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February 27, 2012

CPUC Energy Division
Tariff Files, Room 4005
DMS Branch
505 Van Ness Avenue
San Francisco, California 94102

Re: California Energy Storage Alliance Protest and Response to Advice Letter 3253-G/3940-E of Pacific Gas & Electric Company; Advice Letter 24-A of California Center for Sustainable Energy; Advice Letter 2651-E-A of Southern California Edison Company; and Advice Letter 4292-A of Southern California Gas Company

Dear Sir or Madam:

Pursuant to the provisions of General Order 96-B, the California Energy Storage Alliance ("CESA") protests and responds seeking clarification of the above-referenced *Proposed Supplements to Proposed Revisions to the Self-Generation Incentive Program Handbook to Implement Decision D.11-09-015: Implementation of the Hybrid-Performance-Based Incentive Payment Structure; Metering and Monitoring Protocols, Other Amendments* submitted on February 17, 2012 ("Advice Letters").

I. BACKGROUND.

The Advice Letters submitted by the above-referenced entities on February 17, 2012, propose to revise sections of the SGIP Handbook to implement D.11-09-015 and to make other necessary updates and revisions. Pacific Gas & Electric Company, California Center for Sustainable Energy, Southern California Edison Company, and Southern California Gas Company are referred to collectively as the Program Administrators or "PAs." Proposed amendments to the SGIP Handbook include clarifications to certain sections highlighted as part of related advice letters submitted on October 10, 2011 ("October Advice Letters") and November 7, 2011 ("November Advice Letters"). The following protests and responses by CESA seeking clarification are related directly to the redlined version of the SGIP Handbook that is attached to each of the Advice Letters. For reasons discussed below, they are also directed to the October Advice Letters and the November Advice Letters.

II. CESA STRENUOUSLY OBJECTS TO THE REQUEST FOR SHORTENED TIME TO PROTEST OR RESPOND TO THE ADVICE LETTERS AND EXPRESSLY RESERVES ITS RIGHTS TO SUPPLEMENT THIS PROTEST AND RESPONSE.

The Advice Letters say the following: "In an effort to launch the 2012 SGIP as soon as possible, PG&E requests that the protest period for this filing be shortened to ten (10) days." General Order 96-B, Section 1.3 clearly provides for shortened protest periods: "In a specific instance and for good cause, the Director of the appropriate Industry Division may shorten the protest and reply period under the General Rules." However, Section 1.3 also clearly provides that shortening the generally applicable time period of 20 days is only appropriate if there is a showing of "good cause." The Advice Letters certainly do not reference any "good cause" and in fact make no effort whatsoever to justify cutting in half CESA and other parties' opportunity to protest and respond. Many parties, CESA included, want the SGIP to succeed as quickly as possible. But undue speed - and limiting the opportunity without justification for complete analysis and thoughtful comment - may likely interfere with the SGIP's success.

CESA has asked the PAs and the Energy Division Staff for the request for shortened time to be withdrawn, but has been rebuffed without any explanation of the "good cause" to prejudice parties in such an unfair and inequitable manner. Weighing fairness and due process considerations to find a reasonable balance is, of course, the essence of finding "good cause." The shortened time to respond has not been specifically granted either - nor should it. Additionally, it is rather disingenuous to have asked on the one hand for an extension of time to reply to protests and responses (as the PAs had done in this case), and on the other hand, to make it very difficult for parties to subsequently file protests and responses to the supplemental changes that will result. CESA is compelled to file this protest and response today to preserve its right to object to the request to shorten time. If this request is not granted, CESA expressly reserves its rights to supplement this protest and response in due course.

The recitation of the history of advice letter filings related to D.11-09-015 in the Advice Letters explains why the request for a shortened time period to submit protests or responses should be rejected. On October 10, 2011, California Center for Sustainable Energy, on behalf of the PAs submitted the October Advice Letters to propose revisions to the SGIP Handbook to implement D.11-09-015, propose improvements to the Waste Heat Utilization Worksheet, propose a greenhouse gas ("GHG") emission rate testing protocol for electric-only technologies that consume fossil fuels, and propose guidelines to protect against entities creating different governance structures to be able to achieve more funding than the capped amount under the SGIP. No proposed methodology for GHG mechanism for advanced energy storage ("AES") was included in the October Advice Letters.

On November 7, 2011, PG&E, on behalf of the PAs, submitted additional advice filings to propose revisions to the SGIP Handbook to implement D.11-09-015 implementation of the hybrid Performance-Based Incentive payment structure, metering and monitoring protocols, and other amendments. Again, there was no proposed methodology for GHG compliance for AES in the November Advice Letters.

On November 28, 2011, seven parties filed protests and responses to the November Advice Letters. On December 1, 2011 PG&E, on behalf of the PAs, requested an extension of the due date to submit their Reply to the protests that stated: "***Due to the large number of protests that were submitted and the complexity of the issues addressed, PG&E respectfully requests, on behalf of the Program Administrators, an extension to December 19, 2011."*** That request was granted and understandably so.

