Exhibit

Witnesses: Kenneth Sahm White & Stephanie Wang

Proceeding: R. 12-04-014

Judge: David Gamson

CLEAN COALITION REPLY TESTIMONY TO THE CALIFORNIA INDEPENDENT SYSTEM OPERATOR AND SOUTHERN CALIFORNIA EDISON TESTIMONY, OPENING TESTIMONY ON ADVANCED INVERTER CAPABILITIES IN R. 12-03-014

September 30th, 2013

1) *Introduction and Summary*

Pursuant to ALJ Gamson's ruling of September 16th, 2013, the Clean Coalition respectfully submits the following testimony of Kenneth Sahm White, Economics and Policy Analysis Director, Clean Coalition, and Stephanie Wang, Regulatory Policy Director, Clean Coalition, into the record.

The Clean Coalition is a California-based nonprofit organization whose mission is to accelerate the transition to local energy systems through innovative policies and programs that deliver cost-effective renewable energy, strengthen local economies, foster environmental sustainability, and enhance energy security. To achieve this mission, the Clean Coalition promotes proven best practices, including the vigorous expansion of Wholesale Distributed Generation (WDG) connected to the distribution grid and serving local load. The Clean Coalition drives policy innovation to remove major barriers to the procurement, interconnection, and financing of WDG projects and supports complementary Intelligent Grid (IG) market solutions such as demand response, energy storage, forecasting, and communications. The Clean Coalition is active in numerous proceedings before the California Energy Commission, the California Public Utilities Commission and other state and federal agencies throughout the United States, and works on the design and implementation of WDG and IG programs for local utilities and governments.

The Clean Coalition supports the California Independent System Operator and Southern California's stated emphasis on reducing reliance on conventional resources in favor of preferred resources (energy efficiency, demand response, distributed generation, and storage). This approach is consistent with the Loading Order, the California Public Utilities Commission's proposed storage procurement targets decision, and Governor Brown's 12,000 megawatt distributed generation goal. However, the submitted testimony from the ISO and Southern California Edison does not take full advantage of this proceeding's opportunity to showcase the full value of

preferred resources as alternatives to conventional resources and transmission for meeting system needs. The Clean Coalition urges the Commission to not rush to support new conventional generation and transmission investments before updating assumptions about the value and availability of preferred resources and system needs assessments through public procurement and planning processes.

A summary of the Clean Coalition's points are as follows: First, procurement should be informed by an assessment of the full operational value of preferred resources, including the reactive power capabilities of distributed solar and energy storage paired with advanced inverters. Second, Track 4 of this proceeding should have the objective of maximizing the use of cost-effective preferred resources to meet local area needs, and especially taking advantage of advanced inverter capabilities.

2) ***This proceeding should be informed by an assessment of the full operational and planning value of preferred resources, including the reactive power capabilities of distributed solar and energy storage paired with advanced inverters.***

Ratepayers will be best served by procurement policies that are informed by an accurate assessment of the full operational and planning value of preferred resources. For example, preferred resources take much less time to permit and deploy than transmission lines or conventional generation. This Commission should take advantage of the short deployment time associated with these resources, and incorporate into short and long-term procurement policies.

Specifically, this assessment should include the reactive power capabilities of distributed solar and energy storage paired with advanced inverters. Since the joint agency Preliminary Reliability Plan as well as Southern California Edison's opening testimony in this proceeding includes transmission upgrades that have not received all Commission and environmental approvals, there is no reason why this proceeding should exclude the ability of distributed resources to provide cost-effective voltage

support through advanced inverter functions that will be approved and deployed within the next few years.[1]

This Track of the proceeding is the right place for demonstrating the ability of distributed preferred resources to mitigate reactive power needs for the local area. Southern California Edison's Preferred Resources "Living Pilot" is the ideal opportunity to showcase the ability of preferred resources to cost-effectively replace conventional resources for providing real power, reactive power, and grid services. As noted in recent comments to the CEC from SCE, the SCE living pilot is "a means of informing future policy decisions surrounding the procurement of preferred resources and their ability to meet local reliability. A key component of this program…will be leveraging SCE's extensive experience in developing and managing EE, DR, and Advanced Technology projects and programs."[2]

3) Please describe the advanced inverter capabilities and coordination with Rule 21

The Clean Coalition is actively involved in the Rule 21 Smart Inverters Working Group (SIWG) at the CPUC, which is focused on expediting revisions to operational and safety technical standards to allow advanced inverters to ride-through voltage events and provision reactive power. The SIWG reasonably anticipates that the commercial implementations of advanced inverter systems will begin in October 2015.[3]

[1] "Given the urgent need for new resources, SCE will pursue construction of a LA Basin transmission project, the Mesa Loop-In, through requests to the CAISO and through an application to the CPUC. This project reduces the need for new generation in the LA Basin." (SCE testimony at 4).

