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STATE OF CALIFORNIA

Energy Resources Conservation
and Development Commission

Application for Certification for the HIDDEN HILLS SOLAR ELECTRIC GENERATING SYSTEM PROJECT	)	Docket No. 11-AFC-2

APPLICANT'S MOTION
TO SUPPLEMENT THE EVIDENTIARY RECORD

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Pursuant to Section 1716.5 of the Commission's regulations,[1] Hidden Hills Solar I, LLC and Hidden Hills Solar II, LLC (collectively, the "Applicant") hereby moves to supplement the record in this proceeding, and requests that the Committee admit into evidence the attached affidavit of Dr. Sönke Johnsen.

Dr. Johnsen's affidavit responds to certain documents (including Exhibit 330) and verbal testimony presented by Staff at the March 14, 2013 evidentiary hearing for the Hidden Hills Solar Electric Generating System project ("HHSEGS"). These exhibits were not pre-filed nor were they provided to the Applicant prior to commencement of the March 14, 2013 hearing.

Dr. Johnsen's affidavit must be received into evidence to correct the procedural unfairness and prejudice to the Applicant and all parties that resulted from Staff's surprise introduction of fundamentally new evidence on the issue of flux at the March 14, 2013 evidentiary hearing which the Applicant did not have the opportunity to review and address in advance. The affidavit contains facts and information Dr. Johnsen would have presented at the evidentiary hearing if Staff's testimony and Exhibit 330 had been pre-filed in advance of the hearing as required by the Committee's December 21, 2012 Order of Prehearing Conference and Evidentiary Hearings ("December 21st Order"). The affidavit contains relevant evidence as defined by the Commission's regulations.

For the reasons set forth herein, the Applicant moves that the Committee receive into evidence Dr. Johnsen's affidavit.

[1] The Commission's regulations are set forth in Title 20 of the California Code of Regulations.

DISCUSSION

The Committee's December 21st Order expressly required the parties to pre-file all testimony by the deadlines specified in the order. Exhibit 330 and other testimony presented by Staff at the March 14th hearing were not pre-filed by the Staff in compliance with the Committee's Order.

At the Prehearing Conference, the Committee ordered that "Applicant, Staff and Intervenors shall exchange copies of any documentary evidence not already provided …by close of business Thursday, February 28, 2013. Exhibit 330 was not provided to the Applicant or other parties by close of business on February 28, 2013.

Despite the Committee's clear direction that all testimony and exhibits must be pre-filed, or at the very least exchanged between the parties prior to the hearing, during the evidentiary hearing held on March 14th, 2013 relating to solar flux, Staff presented a new theory of a California Environmental Quality Act ("CEQA") threshold of significance, new testimony regarding applicable regulatory guidelines ostensibly supporting its engineering calculation and new testimony on technical issues including several new graphs, including graphs of reflectance measurements of birds. Neither the graphs nor Staff's accompanying testimony were timely filed as Staff's testimony in accordance with the Committee's December 21st Order. Even though these graphs were clearly prepared prior to the date of the hearing, the documents were not provided to other parties in advance of the evidentiary hearings.[2] As acknowledged by both

[2] Indeed, Applicant's witnesses on solar flux were physically in the hearing room with Staff witnesses and counsel for several hours prior to this issue coming before the Committee. Staff could have, *at the very least*, shared the graphs and new information earlier in the day. Instead, Staff quite deliberately chose to wait until Applicant's witnesses were literally on the stand such that they would be forced to respond to the new evidence—assuming any response was even permitted—in real time.

Staff counsel and Staff's witness on flux issues at the outset of their testimony, the graphs and testimony presented by Staff at the evidentiary hearing on the issue of flux was "new".

Staff's only stated justification for the surprise evidence was their counsel's assertion that the evidence was in response to Applicant's pre-filed rebuttal testimony. For multiple reasons, this rationale plainly does not justify Staff's tactics. First, the Committee Hearing Order did not allow Staff to file any sur-rebuttal to Applicant's rebuttal testimony. Second, Staff's surprise testimony does not address any new issue raised in Applicant's rebuttal testimony. It addresses issues fully known to Staff from workshop discussions and Applicant's initial testimony, and could have been presented in Staff's pre-filed initial or rebuttal testimony. Lastly, and most importantly, Applicant's rebuttal testimony was filed on February 11, 2013. Staff had one month in which it could have sought permission to file a response and provide the information to all Parties in advance of the hearing. Staff's decision to wait until the convening of witnesses to express any concern regarding Applicant's rebuttal testimony and to surprise all parties with substantial new testimony is without any justification.