On December 19, 2011, PG&E, on behalf of the PAs, filed a Joint Reply. In that Joint Reply, the PAs identified certain clarifications that the PAs agreed should be included in the SGIP Handbook and stated that PG&E would file amended Advice Letter on behalf of the PAs in order to clarify certain proposed sections of the SGIP Handbook. The above-described administrative process is confusing and muddled at best, and *did not include any* proposed methodology for GHG compliance of AES. It is completely unfair that at this late juncture, GHG compliance could be applied to AES with only a shortened 10-day comment period.

III. THE PROTEST PERIOD FOR THE OCTOBER AND NOVEMBER ADVICE LETTERS SHOULD BE REOPENED TO ENABLE MEANINGFUL RESPONSES TO POLICY DETERMINATIONS THAT ARE MUDDLED AND VIRTUALLY INCOMPREHENSIBLE.

The recitation of the history of Advice Letters set forth above also reveals a very complex set (or suite) of revisions to the SGIP Handbook that are, taken as a whole, very difficult for parties to parse. The remedy for this unfortunate situation is to reopen the protest period for the October Advice Letters and the November Advice Letters, and set an entirely new protest period applicable to all three sets of proposes revisions to occur at one time. Ordering Paragraph 3 of D.11-09-015 gave the PAs until submittal of the November Advice Letters to include revisions related to the hybrid incentive model, but the PAs chose to address much of the topic in the October Advice Letters. Similarly, the PAs chose to rearrange workshop subjects in a manner that led to small but significant omissions. CESA's protest and response filed on November 28, 2011, related to aspects of the hybrid incentive model, which the Commission originally ordered to have been included in the October Advice Letters.[1]

[1] The November Advice Letters include a version the SGIP Handbook with proposed revisions shown in green text and with revisions proposed in the October Advice Letters shown in red text.

The Joint Reply says the following:

> "The red-line language that appeared in the SGIP Handbook attached to the Advice Letter reflected changes associated with a previously filed advice letter that was pending before the Commission at the time of this filing on November 7, 2011. The redline language was approved by the Commission on November 9, 2011. Any protests regarding the redline changes to the Handbook are not relevant to the current Advice Letter and must be rejected. The pending changes to the SGIP Handbook that are the subject of this Advice Letter appear in green-line formatting. However, despite parties' protests to some of the redline language already approved by the Commission, the SGIP PAs may address these protests as part of the annual Handbook release." (p. 3).

The PAs appear to labor under the misimpression that parties are limited to the specific text that may be marked for examination in a proposed SGIP Handbook to such an extent that no other parts of the text may be touched. In fact, each revision of the SGIP Handbook opens it for comment to the document as a whole. Whether or not this lack of understanding is a reason for the approach taken by the PAs, it produces a "mash up" of layer upon layer of text that loses meaning unless it can be reviewed afresh. CESA submits that the only sensible approach under these circumstances is effectively to start over and submit one consolidated advice letter.

IV. ADVANCED ENERGY STORAGE, BOTH STANDALONE AND PAIRED WITH ELIGIBLE SGIP TECHNOLOGIES AND PV TECHNOLOGY, SHOULD BE EXEMPT FROM GHG REQUIREMENTS AND THE SGIP HANDBOOK SHOULD BE CLARIFIED ACCORDINGLY.

Consistent with its protest and response filed on November 28, 2011, CESA continues to maintain that Section 1.1, Section 9.5, and Attachment A of the SGIP Handbook related to GHG requirements should expressly state that AES is an emerging technology and should therefore be entirely exempt from GHG requirements. GHG requirements for AES are not addressed in D.11-09-015. Therefore, other than general statements, D.11-09-015 does not provide adequate guidance as to how AES should be treated or the basis for analyzing its merits. The latest (and only official) statement filed by the Energy Division Staff addressing GHG reduction requirements for AES was the Staff Proposal published on September 30, 2010 ("Staff Proposal"), which stated:

> "Energy storage technologies do not perform like other generating technologies and therefore the analysis of GHG impacts for energy storage had to be calculated slightly differently. Staff assumed that energy storage technologies, regardless of whether they are coupled with a renewable DG

> technology, would charge primarily from the grid and primarily during off-peak hours. Staff also assumed that these storage technologies would be discharging exclusively during on-peak hours to help reduce a customer's peak energy and demand charges. Since the emissions profile of the grid differs significantly during on-peak versus off-peak hours with less efficient, higher emitting resources operating during peak hours and more efficient, lower emissions resources operating at night—this analysis used different emissions factors for charging and discharging of energy storage technologies." (p. 59).

