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DOCKET
07-AFC-5
DATE 8/20/2009
RECD. 8/20/2009

August 20, 2009
File No.: 04.02.16.02
Project No. 357891

Mr. John Kessler, Project Manager
California Energy Commission
Systems Assessment and Facilities Siting Division
1516 9th Street, MS 15
Sacramento, CA 95814-5504

RE: Supplemental Data Response, Set 4
Ivanpah Solar Electric Generating System (07-AFC-5)

Dear Mr. Kessler:

On behalf of Solar Partners I, LLC, Solar Partners II, LLC, Solar Partners IV, LLC, and Solar Partners VIII, LLC, please find attached 5 hard copies and 5 electronic copies of the Supplemental Data Response, Set 4, which provides responses to Staff's email request dated August 6, 2009.

Please call me if you have any questions.

Sincerely,

CH2M HILL

John L. Carrier, J.D.
Program Manager

Enclosure
c: POS List
Project File

Ivanpah Solar Electric Generating System (ISEGS)

(07-AFC-5)

Supplemental Data Response, Set 4

(Response to Data Request: Visual Resources

Submitted to the

California Energy Commission

Submitted by

Solar Partners I, LLC; Solar Partners II, LLC; Solar Partners IV, LLC; and Solar Partners VIII, LLC

August 20, 2009

With Assistance from

CH2MHILL
2485 Natomas Park Drive
Suite 600
Sacramento, CA 95833

Contents

Introduction

Attached is a supplemental response by Solar Partners I, LLC; Solar Partners II, LLC; Solar Partners IV, LLC; and Solar Partners VIII, LLC (Applicant) to the California Energy Commission (CEC) Staff's data request for the Ivanpah Solar Electric Generating System (Ivanpah SEGS) Project (07-AFC-5). This data request was the result of a Staff email request for information dated August 6, 2009. As before, within each discipline area, the responses are presented in alphabetical order and are numbered for tracking and reference convenience. New graphics or tables are numbered in reference to the Supplemental Data Request number. For example, if a table were used in response to Data Request VR-5, it would be numbered Table VR5-1. The first figure used in response to Data Request VR-5 would be Figure VR5-1, and so on.

The Applicant looks forward to working cooperatively with the CEC and Bureau of Land Management (BLM) staff and the other resource agencies as the Ivanpah SEGS Project proceeds through the licensing process. We trust that these responses address the Staff's questions and we remain available to have any additional dialogue the Staff may require.

Visual Resources (VR-8 through VR-12)

Background

In all correspondence provided by the Applicant, light that would be reflected by project components has been expressed in terms of W/m^2 (watts per square meter). While this measure describes the level of energy that would be reflected, it does not quantify the brightness of that energy.

Data Request

VR-8. Please quantify the maximum level brightness (in terms of candelas per meters squared) of solar radiation expected to be:

a) reflected by a single heliostat at its surface

b) observed by overflying aircraft pilots

c) reflected by each side of each receiver at the ISEGS site at the surface of each receiver

VR-9. Please present data as cd/m^2 (candelas per square meter).

Response:

VR-8 & VR-9:

a. Brightness as reflected from a single heliostat at its surface: Lv = 1340Mcd/m².

One sun = 1420Mcd/m².

This reflectance is specular, reflected directionally from the heliostats' mirrors. It is relative only to the half degree "conus" of the sun and the reflected angle position of each individual mirror. For example; for each direction, or each position in the sky, only the relevant heliostats in the half degree cone will be observed. The rest of the heliostats have simple regular reflectance and even lower than ground reflectance. Note, that all the helisoats are either aimed to the boiler-receiver, which is irrelevant to planes flying over and never aimed toward a single location in the sky (the probability of more than one heliostat targeting the same point in the sky is nill. Even if multiple heliostats were aimed at a single location the intensity would be low.

b. Brightness as reflected from a single heliostat at a distance as seen from a flying aircraft:

$$Lv = 900\left[\frac{Mcd}{m^2}\right] * \frac{1442[m^2]}{D^2[m^2]} * \cos\theta$$

Where:
D = distance of the aircraft from the mirror.
θ = relative angle between the aircraft and the mirror normal.

