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June 2, 2008

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VIA E-MAIL AND OVERNIGHT DELIVERY

California Energy Commission
Docket Office, MS-4
1516 Ninth Street
Sacramento, CA 95814-5504

Re: Docket No. 07-OIIP-01; Comments of the Solar Alliance on Allocation Methodologies and Other Issues

Dear Sir or Madam:

Attached please find an original copy of the Comments of the Solar Alliance on Allocation Methodologies and Other Issues to be filed in the above-referenced docket. Simultaneously with this mailing, an electronic copy of the above-referenced comments was e-mailed to the Energy Commission's Docket Unit.

Should you have any question with regard to the referenced filing, please contact the undersigned.

Very truly yours,

GOODIN, MACBRIDE,
SQUERI, DAY & LAMPREY, LLP

By

Joseph F. Wiedman

cc: Karen Griffin (kgriffin@energy.state.ca.us)

3326/003/X100090.v1

BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to Implement the Commission's Procurement Incentive Framework and to Examine the Integration of Greenhouse Gas Emissions Standards into Procurement Policies.	Rulemaking 06-04-009 (Filed April 13, 2006)
[*Also filed at the California Energy Commission*]	CEC Docket 07-OIIP-01

COMMENTS OF THE SOLAR ALLIANCE ON ALLOWANCE ALLOCATION METHODOLOGIES AND OTHER MATTERS

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BEFORE THE PUBLIC UTILITIES COMMISSION

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COMMENTS OF THE SOLAR ALLIANCE ON ALLOWANCE ALLOCATION METHODOLOGIES AND OTHER MATTERS

Pursuant to the Administrative Law Judge's Ruling Modifying Schedule and Correcting Suggested Outline for Comments and Reply Comments, the Solar Alliance submits these Comments on allowance allocation methodologies and other matters. These comments are also being filed in Docket 07-OIIP-01 of the California Energy Commission (CEC).

The Solar Alliance appreciates the opportunity to provide comments on allowance allocation methodologies and other matters related to the Commission's continued investigation of greenhouse gas (GHG) emission reduction measures. The Solar Alliance is a state-focused alliance of solar photovoltaic (PV) manufacturers, integrators, installers and financiers dedicated to accelerating the deployment of solar electric power in the United States.[1] Our members have a strong interest in the adoption and implementation of far-reaching policies and programs that

[1] Current members of the Solar Alliance include American Solar Electric, Applied Materials, Borrego Solar, BP Solar, Conergy, Dow-Corning, Energy Innovations, Evergreen Solar, First Solar, Kyocera, Mitsubishi Electric, MMA Renewable Ventures, Oerlikon Solar, PPM Energy, REC Solar, Sanyo, Schott Solar, Sharp Solar, SolarCity, Solaria, Solar Power Partners, SolarWorld, SPG Solar, SunEdison, SunPower, Suntech, Tioga Solar, Trinity Solar, Uni-Solar and Xantrex.

will accelerate the movement toward a low-carbon economy and stimulate the development and use of zero-carbon, renewable energy technologies such as solar PV.

I. INTRODUCTION AND SUMMARY

First and foremost, as California looks to achieve AB 32's ambitious goals for reducing greenhouse gas (GHG) emissions we need to ensure that the regulatory policies and market incentives, including cap and trade, designed to meet the goals of AB 32 do no harm to renewable energy markets. To this end, the Solar Alliance believes that it is essential to adopt policies designed to implement AB 32 in a manner that allows robust participation by renewable generation is essential. Programs and policies related to AB 32, including the determination of the method of allocating GHG allowances, must be designed in a way that support and promote the continued development of renewables and work in harmony with other GHG reduction policies.

While there are many issues before the Commission in this proceeding, in these comments, the Solar Alliance addresses:

1) the design and output of the E3 model in determining the relative cost of GHG reduction measures, and

2) allowance allocations under a GHG cap and trade design.

Specifically, a summary of the Solar Alliance comments and recommendations are as follows:

Economic Model

- The PV cost input data in the E3 Reference case does not accurately consider Market Transformation effects, and thus overstates the cost of PV generation. Market

- Structural problems in E3 model result in overstated cost per tonne CO2 reduction with PV. Structural problems include the model's failure to reflect the fact that PV systems will be installed over many years, and customers will not all begin paying for this capacity in 2008.
- The E3 model examines customer-owned PV using wholesale market values, instead of using retail values, thereby using inappropriate avoided cost values in the calculation. The E3 GHG model should use the same avoided cost approach that is used to assess avoided cost for energy efficiency programs in the Commission-approved E3 avoided cost model. Customer-owned PV under the CSI and energy efficiency are both on the customer side of the meter and should be treated as such.
- The E3 model understates electric market heat rates, and fails to include an accurate time-differentiation of either electric market prices or PV output.
- The E3 model understates existing natural gas prices, and does not assume real price escalation of natural gas prices over time. This error significantly understates utility avoided costs, which are directly impacted by rising natural gas prices.
- Conclusion: The E3 model projects the cost of reducing CO2 from customer-sited PV systems as $900 per tonne. If E3 model data inputs are corrected, the cost of reducing CO2 from customer-sited PV systems would produce a negative $40 per tonne impact. In other words, instead of imposing extremely high societal costs, customer-owned PV will in fact provide meaningful societal benefits by reducing CO2 in a manner that is cost-effective to the end-use customer and to society within the next ten years.

Allowance Allocation

- The cap-and-trade system must support voluntary efforts to reduce GHG emissions using renewable energy.
- Corporate customers, local governments, non-profits, and individuals currently purchase renewable power in the form of Renewable Energy Credits (RECs) and on-site renewable power with RECs, outside of utility electricity sales to voluntarily reduce their carbon footprint.
- Cap and Trade design under AB32 could jeopardize existing voluntary renewable and carbon markets, and should not restrict future growth of this market. Instead, cap and trade design under AB 32 should build on current popular momentum to maximize market-driven GHG reduction opportunities in compliance and non-compliance economic sectors.
- The CPUC should allocate GHG allowances to new renewable generation that provides electricity to the grid under the first deliverer approach under an output based approach.
- Allocating GHG allowances to new renewable generation on a proportionate MWh basis is administratively simple. Emission reductions can be calculated using the EPA Climate Leadership EGRID calculator.
- If GHG allowances are not allocated to new renewable generators, the following will occur:
    1. Voluntary renewable and carbon market participants will lose existing GHG reduction values and claims, undermining success of the CSI.
    2. GHG reductions will not occur as a result of PV installations because utilities will adjust generation to account for customer-driven PV generation.