The number one eligibility requirement of D.11-09-015 for SGIP eligibility is that: "A product or technology must produce fewer GHG emissions than it avoids from the grid." (p. 10). Furthermore, GHG reduction is the "primary screen for establishing technology eligibility for the SGIP." (p. 12). With GHG reduction being the most critical requirement of the SGIP, eligibility must be determined by looking at the big picture and understanding the total impact of the technology and its effect on GHG emissions. CESA maintains that, as an emerging technology, and consistent with D.11-09-015, to facilitate a timely re-opening of the SGIP, AES should be temporarily exempt from GHG requirements. The Commission at a later time, once sufficient experience with the program has been developed over the coming months can take up the methodology and basis for GHG compliance for AES.

V. IF MINIMUM ROUND TRIP ENERGY EFFICIENCY IS TO BE USED FOR GHG COMPLIANCE, DIFFERENT FACTORS SHOULD BE CONSIDERED FOR STANDALONE ADVANCED ENERGY STORAGE THAN THOSE BEING PROPOSED FOR DISTRIBUTED GENERATION.

In the most current proposed revisions to the SGIP Handbook, the same methodology and baseline emissions factors have been inappropriately applied to AES as are being proposed for all distributed generation ("DG") technologies. Directly comparing an AES system to DG is inappropriate, in that it fails to understand how AES will be used on the customer side of the meter, fails to consider the significant emissions benefits of AES and demonstrates a fundamental lack of understanding of how AES can significantly help reduce GHG emissions in California. This was quite surprising, as the Staff Proposal published on September 30, 2010 ("Staff Proposal"), clearly stated:

> "Energy storage technologies do not perform like other generating technologies and therefore the analysis of GHG impacts for energy storage had to be calculated slightly differently [Emphasis added]."

For these reasons CESA recommends temporarily exempting AES from GHG compliance at this time, as stated in section IV, above. However, going forward CESA proposes

implementing a more rational methodology for AES GHG compliance that *does* take into account how energy storage will be utilized in behind the meter applications and its resulting GHG benefits.

AES can provide significant GHG benefits by utilizing California's cleaner baseload electric mix at night to "charge" the AES system, storing that cleaner mix and then "discharging" that energy to offset dirtier peak generation. As California implements its 33% Renewable Portfolio Standard, that baseload mix used to charge the AES system will become cleaner and cleaner, further enhancing AES's overall GHG benefits. Since AES's operational profile is vastly different from other generating technologies, it cannot be put into the same category, and cannot be measured by the same baseline emissions factors (379 kg/MWh) as DG technologies. Lumping it together with DG ignores the operational characteristics of AES and completely disregards the advantages that AES can bring to the grid in reducing GHG. CESA strongly recommends considering the dispatch profile of AES. The fact that cleaner nighttime baseload power (including an increasing percentage of renewable energy) can be used to charge the AES. Discharging the AES during peak times would leverage this cleaner baseload power to offset dirtier peaker plants. Thus, the minimum round trip efficiency required for AES to achieve GHG reductions should be based on the inputs (notably nighttime versus peak hours) to the average CO2/MWh cited in the Decision. CESA has provided a straightforward methodology to ensure AES's GHG compliance with SB 412 – this methodology is attached as Appendix A to this protest and response.

VI. IT IS PARTICULARLY INAPPROPRIATE FOR ADVANCED ENERGY STORAGE COUPLED WITH ELIGIBLE RENEWABLE GENERATION TO NOT BE EXPLICITLY EXEMPT FROM GHG REQUIREMENTS.

Finally, the SGIP Handbook inappropriately treats AES charged from renewable generation the same way as it does standalone AES (that is, charged from the grid) with respect to GHG reduction requirements. If an AES system is charged predominately from renewables the GHG emissions will be minimal, as AES charged predominately from a renewable energy resource would not emit GHGs during discharge because the original "source" of its energy is GHG-free CESA recommends the 75% figure in Appendix A, to be consistent with federal income taxation rules,[2] as the standard for being renewables-coupled. Not recognizing this fact fails to support the central goal of the SGIP to lower GHG emissions. Further, it could rule out AES technologies that may be optimal for applications, which couple AES with renewable DG. These applications should be encouraged instead of dismissed.

[2] See, Rag §1.48-9. Definition of energy property.

With respect to standalone storage, CESA recommends using the GHG emission standards from the Staff Proposal for AES, and continue using the methodology amending the SGIP Handbook to reflect the fundamental operating principles and GHG benefits of AES. This is critical because a falsely high requirement will not only create an unwarranted administrative burden for the PAs, but it will also unfairly and unnecessarily disqualify certain classes of AES and hamper its successful development under the SGIP.

VII. ADVANCED ENERGY STORAGE SYSTEM SIZE SHOULD NOT BE LIMITED TO THE SIZE OF A PAIRED GENERATOR AND SHOULD BE TREATED NO DIFFERENTLY THAN THOSE OF *ANY* DISTRIBUTED GENERATION TECHNOLOGY.