[2] "Southern California Edison Company's ("SCE's") Comments on the California Energy Commission Docket No. 13-IEPR-1D Workshop on Evaluation of Electricity System Needs in 2030," September 3rd, 2013. http://www.energy.ca.gov/2013_energypolicy/documents/2013-08-19_workshop/comments/Southern_California_Edison_Comments_on_Evaluation_of_Electricity_System_Needs_in_2030_2013-09-03_TN-71934.pdf

[3] CPUC Rule 21 (R.11-09-011) 'Recommendations for Updating DER Technical Requirements in Rule 21,' Version 2, September 2013 (as edited by Francis Cleveland, appointed by the CPUC to lead the Working Group).

Table 1: Key milestones for advanced inverter approvals and implementation

Tasks	Milestones	Milestone Dates
Grp-A-1 Milestone	UL Publishes the Revised ANSI/UL 1741 with basic autonomous Phase 1 functions	March 31, 2014
Grp-A-5 Milestone	Start Commercial Implementations of Phase 1 DER Systems:	October 1, 2015
Grp-C-1 Milestone	UL Publishes the Second Revision of ANSI/UL 1741:	June 30, 2014
Grp-C-5 Milestone	Start Commercial Implementations of DER Systems	October 1, 2015
Grp-D-1 Milestone	UL Publishes the ANSI/UL 1741 Updates for Testing the Phase 3 Autonomous Functions:	September 30, 2014
Grp-D-5 Milestone	Start Commercial Implementations of DER Systems:	Jan 1, 2016

Source: CPUC Rule 21 (R.11-09-011) 'Recommendations for Updating DER Technical Requirements in Rule 21' Version 2, September, 2013.

Relying on near-term approvals for advanced inverters is no more speculative than relying on future Commission and permitting approvals for transmission upgrades. As the joint agency Preliminary Reliability Plan stated, "the second project, the installation of a Static Var Compensator at San Onofre Mesa substation, requires an additional approval from the CPUC. *SDG&E is expected to file an application for approval by mid-2014, and if approved by mid-2015, the project could be online by summer 2016*." … Sycamore Canyon – Penasquitos Transmission Line - approved by CAISO, to be approved by CPUC by mid-2015."[4] In addition, the testimony submitted by Southern California Edison referenced the Mesa Loop-In project and the studies that "examined three mitigation options to address these violations: (1) generation in the LA Basin, (2) transmission to increase import capability into LA Basin or SDG&E, and (3) use of

[4] See Preliminary Plan for Southern California, prepared by the ISO and the CEC.

Preferred Resources. The LA Basin Generation Scenario (Scenario 1) added generation as mitigation and establishes a base line generation need in the LA Basin. The LA Basin Transmission Scenario (Scenario 2) examined the amount of reduced generation needed in LA Basin with the Mesa Loop-In project."[5] As earlier referenced, this project is still subject to approval by the CAISO and the CPUC.

LTPP Track 4 should also include acceleration of approvals for advanced inverters, consistent with the provision set forth in the Preliminary Reliability Plan to accelerate authorizations and approvals for preferred resources.[6] Track 4 should include active collaboration with the Rule 21 SIWG to ensure consistency across regulatory agencies and to encourage a free flow of information.

3) ***LTPP Track 4 should account for the full value of advanced inverters for distributed voltage control.***

Advanced inverters paired with distributed solar PV or storage facilities can provision reactive power 24 hours a day, regardless of whether the sun is shining. Advanced inverters can draw real power from the grid and convert it to reactive power, in the same manner that capacitor banks provision reactive power. The Rule 21 SIWG has found that the implementation of advanced functions for inverters paired with distributed generation and storage can cost-effectively improve the reliability and power quality of the power grid. Further, the SIWG discovered that the European experience has shown that timely implementation is critical for avoiding costly upgrades and replacements in the future.[7]

Forward-thinking utilities across the country are embracing advanced features inherent in inverters that are deployed throughout the world today. For example, Georgia Power's requires small solar generators use advanced inverters to provision reactive