Staff's surprise evidence was admitted over the vigorous objections of the Applicant.[3] As a result, the Applicant and all parties were placed at a substantial disadvantage. More importantly, the Committee was deprived of a complete and fair record upon which to base a decision.[4] The Applicant's witnesses did not have a sufficient opportunity to review Staff's materials, confirm the veracity of the presented information, or fully rebut the new surprise

[3] Applicant's counsel objected "in the strongest possible terms" and noted that Staff's new evidence was not merely summaries of pre-filed testimony, but rather comprised a substantially revised basic case on matters such as the CEQA threshold of significance, the legal underpinnings of Staff's engineering calculation and many other things. Indeed, Applicant's counsel opined that Staff's new evidence comprised the most unfair hearing tactic he had experienced in over three decades of practice at and before this Commission.

[4] The unfairness of Staff's new evidence was compounded by the Committee's decision to use "informal" hearing procedures that severely limited the ability of parties to question one another's witnesses. The Applicant supports increased use of "informal" procedures in appropriate circumstances. However, as implemented on this issue and coupled with major new surprise evidence, the result here was a denial of due process to the Applicant and, more importantly, denial to the Committee of a fully developed and coherent evidentiary record.

exhibits at the hearing. At the time of its objections, Applicant also served notice that it would consider filing a motion to respond to Staff's new evidence.

Dr. Johnsen's affidavit does not cure the unfairness of Staff's tactics. However, it addresses certain technical evidence Dr. Johnsen would have presented if Staff's exhibits and testimony had been timely pre-filed, and had Dr. Johnsen been afforded a reasonable opportunity to review these documents before they were received into evidence. Dr. Johnsen identifies several errors and issues contained in the new testimony presented by Staff on March 14th, but which was not fully addressed within the time constraints of the evidentiary hearing. Therefore, to remedy the procedural unfairness of the receipt into evidence of Staff's new testimony, the Applicant moves that Dr. Johnsen's affidavit also be received into evidence.

Dr. Johnsen's affidavit is admissible pursuant to Section 1212 of the Commission's regulations, which provides that "[a]ny relevant noncumulative evidence shall be admitted if it is the sort of evidence on which responsible persons are accustomed to rely in the conduct of serious affairs." Dr. Johnsen's affidavit is evidence that a responsible person would rely as it is the opinion of the field's foremost expert on issues of organismal biological optics and particularly how to measure absorptivity, reflectance and transmittance. Such evidence should be taken into account by the Committee prior to rendering a decision on the Application for Certification of the HHSEGS project.

CONCLUSION

For the reasons set forth herein, the Applicant moves that the Committee receive into evidence Dr. Johnsen's affidavit.

Dated: March 22, 2013

ELLISON, SCHNEIDER & HARRIS L.L.P.

By _____

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AFFIDAVIT OF SÖNKE JOHNSEN

I, Dr. Sönke Johnsen, Ph.D, declare as follows:

This affidavit addresses three issues that were not covered in my original testimony in the Hidden Hills hearings held in Shoshone, California on March 14th, 2013. This affidavit responds to graphs and statements presented by Staff for the first time at hearing that were not in Staff's prefiled testimony nor shared with Applicant prior to presentation.