There is no justification for or discussion at all related to, any form of system sizing limitations for AES in relation to paired technologies, or otherwise, anywhere in D.11-09-015. General Order 96-B provides: at Section 4.2: "An advice letter may be protested on one or more of the following grounds: **. .** . (2) The relief requested in the advice letter would violate statute or Commission order, or is not authorized by statute or Commission order on which the utility relies; . . . (6) The relief requested in the advice letter is unjust, unreasonable, or discriminatory."

The size limit set forth in Section 9.1.3 of the SGIP Handbook set forth below should therefore be removed: "9.1.3 System Sizing for Advanced Energy Storage Projects "Stand alone Advanced Energy Storage Projects may be sized up to the Host Customer's previous 12-month annual peak demand at the proposed Site. Advanced Energy Storage Projects coupled with generation technologies *must be sized no larger than the rated capacity of the SGIP eligible technology it is operating in concert with* [Emphasis added]." There is no reference at all to the concept in D.11-09-015.

The original application of the AES sizing concept was in D.08-11-044. With the complete overhaul of the subject of size limitations in D.11-09-015 the concept became a historical artifact of a progressive expansion of the role of AES in the SGIP. In D. 08-11-044, the following was the only provisions at all related to sizing:

> "Conclusions of Law: 6. The size of the AES should not exceed the capacity of the accompanying generation." (p. 16).

In D.11-09-015, the concept of a size cap was not included. In fact a new list replaced the old to include the following:

> "For other technologies, removing the minimum size requirement would ensure that customers with smaller load such as residential and small commercial customers also have access to incentives. Removal of the size

> requirement would also be consistent with SB 412, which requires the Commission to ensure that incentives under this program be available to all customers. We therefore adopt this Staff recommendation." (p. 25)
>
> "Similarly, we eliminate the maximum size limit for SGIP systems. Eliminating the maximum size will be consistent with the policies of SB 412 as it will open up the program to large energy users and allow these customers to more effectively participate in SGIP." (p 25).
>
> "[W]e agree that the capacity factors for wind and AES should reflect practical standards suited to the location and performance characteristics of SGIP-funded projects. Accordingly, we reduce the assumed capacity factor for wind to 25% and for AES to 10%." (p. 43).
>
> "We also reduce the current SGIP requirement that an AES must be able to discharge its rated capacity for a minimum of 4 hours to 2 hours." (p. 43).
>
> "Metering: 15 minute interval data for kWh generation, heat output, fuel input, and AES charging/discharging to be provided to PAs, Energy Division, and or evaluation contractor on a quarterly basis for the first five years." (Att. A, p. 5).

The list of size-related provisions in D.11-09-015 simply makes no sense if the pairing size limitation is included because it is inherently unfair. Basically, this requirement subjugates AES to DG. Consider the reverse requirement - would it be fair to DG to limit their size to the companion AES? AES should be subject to the *same* size limitations as all other technologies in the SGIP, the "Host Customer's previous 12-month annual peak demand at the proposed site."

The fact that it would be completely illogical, coupled with the fact that it was in fact removed from the Commission's list of factors shows that it has lost any useful purpose it may once have had. To attempt to parse every concept in D.08-11-044 that should or should not be carried forward to D.11-09-015 would be simply a fool's errand that could not have been intended by the Commission. For the Commission to treat each of its decisions as a palimpsest, or document used many times after original text has been erased, would be absurd.

VIII. CLARIFICATION OF METERING AND WARRANTY REQUIREMENTS.

As noted earlier the informality and lack of coordination throughout the advice letter and workshop processes subsequent to D.11-09-015 led to a number of small but important points not being incorporated in the SGIP Handbook as anticipated. At this time, CESA therefore requests the following clarification to the new metering requirements proposed in section 11.2.1.

> Electricity Meters shall be kept secure from Denial of Service (DOS) Attacks, Port Scanning, Unauthorized Access and other security violations. To achieve this security, Communications Interfaces to all meters must be located in a *physically* secure location and include strong password protection with either a network firewall or *encrypted connection* ~~a secure VPN tunnel~~ the meter's network access to the PDP and/or a defined list of authorized users. In addition, security measures may be implemented as needed to ensure data security including restriction of direct meter access for real time data to sequential access basis.