3. A windfall will accrue to utility because they will capture the compliance value of PV, even though they do not purchase the PV-generated power.
4. Entities with compliance obligation outside the electric sector will lose the opportunity to invest in PV as means to cost-effective alternative compliance mechanism to meet their GHG emission obligation.
5. Significant amounts of carbon capital otherwise available to finance PV projects and accelerate renewable market development will be lost. Financial institutions will have no ability to leverage PV generated GHG allowances.

II. COMMENTS ON E3 MODEL

A. E3 Modeling Assumptions Overstate the Total Cost of Installed Photovoltaic (PV) Systems Over Time by Ignoring Existing U.S. Market Transformation Trends

While we appreciate the complexities involved in developing the E3 GHG Calculator, the Solar Alliance has significant concerns with the E3 calculator's modeling of the relative costs of various GHG mitigation strategies, including the California Solar Initiative (CSI). The Solar Alliance appreciates E3's candid warning at the May 6 workshop that its GHG calculator should not be used as a resource planning tool.[2] As discussed below, the current version of the E3 calculator has certain structural deficiencies that make it inappropriate to use for making decisions about which electric resources provide the most cost-effective reductions in GHG emissions, even if the model included the best available input assumptions (which in the case of PV costs, it does not). The Solar Alliance provides in these comments suggestions for improvements in the input assumptions, and hopes that E3 and the Commission will work to fix

[2] Attachment 20, slide 27, Administrative Law Judge Ruling Modifying Schedule and Correcting Suggested Outline for Comments and Reply Comments, filed May 20, 2008.

the structural problems with the model.

B. Inaccurate PV Cost Inputs and Structural Problems in the E3 GHG Calculator Distort the Cost of GHG Emission Reductions From PV

The E3 GHG calculator assumes that PV installations under the CSI will cost $8.00 per watt (in 2006 dollars), escalated to $8.32 in 2008. The Solar Alliance concurs with this estimate of current PV costs for residential systems. However, the bulk of the PV capacity being installed in California is for larger commercial systems, whose current costs are significantly lower. Furthermore, E3 assumes that, absent a market transformation, PV costs will remain constant in real terms through 2020. Thus, if inflation averages 3% per year, the cost in 2020 of solar PV in nominal terms would be almost $12 per watt. This assumption ignores the fact that, even without a market transformation, PV systems have decreased in cost by 4-7% per year since California began to offer solar incentives in the late 1990s,[3] and PV module costs have decreased by 7% per year over the past 26 years.[4] Based on this track record, E3's "no market transformation" case should include PV costs that decrease by at least 2% per year in real terms (i.e. a 4% per year nominal decrease offset by 2% inflation).

The E3 "market transformation" scenario also is too conservative. The U.S. DOE has just released a forecast of future PV costs, which the Solar Alliance includes as Attachment A.[5] This data suggests that median PV costs for commercial systems will drop by 9% per year,

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[3] Wiser *et al*., "Letting the Sun Shine on Solar Costs: an Empirical Investigation of Photovoltaic Cost Trends in California" (LBNL, January 2006). Available at http://www.solaralliance.org/resources/.

[4] PV module costs have declined from $27 per watt in 1982 to about $4 per watt today. http://www.solarbuzz.com/StatsCosts.htm.

[5] This data underlies DOE's just-released assessment of the U.S. solar industry: "Solar Energy Industry Forecast: Perspectives on U.S. Solar Market Trajectory" (May 29, 2008), available at http://www.eere.energy.gov/solar/solar_america/.

from $5.30 per watt in 2006 to $3.50 per watt in 2010 and $2.45 per watt in 2015.[6]

This data strongly supports the conclusion that E3's modeled PV costs are much too high in the market transformation case. In addition, the DOE's work supports: (1) a 25-year PV system life, extending to 30 years in 2010 and 2015, rather than the 20 years used by E3, (2) PV system capacity factors of 22% rather than the 18% assumed by E3, and (3) real interest rates of 5% for commercial systems (compared to E3's use of 8%).[7]

These changes in the PV cost and operating assumptions have a very significant impact on the estimated cost-effectiveness of PV, both with and without market transformation. In the no market transformation case, the cost of the CSI as a GHG mitigation strategy decreases from $902 per tonne of CO2 to $286 per tonne, while in the market transformation scenario the cost decreases from $612 per tonne to just $40 per tonne. The Solar Alliance has included these model runs as Attachment B to this filing.

The Solar Alliance has also identified a significant structural issue with how costs are calculated for the CSI program. The model assumes that PV systems are installed over time, reaching 3,000 MW by 2020. Most of the capacity is installed in the later years of the 2008 - 2020 period. The model calculates the annualized cost of PV based on the total cost of installations from 2008 - 2020, in 2008 $, financed with a 20-year loan at an 8% interest rate. The model fails to reflect the fact that the customer's payment for PV capacity will not commence until the year the system is installed, and that the facilities are not *all* installed in

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[6] From "U.S. DOE Solar Technologies Program Solar America Initiative Photovoltaic System LCOE Estimate Projections - May 29, 2008." We increase nominal 2006$ values by 4% to produce 2008$ values.

[7] The interest rate used to estimate annual PV costs should reflect a real, not a nominal, interest rate. In the E3 model, solar PV costs are evaluated in terms of 2008$ costs, which are already discounted relative to nominal costs. Therefore, it is appropriate to use a real interest rate to compute an annual payment that excludes inflation.

2008. Thus, the PV system costs calculated by E3 need to be discounted from the installation year (2008 to 2020) back to 2008 to reflect that the 20-year sequence of payments for each PV project will not start until the year that each project begins operations. This structural problem results in the model overstating the cost of the CSI program. The Solar Alliance has not been able to re-structure the E3 model to remedy this problem.