1. Staff presented several new graphs of reflectance measurements of birds, purporting to show that the absorptivity of their feathers could be greater than 85% because their reflectance was less than 15%. These graphs are misleading for several reasons. First, reflectance and absorbance do not have to add up to 100%. This is because thin layers of feathers (such as are found on the main flight surface of the wing) can transmit a significant amount of light, even if they are black (see figure 1). Therefore, absorptivity is not 100% minus the percent reflectance, but a number that can be considerably lower. Second, even if the layer of feathers is opaque, the reflectances in the graphs shown are not a true measure of their real reflectance. This is because most feathers, especially dark ones, are shiny due to their smooth surface. Shiny objects, even black ones, reflect a fair bit of light in a mirror-like fashion (just like black glass coffee tables do). For a view factor of one, this shiny reflectance is about 4% (equals (n(keratin) – 1)^2/(n(keratin) + 1)^2, where n(keratin) is the refractive index of keratin, which is 1.5). For light that comes in at other angles (lower view factor), the amount of reflected light is much higher, eventually reaching 100% at glancing angles. Because this shiny reflection is white, researchers who make measurements of animal colors arrange their light sources and detectors so that the shiny reflection is excluded (see Johnsen, 2012). So the low reflectance values shown by Staff are misleading. Finally, both Staff and I agree that it is the bottom surface of the wings that will receive the reflected flux. The bottom surfaces of wings are invariably lighter than the top surfaces (see Gates, 2003). For all these three reasons, the value we used (0.85) is far from an "average" value, but instead a highly conservative one. The true absorptivity will of course vary and would have to be measured, but my best estimate for the average value for ventral surfaces of thin feather layers would be closer to 50%.

2. Staff presented a new graph that compared the results of their model to measured temperature values as a function of incident flux, assumedly to show that their model accurately reflected reality. While I agree that their model (which matches ours in this case) will predict how a highly absorptive, flat and immobile material (i.e. a block of wood) will heat up under flux, it says **nothing** about how the feathers of a flying bird will heat up under real conditions. To build on Mr. Lesh's metaphor that he was given a failing grade for his model, he has apparently given himself a passing grade here, but for the wrong test.

3. The above information and Staff's misuse of these graphs is important as much for what it says about Staff's approach to this complex and emerging science of the interaction of biology and optics as for the specific changes the corrections produce in the calculation. Coming from an engineering background and tasked with addressing this issue, Staff has made a good faith but highly flawed attempt to apply simple engineering to an extraordinarily complex problem. It is critical to realize that Staff's and my calculations are not "competing models". First, they are based on very simple and fundamental equations, the kind that would be assigned as part of an overnight homework set for junior engineering students. The difficulty is not in doing the calculations. The difficulty is in applying them to flying birds and getting a meaningful result. At the moment, this cannot be done; merely presenting the equations does not make them accurate. All I did in my analysis was correct several fundamental mistakes in Staff's implementation of these equations and show that the zone of uncertainty conservatively starts at a much higher flux level. At the risk of sounding immodest, I am recognized as one of the top experts in the world on the subject of animal optics and have literally written the book on the subject (*The Optics of Life*, Johnsen, 2012)., I have conducted thousands of measurements of absorptivity, transmittance, reflectance and the like and taught the subject extensively. Staff's simplified analysis (including, fundamental errors such as confusing emissivity with absorptivity, air temperature with sky temperature, and absorptivity with the inverse of reflectance) is not "more conservative" than those proposed by Dr. Caretto and myself; it is simply wrong. More importantly, the very concept of attempting to calculate with simple equations the complex interaction of solar flux and living, flying birds is, as I testified, "a fool's errand." Even correcting for Staff's errors, all the calculation tells you is a threshold of where solar flux *might* begin to impact birds. Above that threshold (including mine), however, the calculation tells you nothing about whether living, flying birds will, in fact, be harmed and, if so, at what flux levels. In my expert opinion, that question is best answered by studying real birds at real operating projects or by field tests such as those conducted by Mr. Santolo.

Figure 1: feather viewed against sunlight. If this feather did not transmit light, it would look jet black.

I hereby affirm, under penalty of perjury, that the above statements are true and correct to the best of my knowledge.

Dated this 21th day of March, 2013, at Durham, North Carolina.

Dr. Sönke Johnsen, Ph.D

References:

Johnsen, Sönke. *The Optics of Life: A Biologist's Guide to Light in Nature*. Princeton, NJ: Princeton UP, 2012. Print.

Gates, David Murray. *Biophysical Ecology*. New York: Springer-Verlag, 1980. Print.

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PROOF OF SERVICE

I, Karen A. Mitchell, declare that on March 22, 2013, I served the attached *Applicant's Motion to Supplement the Evidentiary Record in Response to Staff Exhibits Introduced at Hearing and Affidavit of Dr. Sonke Johnsen* via electronic mail to all parties and U.S. mail to all parties requesting hard copies on the attached service list.

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

Karen A. Mitchell

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11-AFC-2

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