Another notable example of an oversight is the fact that it is unclear what is meant by the term Service Warranty. The definition of a "service warranty" is vague and inherently implies a performance guarantee instead of what we believe the Commission intends to be a parts and maintenance guarantee of the system components. CESA recommends that the ten year warranty requirement may be satisfied through one or more, or a combination of two or more of the following methods:

> **A. Basic Warranty.** In the contract for sale of the energy storage system, the provider of the system may offer a warranty covering repair or replacement of defective components of the system. The coverage period for this warranty may be measured by reference to calendar time, extent of usage of the system or both. Such a warranty may also provide for pro-rata coverage of one or more components of the energy storage system.
>
> **B. Extended Warranty.** Similarly, the purchaser of an energy storage system may purchase an extended warranty from the seller of the energy system for an additional period of time or extent of usage following the expiration of any initial warranty provided in the contract for sale of the energy storage system.
>
> **C. Service Agreement.** A purchaser of an energy storage system may also enter into a service agreement with the seller of the system with a defined scope for a defined period of time The purpose of a service agreement is to contract for ongoing operation and maintenance ("O & M") services necessary to sustain the performance of an energy storage system according to (i) design intent, (ii) the purchaser's needs, and (iii) optimum efficiency levels. O & M services are intended to sustain system reliability and efficient operation. Efficient operation includes activities such as scheduling equipment and optimizing control strategies so that the system operates according to the specifications needed to fulfill its intended

function. Maintenance activities involve physically inspecting and caring for the system.

IX. CONCLUSION.

The PAs request to shorten the reply period for protests should be rejected. The SGIP Handbook should be modified and clarified in accordance with the protest and responses set forth above.

Very truly yours,

Donald C. Liddell
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APPENDIX A

CESA
CALIFORNIA ENERGY STORAGE ALLIANCE

GHG REDUCTION COMPLIANCE RECOMMENDATIONS

December 9, 2011

As noted by the Commission, Advanced Energy Storage (AES) can reduce green-house gas (GHG) emissions, which is a primary requirement for SGIP eligibility. This document recommends a simple, effective method for implementing the GHG requirement for stand-alone AES. The method considers real generation data for each IOU and provides the PA's a simple way of implementing the GHG requirement through a minimum AES round-trip efficiency (RTE). In addition, any AES that charges more than 75% of the time from a renewable energy resource (eligible for FITC) should automatically be compliant with SGIP GHG reduction requirements. Any such system should be monitored in order to confirm the 75% renewables charging standard.

The recommended methodology for stand-alone AES is based on AES systems charging during off peak hours and discharging during peak hours to achieve peak load reduction. GHG emission reductions are realized when the AES system's energy displaces the energy that would otherwise be generated during peak times with higher emitting conventional peaker plants and higher transmission and distribution (T&D) related losses. Comparing the emissions of the generation mix used to charge the AES during off peak times versus the emissions of a peaker combustion turbine (CT), will provide a measurement for the PA's to ensure that AES will reduce GHG emissions. Furthermore, for accurate emission reductions, the higher T&D line losses during peak times must also be considered in the calculation. Once the minimum RTE (necessary to meet the required GHG emission level) is calculated, the PA's can then require the RTE of all proposed AES systems' RTE to be above that number in order to qualify for the SGIP. The minimum RTE can also be monitored on a simple charge/discharge basis going forward.

The following simple steps (similar to those suggested by the Staff Proposal in September 2010[3]) can be used to calculate the minimum RTE requirement per utility:

1) Calculate the emissions/MWh corresponding to off-peak time:
   .368 Tonne CO2/MWh (emissions of a CCGT) x (100%– Emission Free Generation % per Utility)
2) Account for the T&D loss savings by shifting peak to off-peak load:
   Result from Step #1 x 95% or (Off-Peak/Peak T&D losses per MWh generation)
3) Calculate the ratio of emissions corresponding to charging AES to emissions avoided from peaking generators:
   (Result from Step #2)/ (.575 Tonne Co2 / MWh (emissions from a CT) = Minimum RTE

Calculated per utility, the minimum RTE requirement for stand-alone AES is: 36.8% for PG&E projects, 45% for SCE projects and 51% for SDG&E projects. These calculations should be updated annually as the generation mixes will continue to change. The utilities should be responsible for supplying the PA's with updated generation data annually. In addition, the

[3] SGIP Staff Proposal Workbook. http://www.cpuc.ca.gov/PUC/energy/DistGen/sgip/proposal_workshops.htm

minimum RTE numbers should be reduced for AES projects that replace backup diesel generators, which have higher GHG emissions than a peaker combustion turbine. For these projects, the minimum RTE for stand-alone AES is: 25% for PG&E projects, 30% for SCE projects and 34% for SDG&E projects. The following pages provide additional detail regarding the recommended methodology.

Rationale for T&D Line Losses

It has been scientifically proven that as more current passes through power lines, particularly during hot seasons and warmer daytime temperatures (which is typically the case during peak times), line losses will increase disproportionately [directly proportional with the transmission load squared (I2) and with the line electrical resistance (R), which in turn increases with temperature]. Increased line load elevates the transmission line temperature further. This invariably results in greater line losses per MWh during peak times than during off-peak times. A Sandia report published in 2010[4] describes these losses as follows:

"As with any process involving conversion or transfer of energy, energy losses occur during electric energy transmission and distribution. These T&D energy losses (sometimes referred to as I2R or 'I squared R' energy losses) tend to be lower at night and when loading is light and higher during the day and when loading is heavy. T&D energy losses increase as the amount of current flow in T&D equipment increases and as the ambient temperature increases. Thus, losses are greatest on days when T&D equipment is heavily loaded and the temperature is high."