C. The E3 Calculator Fails to Accurately Capture Avoided Costs of Using PV Systems to Reduce Carbon Emissions and Thereby Overstate Costs of Reducing GHG Emissions with PV

The Solar Alliance also has concerns with E3's modeling of the costs that the utility avoids as a result of the CSI program. These include the following issues:

- **Wholesale vs. Retail.** The E3 model examines the wholesale market value of PV electricity. Distributed PV systems serve on-site loads at the retail level. The CSI program and net metering limit a PV system's output to no more than the on-site, retail load served. Fundamentally, PV systems in California provide retail electricity. Widely distributed small PV systems that supply retail demand at the point of use should be evaluated using the same framework as energy efficiency programs that reduce retail demand at the point of use. The Commission has adopted a different E3 model for use in calculating the avoided costs of energy efficiency programs, a model which includes the hourly transmission and distribution (T&D) costs avoided by behind-the-meter reductions in a customer's demand for grid power. E3's avoided cost model can be used to show that PV systems avoid significant peak-related T&D costs, typically in the range of $20 to $40 per MWh, levelized over 20 years.[8] These avoided costs are not included in the E3 GHG calculator's analysis of the utility costs avoided by distributed PV systems.

- **Valuation of On-peak Energy.** The model does not appear to capture accurately the time-of-delivery (TOD) profile of either PV production or of energy prices in California. The TOD profiles of both prices and production using the four TOD periods in the E3 model appear to be very flat. The following table shows what E3 assumes for PV production and electric market prices over its summer/winter high/low load hour periods.

[8] See Table 2 of Green Volts *et al.* comments in R.06-02-012, filed March 13, 2008, at http://docs.cpuc.ca.gov/EFILE/CM/80092.PDF

Table 1: *E3 Incremental PV Output and Market Energy Price*s

	Summer HLH	Summer LLH	Winter HLH	Winter LLH	Annual All Hours
Incremental GWh	1,358	509	1,018	509	3,395
Energy Market Price ($/MWh)	52	50	57	56	54
TOD Factor (Price ratio)	0.97	0.92	1.06	1.03	1.00

It makes no astronomical sense for the output of a PV system in the low load hours to be the same in both the summer and winter. Table 2 shows a revised PV output profile using the hourly profile of PV production estimated with the National Renewable Energy Laboratory's standard PVWatts tool, for a south-facing PV system with a 30 degree tilt in Sacramento, California. The table also shows energy market prices time-differentiated using a moderate set of energy-only TOD factors (the TOD factors used by SDG&E in its 2007 RPS solicitation, mapped to the PLEXOS HLH and LLH periods).

Table 2: *Incremental PV Output from PVWatts*
Market Energy Prices w/SDG&E TOD Factors

	Summer HLH	Summer LLH	Winter HLH	Winter LLH	Annual All Hours
Incremental PV GWh - PVWatts (Sacramento)	1,468	647	851	430	3,395
Energy Market Price – SDG&E TOD ($/MWh)	68	47	60	44	54
TOD Factor (Price ratio)	1.26	0.86	1.12	0.81	1.00

Note : The average price weighted by PV GWh is $59 per MWh (or 1.09 x $54).

- **Starting natural gas price.** Natural gas prices today are above $10 per MMBtu at the California border. E3 uses a gas price of $7.85 per MMBtu for the cost of fuel. If the cost of gas is increased to $10 per MMBtu, the cost of GHG reductions from the CSI, using the DOE PV costs, decreases from $40 to $13 per tonne.

- **Constant real cost of fossil fuel.** The version of the model that E3 has distributed uses the same real cost of natural gas ($7.85 per MMBtu) over the entire period, and the same capital costs for generation resources (with the sole exception of the PV market transformation scenario). Although this is a convenient and simplifying assumption, it ignores the potential for fuel and capital costs to change at different rates in the future. For example, over the last 18 years, natural gas prices at the California border have escalated by an average of 6.4% per year, while general inflation has averaged 2.9%.[9] In the long-run, fossil fuel prices can be expected to escalate at a higher rate than general inflation, due to the increasing scarcity of fossil fuels. The Solar Alliance's comments above have shown how different the calculator's results can be if the costs of renewables decline in real terms, as renewable technologies improve and economies of scale are brought to the manufacture and installation of renewable equipment. The same result occurs if fossil fuel prices escalate in real terms. Assuming that a natural gas price of $10 per MMBtu in 2008 increases at the historical long-term real escalation rate of 3.5% per year, the 2020 natural gas price (in 2008 $) would be $15 per MMBtu.

- **Too-low market heat rates and electricity market prices.** The electricity market prices used in the model average $54 per MWh. Assuming variable O&M of $2.50 per MWh in the market price and dividing the remainder by the gas price results in a market heat rate of approximately 6,600 Btu/kWh. This is 5% below the "clean & new" heat rate of a new CCGT, and is inconsistent with typical market heat rates of 8,000 Btu per kWh observed in the California wholesale market in recent years.

The Solar Alliance has re-run the E3 calculator with all of the above changes to the utility avoided cost assumptions, including the profile of natural gas prices that increases to $15 per MMBtu in 2020. In the "market transformation" case, these changes produce a GHG mitigation cost for the CSI of a negative ($125) per tonne. The output summary for this case is shown in last spreadsheet in Attachment B.

The Solar Alliance appreciates the difficult task that E3 has embarked on to model the future costs of different technologies. E3's projection of excessively high costs for GHG reductions from the CSI are a problem, however, because they create a disincentive for regulators to view PV as a viable, market-based means to reduce carbon emissions, and by

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[9] In 1989, southern California border natural gas prices averaged $2.11 per MMBtu; in 2007 they averaged $6.42 per MMBtu. General inflation is based on the GDP price deflator.

extension discredit the importance of allocating carbon allowances to new renewable generation, including solar PV, either in the RPS or voluntary cap and trade markets. The Solar Alliance believes that the modeling changes suggested above present a more accurate and balanced view of the potential for the CSI to be an integral and cost-effective element of California's carbon reduction strategy.

III. COMMENTS ON ALLOWANCE ALLOCATION

A. Allowing Renewable Generation Resources to Participate in All Parts of the GHG Compliance Framework Will Place Renewable Generation on an Equal Footing with Other GHG Emissions Reduction Measures.