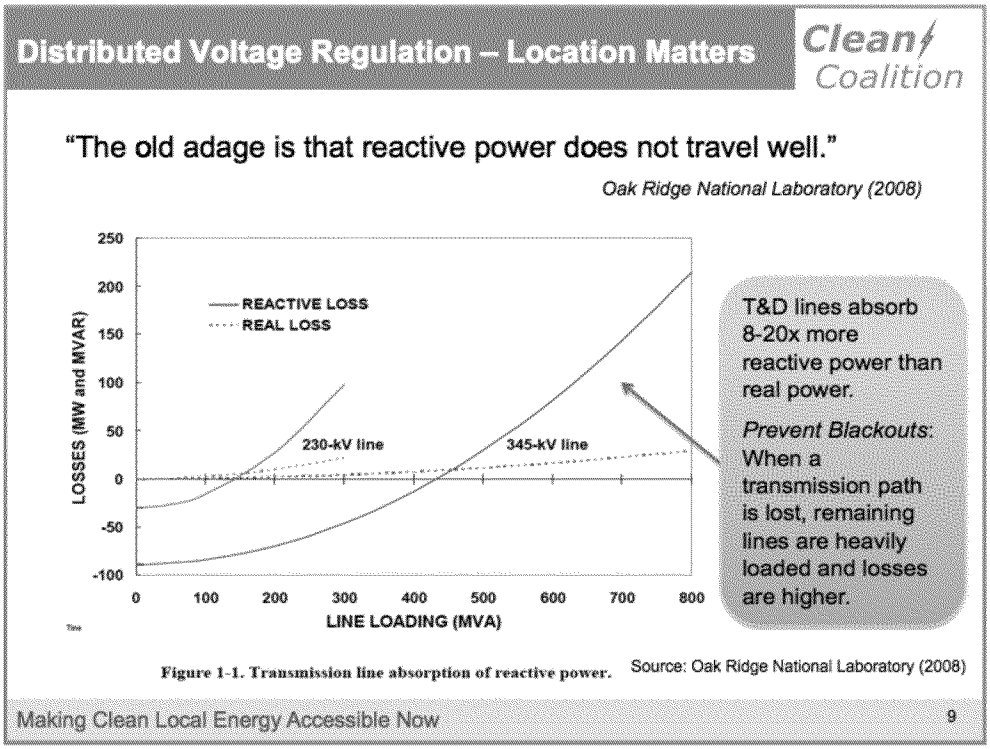
[5] SCE testimony at 29.
[6] SCE's testimony states "As any major upgrade of transmission lines in a populated area is subject to significant public scrutiny, timely completion is unlikely" (at 20).
[7] CPUC Rule 21 (R.11-09-011) "Recommendations for Updating DER Technical Requirements in Rule 21" Version 2, September, 2013, pg. 1.

power in exchange for compensation.[8] Similarly, a group of Western utilities, including the California investor-owned utilities, is working to make advanced inverters mandatory for all new solar facilities within their service territories. In a letter dated August 7, 2013, the Western Electric Industry Leaders urged state policymakers to encourage the "immediate" and "widespread" adoption of smart inverters, which they called "simple and inexpensive devices" that will play a "transformative role" in voltage control.[9]

Advanced inverters are not just a solution for integrating variable renewable generators – distributed voltage control can make the power grid more reliable and efficient system-wide. A report by the Oak Ridge National Lab found that distributed voltage control significantly outperforms centralized voltage control. Reactive power suffers far greater line losses than real power, and those losses increase as a line is more heavily loaded. Distributed reactive power minimizes these significant reactive power line losses and reduces line congestion. As a result, distributed voltage regulation provides substantial system efficiency while preventing blackouts.[10] Additionally, advanced inverters can be programmed to ride-through minor voltage fluctuations on the grid, which eliminates unnecessary grid disconnects.[11]

[8] See Section 1.8 of https://www.weboasis.com/OASIS/SOCO/Interconnection/SGIA.pdf
[9] www.weilgroup.org/WEIL_Smart_Inverters_Letter_Aug-7-2013.pdf
[10] "Local Dynamic Reactive Power for Correction of System Voltage Problems," Oak Ridge National Laboratory, September 2008.
[11] See http://www.fiercesmartgrid.com/story/advanced-inverters-providing-voltage-regulation-where-it-needed-most/2013-09-11 for details

