfaces specified in the system would have test procedures but there may be cases where some interfaces are treated as internal to a larger product offering, especially in the case of aggregation and proprietary protocols. In CA Rule 21, testable requirements are specified in IEEE 2030.5 as bounded by CSIP.

Going beyond CSIP, testing of combinations of products becomes an intractable problem as the number of products in each category grows. Accordingly, standard industrial practice is to avoid mandating testing of this type. As a matter of competitiveness, manufacturers and implementers often perform integration testing on a voluntary, independent basis.

Integration testing of products by utilities and others is desirable but should not be a condition of interconnection. Specifying new testing requirements without corresponding reviewed and published test procedures should be avoided.

## 2.1 Test Procedures

The SunSpec Alliance developed the SunSpec Common Smart Inverter Profile (CSIP) Conformance Test Procedures<sup>2</sup> for the IEE 2030.5/CPIP interface. Development was performed in accordance with the guidelines specified in the SunSpec member agreement which precludes injection of patented intellectual property and the provision that the resulting material will be offered royalty free to the public. Document review and comment gathering was performed in the standard manner, with a well-publicized comment period, a system to gather and track comments, and an open invitation to the general public to provide commentary.

Version 1.0 of the CSIP Test Procedures was published on May 22, 2018 at SunSpec.org and is offered for free download and use. SunSpec provides a facility on SunSpec.org for the general public to provide feedback, comments, and reports of suspected defects pertaining to these procedures. Additionally, SunSpec has established an interoperability testing and certification program that is supported by eight global testing laboratories (including six

---

<sup>2</sup> SunSpec Common Smart Inverter Profile (CSIP) Conformance Test Procedures version 1.0. May 22, 2018 available at <https://www.sunspec.org>.

Nationally Recognized Testing Laboratories) that utilize these test procedures to certify compliance to the standards.

### 2.1.1 Utility Interface

The utility interface is IEEE 2030.5 as specified by CSIP.

### 2.1.2 DER Interface

A DER interface that supports IEEE2030.5/CSIP is supported in the testing framework mentioned above. The test procedures verify protocol compliance and do not verify electrical functional behavior.

A DER interface that supports SunSpec Modbus, a device interface standard specified in IEEE 1547-2018, is supported by the SunSpec certification program. The SunSpec test procedures verify protocol compliance and do not verify electrical functional behavior. To our knowledge, test and certification programs for proprietary DER protocols do not exist.

There is a desire to couple testing at the communication interface with testing at the electrical interface. This coupling requires a specification that couples communication and electrical requirements. The U.S. national standard, IEEE 1547-2018, combines communication and electrical requirements in a single specification. IEEE 1547.1 will provide testing requirements for both the communication and electrical requirements when it is published.

## 2.2 IEEE 1547.1 Functionality

IEEE 1547.1 testing **provides:**

- Must test at least one of the three specified standard protocols (IEEE 2030.5, SunSpec Modbus, or IEEE 1815 (DNP3)) at the physical DER communications interface.

- Must only show that all adjustable settings specified in IEEE 1547-2018 are supported through the communications interface and elicit the required functional behavior in the DER.

IEEE 1547.1 testing **does not provide:**

- Any protocol verification beyond demonstrating support for adjustable settings and required functional behavior.
- Any testing beyond the physical DER interface. IEEE 1547-2018 specifically declares any communications beyond the physical DER interface out of scope and thus out of scope for IEEE 1547.1 test procedures.
- Does not require that a standardized interface be used in a deployment. Proprietary protocols may be used.

### **3. Recommendations**

Our recommendations pertain to deployment considerations and interface testing.

#### **3.1 Deployment**

It is beneficial to pursue standardized interfaces and testing as an on-going process rather than a single event. Much work has been done to create an initial communication framework and much work remains. The only way workable solutions will be developed is through refining the implementation and deployment process.

Delaying the start of the Rule 21 phase 2 requirements increases the probability that deployed equipment will be incompatible with communication requirements. Equipment that is potentially fully compliant, but may only be partially compliant, is better than equipment that does not attempt to be compliant. There seems to be little downside to moving forward with a sensible approach that does not impose imbalanced or unreasonable requirements.

## 3.2 Interface Testing

### 3.2.1 IEEE 2030.5/CSIP

Require testing and certification for all aggregator and DER implementations supporting an IEEE 2030.5 CSIP interface using the SunSpec CSIP test procedures.

### 3.2.2 DER With Proprietary Protocol

Require manufacturer attestation of compliance to the requirement that equipment must be capable of communicating the required Rule 21 functionality.

Require manufacturer attestation of compatibility with IEEE 2030.5/CSIP-compliant products that can act as a utility interface for the equipment.

### 3.2.3 IEEE 1547.1

Utilize IEEE 1547.1 when it becomes available to increase the functional testing coverage.

## 4. Additional Observations

The dialog associated with the timing of Rule 21 requirements have triggered significant discussion pertaining to product development and communication system commissioning.

Though these activities are not specifically referenced in this Rule 21 development proceeding or in the related CSIP document, some comments are indicated.

### 4.1 Product Development

It is important to note that the connection scenarios agreed to in the CSIP document allow for vertically integrated systems to be developed using the aggregator model. It is not clear how the industry will evolve but the provision for the creation of integrated systems that provide a complete product offering may be an important source of innovation and efficiency. It is clear

that there is still additional work to do in specifying requirements to ensure the robustness of these systems, but it is important not to artificially constrain innovation in this area.

#### 4.2 Communication System Commissioning

Once communication resources are deployed and utilities are capable of communicating with deployed DER, end-to-end testing could be performed as an automated commissioning test driven from the utility at the time of interconnection. If the equipment does not perform as specified in the commissioning test, the equipment would not be allowed to interconnect. This would bring the appropriate pressure to comply with the communication and associated electrical functional requirements without additional regulatory requirements being imposed on internal interfaces.

### 5. Conclusion

Much significant, consensus-based work has been done to develop the current Rule 21 technical requirements including the concurrent development of CSIP and modification of the IEEE 2030.5 and IEEE 1547 standards. We should recognize that the current solution is not complete but is sufficient to continue to the next step of the planned deployment process. There are still significant technical issues to be addressed and they should be approached in the same consensus-based fashion and reflected in the appropriate guides.

If there are reasons to provide some additional time, these should be considered but we must continue with the plan in order to be able to gain experience to improve it. No delay to the implementation date is preferable but a delay of a few months may be warranted.

IEEE 1547-2018 and IEEE 1547.1 are important standards for the success of Rule 21 deployment, but they do not address import system level issues such as security and communications interoperability. These issues can only be addressed at the state rule-making

level and only with consideration for how application-level protocols (i.e. IEEE 2030.5-2018, IEEE 1815, or other) are applied.

Because of the need to determine which physical network will be utilized and how it will be funded is still to be determined (perhaps in Rule 21 but maybe in some other proceeding), it is clear that mandating of the usage of the DER protocols such as IEEE 2030.5 is still some time in the future. In this light, it seems reasonable that Rule 21 would allow component manufacturers to attest to compliance to the current requirements now and mandate that testing requirements be developed and updated on an annual basis.