Californians currently purchase renewable power outside of utility offerings to reduce their contribution to GHG emissions. Corporations, local governments, non-profits and individuals may all purchase Renewable Energy Credits (RECs), separate from the electricity delivered by the utility, or purchase on-site PV, with associated RECs, to mitigate their contribution to global climate change by reducing emissions from the electric sector. Indeed, the U.S. voluntary renewable power market has grown 50% over the last 3 years, and voluntary markets are driving as much new renewable generation as mandated compliance markets are today. This growth is driven in large part by customer desire to make a direct contribution to reducing GHG emissions. Emission reductions from these purchases are calculated relying on guidance from the US EPA Climate Partners Program and the national Center for Resource Solutions Green-e standard. As California decision-makers contemplate the design of measures to enforce GHG reductions beyond these voluntary actions, they should not to disrupt the existing GHG reduction activity already in place. Instead, AB 32 compliance efforts should build on this momentum to further develop renewable power, consistent with long-standing California policy directives, and encourage accelerated GHG emission reductions by all sectors of society.

For this reason, the Solar Alliance supports the allocation of allowances to generators or deliverers of electricity into the California system, including renewable electricity, based on their proportion of total MWh generated (output-based allocation). If new renewable generation is not included under the electric sector cap and trade through the allocation of GHG allowances, voluntary purchases of renewable power, including on-site PV, will not reduce GHG emissions because utilities will adjust their generation mix to account for zero emission PV contributions to the grid, and will emit the same GHG emissions they would have if the PV system were not added. Moreover, the utility will capture the entire GHG compliance value of any PV development that does occur, instead of the customer or financing company who made the investment. This result will offer a windfall compliance benefit to the utility and eliminate a principle driver in the voluntary market, needlessly undermining growth in this market. Without allocating GHG allowances to new renewable generation, this sector will lose the carbon capital potential to finance new renewable systems, including PV, lose customer enthusiasm to purchase renewable power due to lost GHG reduction claims, and lose the ability to market GHG allowances to willing buyers either under the regulated cap and trade regime or the voluntary carbon market. These negative consequences are unnecessary and can be remedied by allocating GHG allowances to new renewable generation, including PV.

It is clear that the California Legislature intended that implementation of AB32 should ensure robust participation by renewable generation and stakeholders with an interest in reducing GHG emissions through their purchase of renewable power. Staff's recommendation to restrict output-based GHG allowances solely to fossil fuel generation sources will undermine the ability of renewables to contribute to AB 32's GHG reduction goals.[10] As the Staff Paper notes, allowing new renewables to obtain allowances under an output-based approach "would help counter the competitive disadvantage that renewables face under a fossil fuel-only output-based allocation method."[11] The Solar Alliance fully agrees with this statement.

Including new renewable generation in an output-based approach will allow continued recognition of the GHG value from voluntary purchases of renewable power and spur accelerated investment in new renewable generation. New renewable generators who want to maintain their ability to make GHG reduction claims can do so by retiring their allowances. For new renewable generation who do not want to maintain their ability to make GHG reduction claims, they can sell their allowances to entities with GHG compliance obligations or to entities with an interest in contributing to GHG reductions outside of any compliance obligation. In either case, renewable generation owners are rewarded for their investment in clean generation either through a direct financial transaction or the ability to make a carbon reduction claim. The retirement of the allowances by the purchaser or renewable generation owner will avoid double counting.

Allocating allowances to new renewable generation ensures all participants with compliance obligations under a GHG cap, not just under the electric sector cap, are able to invest in renewables as a pathway for achieving their GHG compliance. Maintaining choice is at the heart of what a market-based cap and trade program is all about – ensuring entities with compliance obligations are able to meet those obligations in a cost-effective and efficient manner through a host of competing opportunities. Renewables must be part of that opportunity mix.

[10] See Joint California Public Utilities Commission and California Energy Commission Staff Paper on Options for Allocation of GHG Allowances in the Electric Sector, filed April 16, 2008, R.06-04-009 and D.07-OIIP-01pg. 31.

Freezing new renewable generation out of that mix fundamentally undermines any cap and trade program by decreasing the options available to entities with compliance obligations. It also undermines the ability of private sector customers, local government and non-profits (including the religious community which has been at the forefront in investing in renewable power to reduce GHG emissions) to choose to reduce GHG emissions beyond the cap, through the voluntary purchase of renewable power, including solar

The Solar Alliance fully supports achieving significant GHG reductions in the electricity sector through a 33% Renewables Portfolio Standard program requirement. However, this requirement cannot and should not be the only opportunity that renewable generation has to participate in meeting AB 32 compliance goals. Allowing trade in allowances from new renewable generation will allow a wide variety of stakeholders, not only utilities, to purchase renewable power to reduce GHG emissions. Preventing market participants from reducing their carbon footprint through renewable power runs counter to the rational of a cap and trade program which is intended to harness the power of the competitive market to seek out innovative means of achieving cost-effective GHG reduction goals.

Using new renewable generation to an output based approach would not be difficult to administer. Administrators could allocate allowances to deliverers of new renewable generation based on their proportion of megawatts delivered to the grid, using the GHG emission reduction calculation from the Emissions & Generation Resource Integrated Database (eGRID) calculator, which is a comprehensive inventory of environmental attributes of electric power

[11] Id.

systems.[12] The US EPA Climate Leaders Program relies on eGRID to provide peer-reviewed, federal guidance for corporate and other customers using renewable power to reduce their GHG footprint through voluntary renewable power purchases and can easily be adapted to establish GHG reductions from renewable power under a cap and trade program. Once the renewable generator receives the allowances, they could either retire them to retain their ability to make GHG reduction claims, or they could sell the allowances to another entity who either needs the allowances for GHG compliance or wants to reduce their carbon footprint voluntarily to accelerate climate change mitigation.

If allowances are auctioned, a portion of allowances could be set aside for new renewable generation according to an output based allocation approach. This set aside portion could be adjusted over time to account for changes in the rate of new renewable generation development. Instead of requiring carbon-intensive industries to pay an Administrator for GHG allowances under an auction system, an output based new renewable set aside within the auction would create an opportunity for these same carbon-intensive industries to purchase allowances from new renewable generation owners, thereby leveraging carbon capital directly to finance new renewable projects, expanding the renewable power market, and driving down renewable power costs to benefit the economy as a whole. Wisconsin and Pennsylvania, for example, have proposed output-based allocations, including allocating allowances to renewable generation, as

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[12] On the web site, available at http://www.epa.gov/cleanenergy/energy-resources/egrid/index.html, eGRID is described as "The preeminent source of air emissions data for the electric power sector, eGRID is based on available plant-specific data for all U.S. electricity generating plants that provide power to the electric grid and report data to the U.S. government. eGRID integrates many different federal data sources on power plants and power companies, from three different federal agencies: EPA, the Energy Information Administration (EIA), and the Federal Energy Regulatory Commission (FERC). Emissions data from EPA are carefully integrated with generation data from EIA to produce useful values like pounds per megawatt-hour (lb/MWh) of emissions, which allows direct comparison of the environmental attributes of electricity generation. eGRID also provides aggregated data by state, U.S. total,