For an aircraft flying at 370m above the plant (FAA regulation 220m above obstacle + 150m tower):

$$Lv = 35Mcd/m^2$$

c. Brightness from the receiver.

   i. Max on one side (north side): Lv = 555kcd/m^2.
   ii. Average brightness: Lv = 345kcd/m^2.
   iii. On some extreme scenario one panel on Eva can get: Lv = 900kcd/m^2.

Background

The response to Data Request VR-2 presented in Data Response Set 3A (dated July 23, 2009) provides detailed information about the absorptive and reflective properties of a solar receiver at a pilot plant. This response also states that detailed design of towers to be constructed at the ISEGS site is not available but that the principle would be the same for ISEGS. The dimensions of the pilot plant receiver are approximately 20 m x 17m x 17 m and that half of the surfaces of the solar receiver would receive approximately half has much energy from the heliostats as the other two sides.

Data Requests

VR.10 Please provide an estimate of the expected dimensions of the ISEGS receivers.

Response: The receiver has a box shape, with each side (face) having the following approximate dimensions: Width - 17 meters, Height - 20 meters

VR-11. Please explain why two sides of the receiver would receive more energy than the other sides.

Response: The sun rises from the east side, goes south, and sets in the west. The cosine component of the heliostats' efficiency is better when heliostats "see" the receiver and the sun in the same area in the sky. In the morning, the west side of the solar field has a better cosine effect, so the west side of the receiver absorbs more energy. At noon, the sun is in the south so the north side of the solar field is the best and the north side of the receiver will receive more energy, etc. Generally, in the morning the north and west side will receive more energy; in the afternoon the north and east side will receive more energy.

VR-12. Please identify which sides of each receiver at the ISEGS site would receive which amounts of energy (i.e., would the south- and north-facing sides receive half as much energy as the east and west facing sides).

Response: Table VR12-1 identifies which sides of each receiver would receive energy.

TABLE VR12-1
Energy Received at Each Receiver Throughout the Day

Time	North	East	West	South
08:00	30%	16%	33%	21%
12:00	30%	26%	26%	18%
16:00	30%	33%	16%	21%

Note: All data is +/- 5% depending on the operation conditions

BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT
COMMISSION OF THE STATE OF CALIFORNIA
1516 NINTH STREET, SACRAMENTO, CA 95814
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APPLICATION FOR CERTIFICATION
FOR THE *IVANPAH SOLAR ELECTRIC GENERATING SYSTEM*

DOCKET NO. 07-AFC-5
PROOF OF SERVICE
(Revised 7/20/09)

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DECLARATION OF SERVICE

I, Mary Finn, declare that on August 20, 2009, I served and filed copies of the attached, Supplemental Data Response Set 4 dated August 20, 2009. The original document, filed with the Docket Unit, is accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at: [www.energy.ca.gov/sitingcases/ivanpah].

The documents have been sent to both the other parties in this proceeding (as shown on the Proof of Service list) and to the Commission's Docket Unit, in the following manner:

(*Check all that Apply*)

FOR SERVICE TO ALL OTHER PARTIES:

___x___ sent electronically to all email addresses on the Proof of Service list;

___x___ by personal delivery or by depositing in the United States mail at Sacramento** with first-class postage thereon fully prepaid and addressed as provided on the Proof of Service list above to those addresses NOT marked "email preferred."

AND

FOR FILING WITH THE ENERGY COMMISSION:

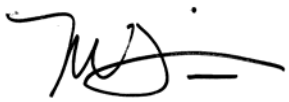
___x___ sending an original paper copy and one electronic copy, mailed and emailed respectively, to the address below (*preferred method*);

OR

_____ depositing in the mail an original and 12 paper copies, as follows:

CALIFORNIA ENERGY COMMISSION
Attn: Docket No. 07-AFC-5
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512
docket@energy.state.ca.us

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



Mary Finn

**or by other delivery service, e.g., Fed Ex, UPS, courier, etc.

*indicates change