

DOCKETED

Docket Number:	09-AFC-07C
Project Title:	Palen Solar Power Project - Compliance
TN #:	202743
Document Title:	Ex.1178 - Biological Resources Supplemental Rebuttal Testimony â€“ Curtailment Infeasibility, Performance Standards and Polarized
Description:	N/A
Filer:	Marie Fleming
Organization:	Galati Blek LLP
Submitter Role:	Applicant Representative
Submission Date:	7/18/2014 1:01:55 PM
Docketed Date:	7/18/2014

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:

Petition For Amendment for the
**PALEN SOLAR ELECTRIC
GENERATING SYSTEM**

DOCKET NO. 09-AFC-07C

**DECLARATION OF MATTHEW
STUCKY**

I, Matthew Stucky, declare as follows:

1. I am presently employed by Abengoa Solar LLC as Manager of Business Development.
2. A copy of my professional qualifications and experience was included with my Opening Testimony and is incorporated by reference in this Declaration.
3. I prepared the attached supplemental rebuttal testimony relating to Biological Resources for the Petition for Amendment for the Palen Solar Electric Generating System (California Energy Commission Docket Number 09-AFC-07C).
4. It is my professional opinion that the attached prepared testimony is valid and accurate with respect to issues that it addresses.
5. I am personally familiar with the facts and conclusions related in the attached prepared testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury, under the laws of the State of California, that the foregoing is true and correct to the best of my knowledge and that this declaration was executed on July 17 2014.


Matthew Stucky

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:

Petition For Amendment for the
**PALEN SOLAR ELECTRIC
GENERATING SYSTEM**

DOCKET NO. 09-AFC-07C

**DECLARATION OF GUSTAVO
BUHACOFF**

I, Gustavo Buhacoff, declare as follows:

1. I am presently employed by BrightSource Energy as a Director of O&M.
2. A copy of my professional qualifications and experience is included with my Supplemental Testimony.
3. I prepared the attached supplemental rebuttal testimony relating to Biological Resources for the Petition for Amendment for the Palen Solar Electric Generating System (California Energy Commission Docket Number 09-AFC-07C).
4. It is my professional opinion that the attached prepared testimony is valid and accurate with respect to issues that it addresses.
5. I am personally familiar with the facts and conclusions related in the attached prepared testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury, under the laws of the State of California, that the foregoing is true and correct to the best of my knowledge and that this declaration was executed on July 17 2014.



Gustavo Buhacoff

**PALEN SOLAR ELECTRIC GENERATING SYSTEM
BIOLOGICAL RESOURCES
SUPPLEMENTAL REBUTTAL TESTIMONY
INFEASIBILITY OF CURTAILMENT
PERFORMANCE STANDARDS
POLARIZED LIGHT**

I. Names: Matthew Stucky
Gustavo Buhacoff

II. Purpose:

Our supplemental rebuttal testimony is provided to respond to the questions relating to the infeasibility of curtailment for avian impact reduction and the performance standards (mortality thresholds) raised by Staff in its Opening Testimony and the absence of polarized light for the Palen Solar Electric Generating System (PSEGS) (09-AFC-7C).

III. Qualifications:

A summary of our qualifications including copies of our resumes have been provided in our previously-filed written testimonies in this proceeding.

To the best of our knowledge all referenced documents and all of the facts contained in this testimony are true and correct. To the extent this testimony contains opinions, such opinions are our own. We make these statements and provide these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

IV. Opinion and Conclusions:

INFEASIBILITY OF CURTAILMENT

The Committee has asked whether it is feasible or appropriate to add a curtailment condition to the project permit to help address avian impacts. As explained in Exhibits 1134 and 1136, a curtailment condition would result in almost all circumstances in a non-financeable project and would not be an effective tool to reduce potential avian impacts.

In Staff's Opening Testimony¹, several questions were posed regarding the potential infeasibility of short-term or long-term curtailment. Answers to those questions are provided below.

1. How long does it take to de-energize the solar field by turning the mirrors down? What would be the configuration, heliostat reflections to the ground, or to the sky? If heliostats are to be turned to the sky, birds might have underside flux of about one sun in addition to the topside flux already coming from the sun; which may still damage a bird. It is unknown how long an animal could withstand the energy of two suns without damage, or if any damage would be sustained.

Response: As stated in Exhibit 1136, it could take up to 30 minutes to place the heliostats in the Stow (vertical) or Protection (horizontal, facing the sky) positions. These are the only positions in which we can guarantee no concentration of sunlight. Exhibit 1136 describes a hypothetical curtailment instruction to place heliostats in Stow position. If the heliostats were directed to Protection, the Petitioner does not believe that a bird would be adversely affected by experiencing sunlight on its top side while simultaneously experiencing reflected sunlight on its bottom side.

2. How much advance notice of curtailment would be available.

Response: Since it takes up to 30 minutes to ensure concentrated solar flux has ceased, 30 minutes advance notice could theoretically be required. Since bird flight patterns are unpredictable, such advance notice could not be provided reliably in advance to effectively prepare for incoming birds. However, as discussed in Exhibits 1134, 1140, and 1141, deterrent methods could be employed quickly to respond to many incoming bird events.