(footnote continued)

part of their Clean Air Interstate Rules

B. <u>New Renewable Generation Resulting from Market Transformation Under the California Solar Initiative Should Not be Allocated to Utilities Under "Core Measures"</u>

Careful consideration must also be given to the impacts of including emissions reductions resulting from the CSI within the "core measures" portion of the AB 32 rulemaking to ensure customers incentives to invest in solar under the CSI program are maintained. Consideration of the impact of including the CSI within "core measures" under AB 32 is particularly important because, as currently proposed, "core measures" attribute GHG emission reductions solely to the utility and other directly regulated entities under a command and control framework. As discussed below, this proposal has the potential to undermine customer incentives to participate in the CSI. Such a result must be avoided for the CSI to succeed.

At the onset of consideration of how the CSI and future customer-owned PV purchases should be counted for AB 32 compliance, it must be remembered that CSI is a market transformation program which provides declining incentives as the PV market grows, but that customers are not *required* to invest in solar. In this sense, the CSI is not a purely regulatory command and control program but is instead a voluntary program driven by market forces, and is designed to expire once market transformation of the PV industry is achieved. The Commission has recognized this aspect of the CSI in many of its decisions.[13] Similar to the CSI, the cap and trade framework is at its heart a market-oriented program designed to achieve a regulatory goal via market forces. Because of these similarities, emission reductions from voluntary PV purchases are more appropriately placed within the cap and trade framework and attributed to

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company, and by three different sets of electric grid boundaries."

[13] See, generally, Decision No. (D.) 06-01-024, D.06-08-028, D.07-01-018 (program design will take account of market conditions and the evolution of the market).

market participants, rather than to utilities as nonmarket-based GHG reduction requirements.

Moreover, the Commission has already determined that the owners of a solar energy system incentivized by the CSI retain ownership and control of the renewable energy credits (REC) generated by their system. The Commission made this determination based on three observations: (1) customers desire to invest in a solar energy system was often motivated by their ability to make green energy claims, including GHG reduction claims; (2) sale of RECs could provide an important revenue stream to CSI participants as incentives decline in the future, if they choose not to make a green energy or GHG reduction claim; and (3) sale of RECs could ultimately result in the incentives provided by ratepayers being reduced because CSI participants sell their RECs in voluntary or compliance markets.[14] Each of these points is equally salient today and supports designing a GHG compliance market under AB 32 that supports customer's voluntary efforts to reduce their GHG footprint through the CSI.

The Commission's first observation is especially germane because many customers are highly motivated to reduce their carbon footprint and see solar as an important tool in doing so. Indeed, as noted in "Forging A Frontier", a joint work by Ecosystems Marketplace and New Carbon Finance, the worldwide voluntary over-the-counter carbon market was valued at $330.8 million in 2007, with the Chicago Climate Exchange market alone valued at $72.4 million.[15] Voluntary carbon markets are growing considerably in the United States. This report also noted that voluntary REC sales increased 75% between 2005 and 2006 and voluntary

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[14] See D.07-01-018, pp. 15-21.

[15] Forging a Frontier: State of the Voluntary Carbon Markets 2008, Ecosystem Marketplace and New Carbon Finance, May 8, 2008, p. 24, available at: http://ecosystemmarketplace.com/documents/cms_documents/2008_StateofVoluntaryCarbonMarket.4.pdf (last accessed May 30, 2008) (Forging a Frontier).

renewable power markets have grown at an average of 50% over several years.[16] This explosive growth shows customers are interested in and highly motivated to reduce their carbon footprint using voluntary carbon markets, and that RECs are an important vehicle for doing so. RECs could also play a key role in the transition from the voluntary to compliance carbon market because RECs currently serve as a widely recognized proxy for GHG reductions in the voluntary carbon market. Each of these points underscore the Commission's earlier finding that a customer's desire to invest in a solar energy system is heavily motivated by their ability to "green" their power supply.

CSI participants make a substantial investment in their solar energy systems in order to contribute to California's green energy production. This investment is growing proportionally over time as ratepayer incentives decline. Commercial customers considering the installation of a solar energy system must often overcome traditional management and internal administrative hurdles. For many companies these obstacles are mitigated by their desire to make a meaningful contribution to reduced GHG emissions. As the impacts of global climate change become more readily observed with every passing day, including the loss of snowpack, increased forest fires, and increased hurricanes, many corporate and non-profit leaders are increasing their commitment to climate mitigation measures. Now is not the time to inadvertently limit the legitimacy of these efforts by negating the GHG emission reductions from the voluntary purchase of renewable power within California's cap and trade design.

Furthermore, for solar customers who choose not to make GHG reduction claims, allowing CSI customers to sell allowances produced by their solar energy system could provide a valuable and market-oriented revenue stream to offset declines in ratepayer incentives. This

[16] Id, p. 35.

transition to a market-funded revenue stream was recognized in D.07-01-018 as "consistent with the long-term goal of transitioning the solar industry away from ratepayer incentives to a self-sustaining model in which no such incentives are necessary."[17] The Commission also recognized that "[revenue from REC sales] could supplement and eventually, in combination with other elements of economic value, replace altogether ratepayer incentives as these incentives are phased out."[18]

Renewable allowances will also allow a greater portion of society to benefit from ratepayer investment in the CSI program by creating a vehicle to reduce GHG emissions across multiple compliance and non-compliance sectors, if the solar customer chooses not to make emission reduction claims by retiring the allowance. Cap-and-trade must be designed in a way that preserves the ability of individuals, private companies, local government and non-profits to make a real contribution to GHG emission reductions through their voluntary purchase of renewable energy. An allowance provides a market incentive that can only be realized if the customer also owns and controls use of the allowance.