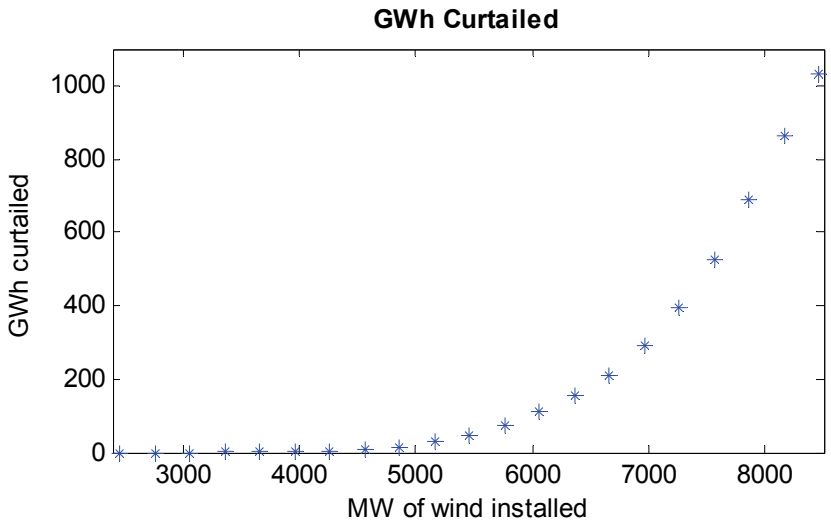
Emissions Peak vs. Off-Peak Times

The Staff Proposal from 9-30-2010 recommended on-peak emissions be equal to "a combustion turbine ("CT") with a heat rate of 10,807 Btu/kWh, which translates into an emissions factor of approximately .575 Tonne CO2E/MWh" and off-peak emissions be equal to a CCGT "with a heat rate of 6,917 Btu/kWh, which translates into an emissions factor of approximately .368 Tonne CO2/MWh." Although, we recommend using these numbers for the CT and CCGT, there are other factors to consider. As peak load is reduced, the less efficient CT's generation will be curbed making this an accurate number to use for peak time emission comparison. However, energy storage systems deployed under the SGIP will not be solely charged by a CCGT – they will be charged from either on-site renewable energy systems or grid energy during off peak times. Grid energy tends to be much cleaner than pure CCGT output, as it represents a mix of gas generation, renewables and base-load hydro and nuclear generation.

Secondly, the emissions profile of off-peak generation will, over time, increasingly factor in more renewable generation, and potentially, the over-generation of wind power. Renewable over-generation (occurring during off-peak times) is forecasted to be quite significant by 2020. The following chart was presented by E3 at the November 10, 2010 PLS Workshop. The underlying analysis assumes wind penetration of 8800 MW and a resulting 1700 hours of over-generation, occurring for the most part in the spring and off-peak hours. If energy storage systems are

[4]Eyer, Jim and Garth Corey. Energy Storage for the Electricity Grid: Benefits and Market Potential Assessment Guide. Sandia Report SAND2010-0815. Printed February 2010. Page 138

absorbing the wind over generation during these times, then there will be no need to curtail the valuable wind generation in the system.



The above over-generation analysis also implies that California's off-peak energy mix will become cleaner over time, as more and more renewable generation is phased in. This also implies that off-peak charging of energy storage systems will become cleaner over time making the SGIP GHG-neutral minimum round trip efficiency requirement a moving target that is decreasing over time. Thus, any minimum RTE requirement established today must be revisited on a regular basis, annually at a minimum.

As described above, California's off-peak generation mix will increasingly become cleaner as renewable, especially wind penetration increases. Therefore, using only CCGT emissions assumptions will not be accurate for the actual emissions profile of the resource that will be used to 'charge' the energy storage systems during off-peak times.

CESA's Recommended Minimum RTE Calculation Approach

CESA recommends the following approach to calculate the minimum round trip efficiency required for GHG neutrality. Specifically, CESA's approaches use the following assumptions:

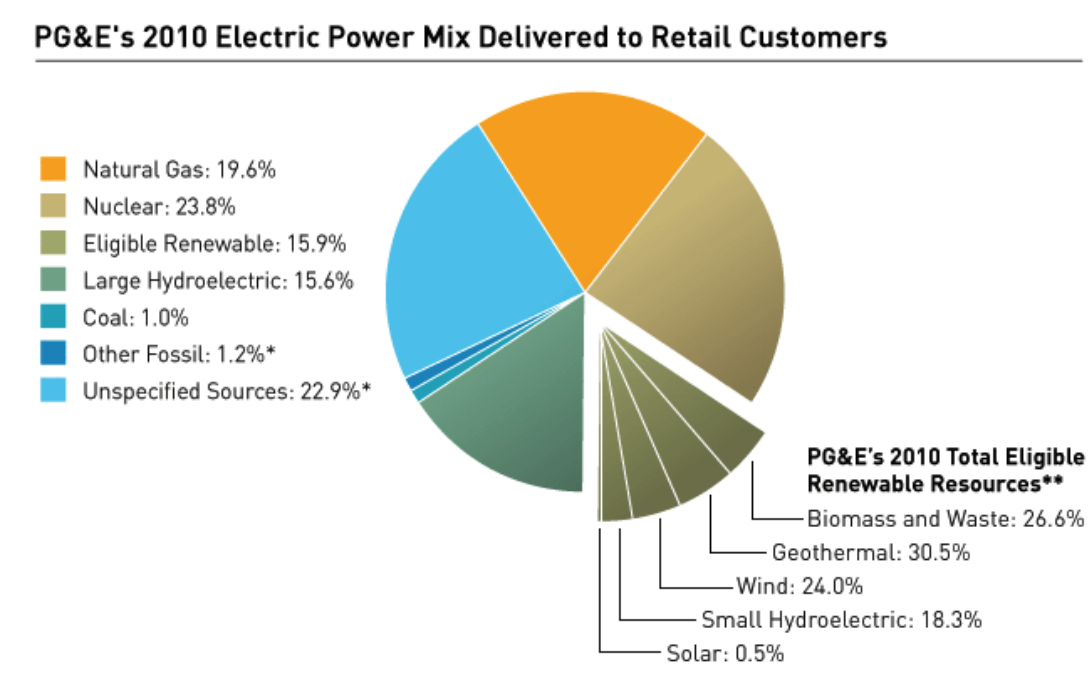
1. Keep assumptions for CT (0.575 Tonne CO2E/MWh) and CCGT (0.368 Tonne CO2/MWh) the same key assumptions as used by the Staff Proposal on 9-30-2010.
2. Use separate assumptions for on-peak line losses and off-peak line losses based on the information presented above, assuming a 5% differential.
3. Calculate the off-peak charging emissions profile based on the entire generation mix, not solely the marginal CCGT emissions as GHG-free assets within the generation mix include nuclear, large hydro, and renewables (the CCGT and CT emissions has already been adjusted for renewables in the CO2/MWh emissions estimate from the Staff Proposal and is excluded from CESA's GHG neutral generation mix to avoid double counting of GHG benefits).

4. Calculate the on-peak discharging emissions reduction using the same methodology as the Staff Proposal from 9-30-2010 —storage is a CT substitute.
5. When the project replaces a diesel generator, additional emissions savings should be factored in by weighting the result by 67%. (see diesel generator replacement calculations below regarding the 67% factor)

Using the assumptions listed above, the minimum RTE requirement has been calculated per utility.

	PG&E	SCE	SDG&E
Min RTE for Stand-alone AES	36.8%	45%	51.1%
Min RTE when Replacing a Diesel Generator	25%	30%	34%

Choosing PG&E territory as an example utility, below are the specifics CESA's minimum round trip efficiency requirements for GHG neutrality. PG&E- specific assumptions were taken from PG&E's available information on 2010 generation mix data[5] and E3's November 10, 2010 PLS Workshop that included line loss data for PG&E20.



[5] PG&E. 2010 Corporate Responsibility and Sustainability Report. http://www.pgecorp.com/corp_responsibility/reports/2010/index.html/

The percentage of carbon neutral generation (nuclear and large hydro) in PG&E territory is 39.4%, as a percentage of total generation. Assuming the rest of the mix is marginal CCGT generation, the CCGT emissions should be weighted by 60.6%, and further adjusted for net reduction in T&D line losses due to the distributed nature of the SGIP projects. Using these assumptions, one can then solve for the minimum round-trip efficiency similar to the process used in the Staff Proposal's GHG Analysis Workbook from 2010.[6]e[7] to the process used in the Staff 2010 Proposal's GHG Analysis Workbook1:

1. GHG Neutral Generation Mix for this equation is 15.6% for large hydro + 23.8% for nuclear = 39.4%. The weighted generation percentage for the equation would be 100% - 39.4% = 60.6%
2. The marginal CCGT emissions is weighted by 60.6% to account for the GHG neutral generation mix: 0.368 Tonne CO2/MWh * 60.6% = 0.223 Tonne CO2/MWh
3. Step #2 result is adjusted for net T&D line loss reductions: 0.223 Tonne CO2/MWh * (100%-5%) = 0.212 Tonne CO2/MWh
4. The minimum round trip efficiency required to equal CT on-peak emissions given the result in Step #3 is solved for: 0.212 Tonne CO2/MWh / 0.575 Tonne CO2/MWh = 36.8% RTE