3. How long would the curtailment period need to be in place to protect target birds? Some species may rapidly overfly an area while other birds may be attracted to the flux field. In the period it would take for a bird to potentially cross the three solar fields, would the bird suffer heat exhaustion? Note standby positions would not reduce the hazard as there is actually a larger hazard zone (and more energy passing over and exiting the solar field) when the heliostats are directed to

¹ The questions presented below are from Exhibit 2017, Staff's Supplemental Staff Assessment and Opening Testimony.

their standby positions than when their beams are intercepted by the solar receiver at the tower. This would be true of any standby configuration where heliostat beams are concentrated in aerial locations other than on the tower receiver

Response: As described above and in the Risk Assessment portion of Exhibit 1139 and in Exhibit 1134, Petitioner believes the area of concentrated solar flux with the potential to harm birds is near the two solar receivers. For the reasons discussed in Exhibit 1134 and 1136 and in answers to Questions 1 and 2 above, the Petitioner does not believe project curtailment is the appropriate mechanism to protect birds. The amount of time curtailment would need to be in place during an event would be unknown and uncertain.

4. How long could a curtailment last before the steam system cooled to the point that would inhibit the facility from operating in the same day? How does the power plant recovery time relate to a flux-outage duration? Could the plant come back online the same day? Would thermal heat storage assist with this? Can the on-site boilers respond quickly enough and forcefully enough to mitigate for the outage time? Would the boilers have to be running all the time to maintain adequate temperatures to keep the liquid piping hot for quick delivery? It is staffs understanding that at ISEGS, “intermittent cloud cover” can be sufficient to trip the steam turbines off line for the rest of the day

Response: As described in Exhibit 1137, it takes about 2 hours from the time the operation is stopped and sent to Stow or Protection until the plant can be back in operation. The auxiliary boilers have not been sized to use natural gas to maintain steam turbine operations without commingled solar heat input. Depending on the time of day curtailment would be triggered, and/or weather conditions subsequent to the curtailment instruction, the plant may be unable to return to service until the next day. Therefore, the costs of a curtailment provision to the Project may be quite significant.

5. How severe would the curtailment need to be? Should we assume 100% over the whole field, or part of a field

Response: Partial curtailment is only possible with small portions of the Solar Field (SF). Bird flight patterns cannot be predicted with enough certainty for the project owner to know, during operations, which particular heliostats should be Stowed in response to a particular avian event.

Removing larger portions from operation would result in a reduction in the thermal load on the effected section of the SRSG. As a consequence, a much larger portion of heliostats across the entirety of the SF would be affected to keep the thermal load on the SRSG balanced. Reducing thermal load on the other sections of the SRSG would send those associated heliostats to Standby.

If an entire quadrant of the SF, for example, was sent to Protection or Stow, the load unbalance would be too great to overcome and the unit would trip off in a matter of minutes. All the other heliostats in the remaining three quadrants that are removed from Tracking would be sent to Standby first, resulting in the opposite action than intended.

6. How reliable would advance notice predictions of bird flyovers be? Could there be a probability/consequence threshold associated with a flyover advance notice prediction

Response: The Petitioner believes that there is technology that can reliably detect birds at some distance from the tower. However, there is little to no certainty that the birds would behave in a predictable manner and/or that the cessation of concentrated flux generation could be achieved in time to remove the exposure risk through the curtailment mechanism alone. In addition, it is unlikely that birds could be detected up to 30 minutes away from the facility to ensure curtailment would be effective. There are different detect and deter systems that could be employed that would be far more effective than curtailment.

7. If the power plant is able to restart the same day as a curtailment would the process affect the maintenance and reliability of the plant similar to a daily startup? At the time PSEGS would finish construction and become operational, will it run at full capacity? Or is it experimental, like ISEGS, requiring a ramp up phase. If so, how long would this last?

Response: Every trip of the plant affects maintenance and reliability, especially a trip of this type where temperature reductions in the SRSG are abrupt and the steam turbine must be ramped down in a disorderly manner.

8. Has there ever been a full-scale demonstration or simulation of this kind of short-term sudden shutdown, with or without an immediate restart for an electric power producing water/steam-based solar tower?

Response: ISEGS has had different trips during the start up phase that could be considered similar to the curtailment discussed above. Usually, the SF was sent to Standby, allowing for a faster restart than would be expected in the cases discussed in this testimony. However, such trips during operations (as opposed to start up) would be difficult to manage as described above.

9. How long will it take to test mirrors, position, and sync them to the operating system (Sphinx) being utilized to control positioning? At ISEGS, this was also a lengthy process, and resulted in flux likely being concentrated offsite, and a high reliance on the standby positions. At ISEGS, it was necessary to spend time “training” the mirrors and syncing Sphinx for standby position. ISEGS employs a system of infrared cameras to track heliostat beams, and search for “lost” mirrors. Is it possible for the Petitioner to use a similar camera system at the proposed PSEGS to report on mirrors that are focused offsite

Response: The infrared (IR) camera system is not used as described above. There is a camera based calibration system that is used to “zero” the mirrors to a desirable starting and aiming position. A similar system will be used at PSEGS, but these are not IR cameras. Initial calibration is a lengthy process. There are procedures already in use at ISEGS to reduce the number of heliostats that have to be in the Standby position while being calibrated. Similar procedures will be used at PSEGS.