The Solar Alliance is sensitive to concerns regarding double counting and believes policies must be put in place to protect the integrity of the CSI, RPS and AB 32 compliance. To avoid double counting of emissions reductions stemming from CSI derived GHG emission reductions, the Solar Alliance believes CSI megawatts should not be counted within the nonmarket-based utility emission reduction measures being considered for the AB 32 compliance. As noted above, the CSI is not a purely regulatory program in the traditional sense but is rather a market-driven program within which customers ultimately make the determination

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[17] D.07-01-018, pg. 19.
[18] Id.

of whether to participate or not. Placement of CSI megawatts within the nonmarket-based regulatory emission reduction portion of any GHG compliance regime could also result in double counting when a customer makes a GHG reduction claim based upon their purchase of a solar energy system which is also being claimed by the utility

For these reasons, placing the CSI program within the cap and trade portion of any AB 32 compliance framework is appropriate. Within that framework, CSI participants should receive allowances for any energy delivered to the system the same as other generators. Doing so allows CSI participants to maintain their ability to make GHG reduction claims which is an important motivation for many CSI customers. Doing so also maintains the potential for the CSI program to transition away from ratepayer incentives to market-oriented revenue streams which the Commission has recognized is the long-term goal of the CSI.

IV. CONCLUSION

The Solar Alliance appreciates the opportunity to provide these comments on the E3 Greenhouse Gas Calculator and greenhouse gas allowance allocation methodologies. The Solar Alliance fully supports AB 32 and believes the best way to achieve AB 32's ambitious goals is to have compliance markets work synergistically with other actions already taking place within California and across the world. To that end, the Solar Alliance believes GHG compliance policies, including a cap-and-trade program, such as cap-and-trade and auctions, must be designed in a manner which does not undermine existing purchases of renewable power, encourages new renewable generation and rewards investments by a broad spectrum of society made in such generation. In order for this to happen, new renewable generation must be granted allowances in the cap and trade program. Doing so will allow owners of new renewable generation to realize the economic value of their investment and also allow individuals, private companies, local government and non-profits to make a real contribution to GHG emission reductions through their voluntary purchase of renewable energy and/or allowances from the generation.

Respectfully submitted this June 2, 2008 at San Francisco, California.

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By *<u>/s/ Joseph F. Wiedman</u>*
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Attorneys for the Solar Alliance

Attachment A

U.S. DOE Solar Technologies Program
Solar America Initiative
Photovoltaic System LCOE Estimate Projections – May 29, 2008

1. **Scenario 1: With current Federal Incentives**

Residential Systems (new construction)

	$/Watt		LCOE (cents/kWh)	
	Low	High	Low	High
2006	7.00	7.25	29.4	30.4
2010	4.40	4.75	14.2	15.2
2015	2.60	3.60	7.4	9.8

Commercial Systems

	$/Watt		LCOE (cents/kWh)	
	Low	High	Low	High
2006	5.00	5.60	16.4	18.2
2010	3.30	3.70	9.4	10.3
2015	2.30	2.60	6.1	6.8

2. **Scenario 2: With NO Federal Incentives**

Residential Systems (new construction)

	$/Watt		LCOE (cents/kWh)	
	Low	High	Low	High
2006	7.00	7.25	31.4	32.4
2010	4.40	4.75	15.7	16.9
2015	2.60	3.60	8.9	11.9

Commercial Systems

	Cost/Watt ($)		LCOE (cents/kWh)	
	Low	High	Low	High
2006	5.00	5.60	27	30
2010	3.30	3.70	15.2	16.8
2015	2.30	2.60	9.9	11.1

3. **LCOE Assumptions:**

Residential:

- 4% real interest rate
- Capital recovery factor of .078 in 2006, .073 in 2010 and 2015
- 25 year term, extending to 30 years in 2010 and 2015
- 92% AC/DC Conversion efficiency
- 80% BOS Derate factor
- 25% capacity factor

- ITC limited at $2,000
- O&M Costs .03/watt in 2006, .015/watt in 2010, .01/watt in 2015

Commercial:

- 5% real interest rate
- Capital recovery factor of .071 in 2006, .065 in 2010 and 2015
- 25 year term, extending to 30 years in 2010 and 2015
- 92% AC/DC Conversion efficiency
- 80% BOS Derate factor
- 22% capacity factor
- 30% ITC and 5 year MACRS
- O&M Costs .02/watt in 2006, .015/watt in 2010, .01/watt in 2015

Attachment B

CO2 Supply Curves

Summary of INCREMENTAL resource CO2, Costs, and Savings
Incremental means those costs and savings that are in addition to the reference case

Display Utility and Customer Costs: FALSE

	EE	DR	CSI	Onsite CHP	Export CHP	Biogas	Biomass	Geothermal	Hydro - Small	Solar	Wind
CO2 Savings	10.2	-	1.7	2.1	2.8	1.1	2.2	2.9	0.0	3.7	2.9
GWh at Generator	20,528	-	3,395	212	308	2,209	4,418	6,165	15	7,359	5,845
Peak MW at Generator	3,695	-	1,077	1,645	2,103	297	593	782	2	1,791	376
Utility Costs	$ 1,334	$ -	$ 119	$ -	$ 1,066	$ 205	$ 754	$ 808	$ 2	$ 1,081	$ 660
Utility Energy Value	$ 1,107	$ -	$ 183	$ 586	$ 850	$ 120	$ 240	$ 335	$ 1	$ 396	$ 311
Utility Capacity Value	$ 388	$ -	$ 115	$ 172	$ 220	$ 31	$ 62	$ 82	$ 0	$ 188	$ 39
Utility Energy and Capacity	$ 1,495	$ -	$ 298	$ 759	$ 1,070	$ 151	$ 302	$ 417	$ 1	$ 585	$ 351
TRC Costs	$ 802	$ -	$ 1,706	$ 765	$ 22	$ -	$ -	$ -	$ -	$ -	$ -
Cost $/tonne	(15.78)	-	(105.53)	(365.74)	(3.68)	49.11	205.04	134.49	111.51	135.17	105.96

Summary of Costs per Tonne ($/Tonne CO2e)

	Utility	Consumer	Total	MMt CO2e
Energy Efficiency	$ (16)	$ 78	$ 63	10.2
Renewables	$ 133	$ -	$ 133	12.8
CSI	$ (106)	$ 1,007	$ 902	1.7
CHP	$ (158)	$ 161	$ 4	4.9
Weighted Average	$ 20	$ 111	$ 131	29.6

Incremental Annual Customer Costs of Resources in 2020 ($M per year in 2020) $2008