SCE Calculation – 45% Minimum RTE Requirement

The calculation steps for getting to a 45% minimum round trip efficiency requirements for GHG neutrality are similar[5] to the process used in the Staff 2010 Proposal's GHG Analysis Workbook1:

1. GHG Neutral Generation Mix for this equation is 5% for large hydro + 21% for nuclear[8]= 26%. The weighted generation percentage for the equation would be 100% - 26% = 74%
2. The marginal CCGT emissions is weighted by 74% to account for the GHG neutral generation mix: 0.368 Tonne CO2/MWh * 74% = 0.272 Tonne CO2/MWh
3. Step #2 result is adjusted for net T&D line loss reductions: 0.272 Tonne CO2/MWh * (100%-5%) = 0.259 Tonne CO2/MWh
4. The minimum round trip efficiency required to equal CT on-peak emissions given the result in Step #3 is solved for: 0.259 Tonne CO2/MWh / 0.575 Tonne CO2/MWh = 45% RTE

SD&E Calculation – 51.1% Minimum RTE Requirement

[6]CPUC Staff Proposal Filed 9-30-10. Attachment 1. http://docs.cpuc.ca.gov/efile/RULINGS/124214.pdf

[7]These calculations use the same guiding principles as the staff workbook referenced in Footnote 1. Charging Emissions / Discharging Emissions = Minimum RTE. The formula also uses the same emission numbers for CCGTs and CTs. The calculation differs by factoring in the line loss difference of peak vs. off peak and by factoring in the Emission Free Generation per Utility.

[8]"Southern California Edison Proposed State's First Major 'Early Action' Greenhouse Gas Reduction Plan." May 16th, 2008. http://www.edison.com/pressroom/pr.asp?id=7036

The calculation steps for getting to a 51.1% minimum round trip efficiency requirements for GHG neutrality are similar[5] to the process used in the Staff 2010 Proposal's GHG Analysis Workbook1:

1. GHG Neutral Generation Mix for this equation is 0% for large hydro + 16% for nuclear = 16%.[9] The weighted generation percentage for the equation would be 100% - 16% = 84%
2. The marginal CCGT emissions is weighted by 84% to account for the GHG neutral generation mix: 0.368 Tonne CO2/MWh * 84% = 0.309 Tonne CO2/MWh
3. Step #2 result is adjusted for net T&D line loss reductions: 0.309 Tonne CO2/MWh * (100%-5%) = 0.2937 Tonne CO2/MWh
4. The minimum round trip efficiency required to equal CT on-peak emissions given the result in Step #3 is solved for: 0.2937 Tonne CO2/MWh / 0.575 Tonne CO2/MWh = 51.07% RTE

Diesel Generator Replacements

In addition to these stand-alone minimum RTE calculations, it should be noted that some projects may include the replacement of diesel backup generators, which have even higher emissions than the CT's. These projects should be encouraged and qualified correctly. Using data from CARB[10], diesel generators emit 1.7 lbCO2/kWh while conventional CTs emit 1.145 lbCO2/kWh. Therefore, the AES replacing a diesel generator could be weighted by a 67% reduction (1.145/1.7). Taking the PG&E territory as an example; if the minimum system RTE needed to be 36.8% for a stand-alone base case, then also replacing a diesel generator would further reduce the minimum RTE to 24.7% (in order to achieve GHG reductions -36.8% x 67%). In the SDG&E territory, the AES system would need to have a minimum RTE of 34% (51.1% x 67%) and in the SCE territory, the AES system would need to have a minimum RTE of 30% (45% x 67%)

Summary

In summary, CESA strongly recommends that round trip efficiency should be based on the minimum efficiency required to be 'on par', from a GHG perspective, with a centralized natural gas-fueled CT power plant. This assumes that the energy storage system is 'charged' with a reasonable mix of base load power, which over time will contain more and more renewables, particularly when factoring in renewable energy over-generation. Certainly, energy storage charged primarily with renewables should be completely exempt from having to meet any minimum round trip efficiency requirement at all.

To guarantee accurate and effective implementation of this methodology, CESA recommends the program administrators use the next 1 – 2 years to gather and analyze the necessary data from energy storage systems operating in the field under the SGIP. As an emerging technology, this sector lacks proper baseline real data, which should be gathered prior to implementing **any**

[9] SDG&E 2010 Power Content Label. http://www.sdge.com/billinserts/regulatory.shtml

[10] "Air Pollution Emission Impacts Associated with Economic Market Potential of Distributed Generation in California" Prepared for CARB June 2000. Page 8, Site: http://www.arb.ca.gov/research/apr/past/97-326.pdf

GHG reduction methodology. Sample data collection includes: actual times of day of discharge, actual times of day of charge, runtimes, overall effect on the grid and local systems, system average round trip efficiency in the field, etc. After this data is collected and analyzed, the PAs can compare the field data to this methodology, making any changes to make it most accurate, and then implement the minimum RTE requirement per utility sector based on the modified methodology.