Graphic 1: Distribution Voltage Regulation – Location Matters

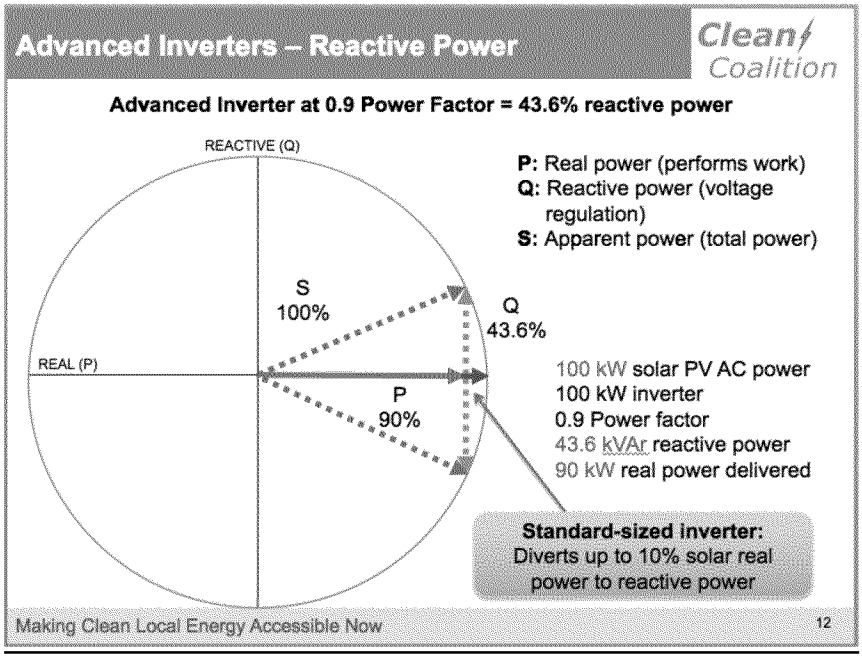


Since advanced inverters are a cost-effective solution for improving voltage control system-wide, ratepayers will be well served by cost allocation policies that facilitate their rapid adoption. Most inverters are already designed with advanced capabilities in order to conform with requirements in leading markets, so there are no significant costs to installing the advanced inverter, which is simply a standard inverter with the advanced features enabled. However, solar and wind generators with standard-sized inverters would divert a portion of real power production to provision reactive power when sun or wind resources are at their peak. Without compensation for the provisioning of reactive power, generators would lose revenue for curtailing real power output to provide reactive power.

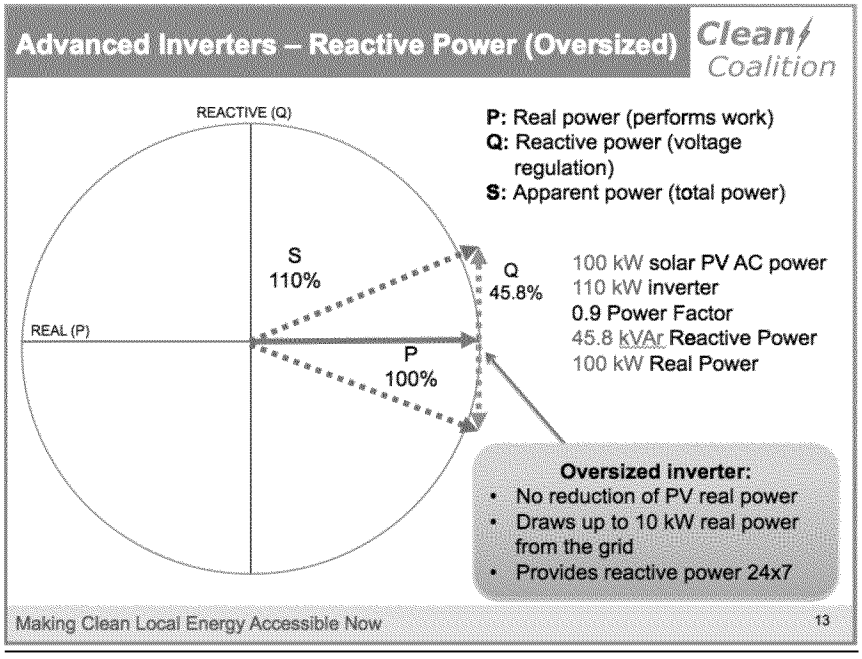
If reactive power will be regularly needed during a generator's peak production hours, installing an "oversized" inverter makes economic sense. For example, a 100 kW solar facility with a 10% oversized inverter (110 kW inverter) set at a 0.9 power factor could draw 10 kW of real power from the grid to convert to 46 kVAr of reactive power even

when the solar facility is producing a full 100 kW of real power. In comparison, a 100 kW solar facility with a standard-sized inverter (100 kW inverter) set a 0.9 power factor may need to divert up to 10 kW of real power output to deliver 44 kVAr of reactive power.