	PG&E	SCE	SDG&E	SMUD	LADWP	NorCal	SoCal	Water Agen	TOTAL CA
EE	$ 310	$ 231	$ 50	$ 55	$ 46	$ 51	$ 59	$ 802	$ 1,605
SB1	$ 996	$ 456	$ 167	$ 18	$ 33	$ 8	$ 28	$ -	$ 1,706
CHP	$ 570	$ 589	$ 118	$ 94	$ 169	$ 125	$ 172	$ 37	$ 1,874
Total	$ 1,877	$ 1,276	$ 334	$ 167	$ 248	$ 185	$ 258	$ 839	$ 5,185

33%RPS / High Goals EE Scenario: E3 case, no market transformation, with lower PV costs

CO2 Supply Curves

Summary of INCREMENTAL resource CO2, Costs, and Savings

Display Utility and Customer Costs FALSE

Incremental means those costs and savings that are in addition to the reference case

	EE	DR	CSI	Onsite CHP	Export CHP	Biogas	Biomass	Geothermal	Hydro - Small	Solar	Wind
CO2 Savings	10.2	-	2.4	2.1	2.8	1.1	2.2	2.9	0.0	3.7	2.9
GWh at Generator	20,528	-	4,715	212	308	2,209	4,418	6,165	15	7,359	5,845
Peak MW at Generator	3,695	-	1,077	1,645	2,103	297	593	782	2	1,791	376
Utility Costs	$ 1,334	$ -	$ 76	$ -	$ 1,066	$ 205	$ 754	$ 808	$ 2	$ 1,081	$ 660
Utility Energy Value	$ 1,107	$ -	$ 254	$ 586	$ 850	$ 120	$ 240	$ 335	$ 1	$ 396	$ 311
Utility Capacity Value	$ 382	$ -	$ 113	$ 170	$ 217	$ 31	$ 61	$ 81	$ 0	$ 185	$ 39
Utility Energy and Capacity	$ 1,490	$ -	$ 367	$ 756	$ 1,067	$ 151	$ 301	$ 415	$ 1	$ 582	$ 350
TRC Costs	$ 802	$ -	$ 963	$ 765	$ 22	$ -	$ -	$ -	$ -	$ -	$ -
Cost $/tonne	(15.21)	-	(123.57)	(364.53)	(0.47)	49.53	205.45	134.90	111.87	135.92	106.16

Summary of Costs per Tonne ($/Tonne CO2e)

	Utility	Consumer	Total	MMt CO2e
Energy Efficiency	$ (15)	$ 78	$ 63	10.2
Renewables	$ 133	$ -	$ 133	12.8
CSI	$ (124)	$ 409	$ 286	2.4
CHP	$ (155)	$ 161	$ 6	4.9
Weighted Average	$ 17	$ 84	$ 101	30.3

Incremental Annual Customer Costs of Resources in 2020 ($M per year in 2020) $2008

	PG&E	SCE	SDG&E	SMUD	LADWP	NorCal	SoCal	Water Agen	TOTAL CA
EE	$ 310	$ 231	$ 50	$ 55	$ 46	$ 51	$ 59	$ 802	$ 1,605
SB1	$ 562	$ 257	$ 94	$ 10	$ 18	$ 5	$ 16	$ -	$ 963
CHP	$ 570	$ 589	$ 118	$ 94	$ 169	$ 125	$ 172	$ 37	$ 1,874
Total	$ 1,443	$ 1,077	$ 262	$ 159	$ 234	$ 181	$ 246	$ 839	$ 4,442

33% RPS / High Goals EE Scenario: E3 case, with market transformation

CO2 Supply Curves

Summary of INCREMENTAL resource CO2, Costs, and Savings

Display Utility and Customer Costs: FALSE

Incremental means those costs and savings that are in addition to the reference case

	EE	DR	CSI	Onsite CHP	Export CHP	Biogas	Biomass	Geothermal	Hydro - Small	Solar	Wind
CO2 Savings	10.2	-	1.7	2.1	2.8	1.1	2.2	2.9	0.0	3.7	2.9
GWh at Generator	20,528	-	3,395	212	308	2,209	4,418	6,165	15	7,359	5,845
Peak MW at Generator	3,695	-	1,077	1,645	2,103	297	593	782	2	1,791	376
Utility Costs	$ 1,334	$ -	$ 119	$ -	$ 1,066	$ 205	$ 754	$ 808	$ 2	$ 1,081	$ 660
Utility Energy Value	$ 1,107	$ -	$ 183	$ 586	$ 850	$ 120	$ 240	$ 335	$ 1	$ 396	$ 311
Utility Capacity Value	$ 388	$ -	$ 115	$ 172	$ 220	$ 31	$ 62	$ 82	$ 0	$ 188	$ 39
Utility Energy and Capacity	$ 1,495	$ -	$ 298	$ 759	$ 1,070	$ 151	$ 302	$ 417	$ 1	$ 585	$ 351
TRC Costs	$ 802	$ -	$ 1,215	$ 765	$ 22	$ -	$ -	$ -	$ -	$ -	$ -
Cost $/tonne	(15.78)	-	(105.53)	(365.74)	(3.68)	49.11	205.04	134.49	111.51	135.17	105.96

Summary of Costs per Tonne ($/Tonne CO2e)

	Utility	Consumer	Total	MMt CO2e
Energy Efficiency	$ (16)	$ 78	$ 63	10.2
Renewables	$ 133	$ -	$ 133	12.8
CSI	$ (106)	$ 717	$ 612	1.7
CHP	$ (158)	$ 161	$ 4	4.9
Weighted Average	$ 20	$ 95	$ 115	29.6

Incremental Annual Customer Costs of Resources in 2020 ($M per year in 2020) $2008

	PG&E	SCE	SDG&E	SMUD	LADWP	NorCal	SoCal	Water Agen	TOTAL CA
EE	$ 310	$ 231	$ 50	$ 55	$ 46	$ 51	$ 59	$ 802	$ 1,605
SB1	$ 709	$ 325	$ 119	$ 13	$ 23	$ 6	$ 20	$ -	$ 1,215
CHP	$ 570	$ 589	$ 118	$ 94	$ 169	$ 125	$ 172	$ 37	$ 1,874
Total	$ 1,590	$ 1,144	$ 286	$ 162	$ 239	$ 182	$ 250	$ 839	$ 4,694