To summarize the this portion of the testimony, short-term curtailment scenarios cannot be relied upon to achieve the desired effect (reduction of concentrated flux in locations and at times that would measurably reduce the biological impacts of the proposed Project). At the same time, operating the Project in a manner in which these elusive gains are pursued would result in significant cost (and thus, risk) to the overall Project. The Committee should weigh these costs against the expected benefits and dismiss the idea of curtail provisions in the Project permit.

PERFORMANCE STANDARDS SHOULD NOT BE MORTALITY THRESHOLDS

Performance Standards

The Committee directed the parties to consider using performance standards as a way to mitigate uncertainty and implement adaptive management. However, it is important to note that the traditional use of

performance standards is to ensure that impacts do not rise above the threshold of significance set for evaluation under the California Environmental Quality Act (CEQA).

Staff has included Avian Mortality Thresholds that may be misinterpreted as recommended performance standards. We strongly disagree that these mortality thresholds should be adopted by the Committee. Putting in place first-of-its-kind thresholds on a utility-scale solar project could have far reaching consequences and would have potentially severe consequences for the industry and this technology, in particular.

Furthermore, in the case of the PSEGS, PSH is not requesting the Committee to find that the PSEGS does not result in significant impacts to avian species. PSH is willing to proceed with a finding that avian impacts at the PSEGS are significant and, due solely to uncertainty, may not be fully mitigated by the incorporation of the mitigation provided in Conditions of Certification **BIO-16a** and **BIO-16b**. With that in mind, we believe that the best approach to incorporate performance standards would be to propose performance standards that can be modified and implemented by the TAC as appropriate. In Exhibit 1128, we have proposed revisions to Condition of Certification **BIO-16b** to allow the TAC, through implementation of the BBCS, to consider performance standards. Performance standards may be developed to help answer the questions below:

1. What are the most effective technologies or combination of technologies for detection and deterrent methods to avoid and reduce mortality of birds and bats?
2. What positioning of heliostats at night results in the least impact to birds as determined by an experimental test of heliostat positioning regimes?
3. What is the best use of compensatory mitigation funds and how may they best be proportionally applied to species/taxa groups impacted?
4. What additional monitoring, mitigation or research should be conducted if mortality is higher than predicted?
5. If mortality on a given day or a given period is considered high based on a specific threshold, what were the factors that appeared to be related to the event or series of events?

These questions cannot be answered definitively at this time and should be left up to the TAC through implementation of the BBCS. In addition, Exhibit 1173 includes a discussion of why the specific mortality thresholds

Staff has identified by species are arbitrary and inappropriate from a biology perspective.

ISEGS ELECTRICITY GENERATION

Staff alleges that ISEGS was operating at less than 20% of generating capacity during the months of January to March 2014.² Even if this calculation could be verified, the electrical output of the ISEGS facility from January to March 2014 should not be conflated with the presence of concentrated flux around the towers, as discussed in Exhibit 1137.

POLARIZED LIGHT

Light can become polarized when it reflects off of non-metallic surfaces, such as glass or silicon, at certain angles. That is, when light encounters a change in the refractive index of the media in which it is travelling, as in the interface from air to glass, a certain amount may be reflected, and at certain angles, this reflected light is polarized. However, the PSEGS heliostats use true, metallic-backed mirrors. Reflection from a metallic material does not cause polarization at all. The glass front of the mirror does reflect some light, which BrightSource estimates as about 4% of the total reflected light. That is, 96% reflects off the mirrored back surface of the heliostat, where it will not be polarized, and 4% reflects off the front surface of the heliostat, where a small portion of it *can* be polarized.

Of the 4% coming off the front surface of a heliostat, only light incident at certain angles will be polarized, and this is dependent on the mirror orientation, time of day, etc. Because heliostats are not all positioned at the same angle and are continuously adjusted during operation to track the sun. In addition, the light reflected from the SRSG is diffuse light and not polarized light.

Regardless of whether or not polarized light may be an attractant to certain insects, for the reasons stated above, PSEGS would not be a significant source of polarized light.

² Based on the citations Staff provided in Opening Testimony (Biological Resources - Figure 1), it is not possible to confirm Staff's anticipated or actual output for January to March 2014. The "Anticipated Output" from the "Final Decision Efficiency Table 1" (TN 58716) is based on a 400MW facility (rather than the ISEGS actual 377MW capacity), with no distinction between individual units or for seasonal output variations. If "Annual Energy Production" is divided by 4 to obtain quarterly "Anticipated Output" in January to March, the estimate will be significantly inflated as these months exhibit lower solar insolation, thus produce less than a quarter of the year's production. In addition, regarding "Actual Output," 2014 data provided for the Quarterly Fuel and Energy Report CEC-1304 Power Plant Data Reporting is not yet available to the public through its host website, http://energyalmanac.ca.gov/electricity/web_qfer/.