Graphic 2: Advanced Inverters and Reactive Power (Standard-Sized Inverter)



Graphic 3: Advanced Inverters and Reactive Power (Oversized Inverters)



The Clean Coalition recommends that the SCE living pilot include either or both of the following cost allocation solutions for wholesale distributed generators and storage facilities. The utility may elect to own the inverters of generators as grid assets and pay generators for real power delivered to the inverter rather than real power delivered to the grid. This solution avoids the need to determine the value of local reactive power or the generator's costs of providing reactive power. In the alternative, the utility should pay generators for reactive power at rates that cover the costs of generators for providing reactive power, including any lost revenue for not delivering real power or costs of oversizing inverters, or reflect the full avoided costs of provisioning this service from conventional facilities, including the additional transmission capacity that would have been required. Either way, generators should not be responsible for the costs of real power drawn from the grid to be converted to reactive power. The Clean Coalition also supports Vote Solar's recommendation that behind-the-meter distributed generators receive a payment to cover the additional cost of over-sized inverters, if this option is adopted.

4) ***Track 4 should have the objective of maximizing the use of cost-effective preferred resources to meet local area needs.***

Track 4 should have the objective of maximizing the use of cost-effective preferred resources to meet local area needs. We are in agreement with Vote Solar, the California Environmental Justice Alliance, the National Resources Defense Council and other parties to this proceeding that it is premature to commit to a path that could lead to significant additional purchases of polluting resources. The Clean Coalition urges the Commission to not rush to support new conventional generation and transmission investments before updating assumptions about the value and availability of preferred resources and system needs assessments through public procurement and planning processes. This "no regrets" approach is consistent with the Loading Order and will best serve the interests of ratepayers.

Further, this is the right time to showcase the extent to which distributed preferred resources can meet local area system needs. In addition to the work on advanced inverters described above, which is applicable to both generation and storage facilities, the Commission has also proposed significant energy storage procurement targets and opened a demand response rulemaking to increase use of preferred resources. Meanwhile, the ISO has proposed a new methodology for evaluating and planning for "non-conventional alternatives" to transmission and conventional generation projects as part of its transmission planning process and the Preliminary Reliability Plan released by the ISO, the Commission and the CEC.

SUMMARY OF QUALIFICATIONS FOR KENNETH SAHM WHITE

Q1: What is your name and business address?

A1: My name is Kenneth Sahm White and my business address is as follows:

2 Palo Alto Square
3000 El Camino Real, Suite 500
Palo Alto, CA 94306

Q2: What is your job title?

A2: Director, Economics and Policy Analysis, Clean Coalition.

Q3: Please describe your educational background and professional experience.

A3: I am currently the Economics and Policy Analysis Director for the Clean Coalition. Prior to joining the Clean Coalition, I spent 15 years working on economic and environmental policy as a Senior Research Consultant to the Center for Ecoliteracy, Technical and Policy Analyst in the development of the Ecological Footprint, and Associate Director of Progressive Secretary, a leading web source of legislative constituent engagement. Following my graduate work in the social studies of science and technology at MIT, I will also receive an MS Environmental Studies from San Jose State University upon completion of a thesis on economic optimization of local GHG reduction strategies.

Q4: Have you been involved in other related proceedings before this Commission?

A4: Yes, I have submitted comments on several related major proceedings before this Commission. These include: Rule 21, SB 32, Resource Adequacy, the 2010 LTPP proceeding and I have provided comments and analysis to the California Independent System Operator and the California Energy Commission.

Q5: Are you willing to be cross examined in evidentiary hearings?

A5: Yes.

Q6: Is this the end of your testimony?

A6: Yes.

SUMMARY OF QUALIFICATIONS FOR STEPHANIE WANG

Q1: What is your name and business address?

A1: My name is Stephanie Wang and my business address is as follows:

2 Palo Alto Square
3000 El Camino Real, Suite 500
Palo Alto, CA 94306

Q2: What is your job title?

A2: Regulatory Policy Director, Clean Coalition.

Q3: Please describe your educational background and professional experience.

A3: I am currently the Regulatory Policy Director of the Clean Coalition, and I have been a director of the Clean Coalition since November 2010. Previously, I advised Pacific Environment on California energy policy. From May 2004 to January 2010, I practiced project finance and development law with Cox Castle & Nicholson in San Francisco and Fried Frank in New York. I received my JD in 2003 and BA in 2001 from the University of Michigan.

Q4: Have you been involved in other related proceedings before this Commission?

A4: Yes, I represent the Clean Coalition in the Energy Storage proceeding, and I advise Clean Coalition staff on other related proceedings, including Resource Adequacy, Renewable Portfolio Standard and Rule 21. I also represent the Clean Coalition in several related proceedings before the California Independent System Operator and the California Energy Commission, including the development of the new CAISO

process for evaluating non-conventional alternatives to transmission and conventional generation.

Q5: Are you willing to be cross examined in evidentiary hearings?

A5: Yes.

Q6: Is this the end of your testimony?

A6: Yes.