33% RPS / High Goals EE Scenario: Market transformation case with DOE PV costs

CO2 Supply Curves

Summary of INCREMENTAL resource CO2, Costs, and Savings

Display Utility and Customer Costs FALSE

Incremental means those costs and savings that are in addition to the reference case

	EE	DR	CSI	Onsite CHP	Export CHP	Biogas	Biomass	Geothermal	Hydro - Small	Solar	Wind
CO2 Savings	10.2	-	2.4	2.1	2.8	1.1	2.2	2.9	0.0	3.7	2.9
GWh at Generator	20,528	-	4,715	212	308	2,209	4,418	6,165	15	7,359	5,845
Peak MW at Generator	3,695	-	1,077	1,645	2,103	297	593	782	2	1,791	376
Utility Costs	$ 1,334	$ -	$ 76	$ -	$ 1,066	$ 205	$ 754	$ 808	$ 2	$ 1,081	$ 660
Utility Energy Value	$ 1,107	$ -	$ 254	$ 586	$ 850	$ 120	$ 240	$ 335	$ 1	$ 396	$ 311
Utility Capacity Value	$ 382	$ -	$ 113	$ 170	$ 217	$ 31	$ 61	$ 81	$ 0	$ 185	$ 39
Utility Energy and Capacity	$ 1,490	$ -	$ 367	$ 756	$ 1,067	$ 151	$ 301	$ 415	$ 1	$ 582	$ 350
TRC Costs	$ 802	$ -	$ 384	$ 765	$ 22	$ -	$ -	$ -	$ -	$ -	$ -
Cost $/tonne	(15.21)	-	(123.57)	(364.53)	(0.47)	49.53	205.45	134.90	111.87	135.92	106.16

Summary of Costs per Tonne ($/Tonne CO2e)

	Utility	Consumer	Total	MMt CO2e
Energy Efficiency	$ (15)	$ 78	$ 63	10.2
Renewables	$ 133	$ -	$ 133	12.8
CSI	$ (124)	$ 163	$ 40	2.4
CHP	$ (155)	$ 161	$ 6	4.9
Weighted Average	$ 17	$ 65	$ 82	30.3

Incremental Annual Customer Costs of Resources in 2020 ($M per year in 2020) $2008

	PG&E	SCE	SDG&E	SMUD	LADWP	NorCal	SoCal	Water Agen	TOTAL CA
EE	$ 310	$ 231	$ 50	$ 55	$ 46	$ 51	$ 59	$ 802	$ 1,605
SB1	$ 224	$ 103	$ 38	$ 4	$ 7	$ 2	$ 6	$ -	$ 384
CHP	$ 570	$ 589	$ 118	$ 94	$ 169	$ 125	$ 172	$ 37	$ 1,874
Total	$ 1,105	$ 922	$ 205	$ 153	$ 223	$ 178	$ 237	$ 839	$ 3,863

33% RPS / High Goals EE Scenario: Market transformation, DOE PV costs, and utility avoided cost changes

CO2 Supply Curves

Summary of INCREMENTAL resource CO2, Costs, and Savings

Display Utility and Customer Costs: FALSE

Incremental means those costs and savings that are in addition to the reference case

	EE	DR	CSI	Onsite CHP	Export CHP	Biogas	Biomass	Geothermal	Hydro - Small	Solar	Wind
CO2 Savings	10.2	-	2.4	2.1	2.8	1.1	2.2	2.9	0.0	3.7	2.9
GWh at Generator	20,528	-	4,715	212	308	2,209	4,418	6,165	15	7,359	5,845
Peak MW at Generator	3,695	-	1,077	1,645	2,103	297	593	782	2	1,791	376
Utility Costs	$ 1,334	$ -	$ 76	$ -	$ 2,229	$ 205	$ 754	$ 808	$ 2	$ 1,081	$ 660
Utility Energy Value	$ 2,474	$ -	$ 641	$ 1,388	$ 2,012	$ 284	$ 568	$ 792	$ 2	$ 1,037	$ 689
Utility Capacity Value	$ 382	$ -	$ 113	$ 170	$ 217	$ 31	$ 61	$ 81	$ 0	$ 185	$ 39
Utility Energy and Capacity	$ 2,856	$ -	$ 754	$ 1,558	$ 2,229	$ 315	$ 629	$ 873	$ 2	$ 1,222	$ 728
TRC Costs	$ 802	$ -	$ 384	$ 230	$ 7	$ -	$ -	$ -	$ -	$ -	$ -
Cost $/tonne	(148.64)	-	(288.09)	(751.21)	(0.47)	(99.28)	56.64	(22.53)	(25.85)	(38.56)	(23.44)

Summary of Costs per Tonne ($/Tonne CO2e)

	Utility	Consumer	Total	MMt CO2e
Energy Efficiency	$ (149)	$ 78	$ (70)	10.2
Renewables	$ (20)	$ -	$ (20)	12.8
CSI	$ (288)	$ 163	$ (125)	2.4
CHP	$ (320)	$ 48	$ (271)	4.9
Weighted Average	$ (133)	$ 47	$ (86)	30.3

Incremental Annual Customer Costs of Resources in 2020 ($M per year in 2020) $2008

	PG&E	SCE	SDG&E	SMUD	LADWP	NorCal	SoCal	Water Agen	TOTAL CA
EE	$ 310	$ 231	$ 50	$ 55	$ 46	$ 51	$ 59	$ 802	$ 1,605
SB1	$ 224	$ 103	$ 38	$ 4	$ 7	$ 2	$ 6	$ -	$ 384
CHP	$ 171	$ 177	$ 35	$ 28	$ 51	$ 38	$ 52	$ 11	$ 563
Total	$ 706	$ 511	$ 123	$ 87	$ 105	$ 91	$ 117	$ 813	$ 2,552

CERTIFICATE OF SERVICE

I, Lisa Vieland, certify that I have on this 2nd day of June 2008 caused a copy of the foregoing

COMMENTS OF THE SOLAR ALLIANCE ON ALLOWANCE ALLOCATION METHODOLOGIES AND OTHER MATTERS

to be served on all known parties to R.06-04-009 listed on the most recently updated service list available on the California Public Utilities Commission website, via email to those listed with email and via U.S. mail to those without email service. I also caused courtesy copies to be mailed as follows:

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I declare under penalty of perjury that the foregoing is true and correct.

Executed this 2nd day of June 2008 at San Francisco, California.

/s/ Lisa Vieland
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