DOCKETED

Docket Number:	09-AFC-06C
Project Title:	Blythe Solar Power Project - Compliance
TN #:	200108
Document Title:	NextEra Blythe Solar's Response to Data Requests Set 2 (20-25)
Description:	N/A
Filer:	Marie Fleming
Organization:	Galati | Blek LLP
Submitter Role:	Applicant's Representative
Submission Date:	8/1/2013 2:36:02 PM
Docketed Date:	8/1/2013

GALATI | BLEK LLP

455 Capitol Mall Suite 350
Sacramento CA 95814
Tel •916.441.6575
Fax •916.441.6553

August 1, 2013

Mary Dyas
Compliance Project Manager
Siting, Transmission and Environmental Protection Division
California Energy Commission
1516 Ninth Street, MS-48
Sacramento, CA 95814-5512

Subject: **NEXTERA BLYTHE SOLAR ENERGY CENTER LLC'S RESPONSE TO CEC STAFF DATA REQUEST SET 2 (20-25)**
BLYTHE SOLAR POWER PROJECT AMENDMENT
DOCKET NO. (09-AFC-6C)

Dear Ms. Dyas,

On behalf of NextEra Blythe Solar Energy Center, LLC, enclosed for filing with the California Energy Commission is the electronic version of **NEXTERA BLYTHE SOLAR ENERGY CENTER LLC'S RESPONSE TO CEC STAFF DATA REQUEST SET 2 (20-25)**, for Blythe Solar Power Project Amendment (09-AFC-6C).

Sincerely,

Scott A. Galati
Counsel to NextEra Blythe Solar Energy Center, LLC

BLYTHE SOLAR POWER PROJECT (09-AFC-6C)

DATA RESPONSES TO DATA REQUESTS – SET 2

Submitted by:

NextEra Blythe Solar Energy Center, LLC

Submitted to:

California Energy Commission

August 1, 2013

Prepared by: TETRA TECH WorleyParsons resources & energy AECOM

Technical Area: Biological Resources

CEC STAFF BACKGROUND: OPERATIONAL IMPACTS

Polarized light pollution, an impact associated with photovoltaic (PV) technology, is an environmental impact that may have adverse effects on birds. Polarized light occurs when ordinary white light becomes strongly aligned in a single, often-horizontal plane by reflection from artificial surfaces that alters the manner in which organisms would normally receive light. Light is naturally polarized by large bodies of water, but light is often artificially polarized by smooth, large, dark surfaces such as roads, large glass windows, buildings, and PV panels. Many taxa of birds, reptiles, fish, insects, and crustaceans utilize artificially polarized light; polarized light has been shown to play a role in habitat selection and may affect foraging behaviors, navigation, and orientation in birds (Horvath, et al., 2009; Horvath, et al., 2010).

Studies at several PV solar power-generating facilities identified that solar modules, or panels, could cause an increase in polarized light pollution and therefore could pose a possible risk of collision for birds.[1] At the Desert Sunlight Solar Farm project site, a PV installation of approximately 4,000 acres, over 50 birds have been documented to have collided with the panels. Of these, the majority consisted of waterbirds, species that would not typically be found foraging in desert habitat, and whose presence would not have been expected at the project site (Pagel 2013). A federally endangered species, the Yuma clapper rail, was among the recorded mortalities.

CEC DATA REQUEST 20a:

> Please discuss the features of the proposed modified Blythe Solar Power Project (BSPP) that might attract birds, bats, and insects, and the various behavioral, flight, and life history traits which would ultimately influence a species' collision risk.

BSPP DATA RESPONSE 20a:

First, NextEra Blythe Solar respectfully disagrees with the CEC Staff background statement above. There is no data to support the statement that 50 birds have collided with panels at the Desert Sunlight project. An evaluation as to the cause of certain avian injury/mortality at that project is ongoing and the results may ultimately inform the adaptive management techniques that should be included in a comprehensive Bird, Bat and Conservation Strategy (BBCS), which NextEra Blythe Solar is proposing for the BSPP.

---

[1] The reports include: Topaz Solar Farm Draft Environmental Impact Report, the California Valley Solar Ranch Final Environmental Impact Report, and the Desert Sunlight Solar Farm Project California Desert Conservation Area Plan Amendment and Final Environmental Impact Statement. See:
http://www.sloplanning.org/EIRs/topaz/FEIR/FEIR/Vol1/C%20files/C06%20Biology_.pdf;
http://www.sloplanning.org/EIRs/CaliforniaValleySolarRanch/feir/c06_biology.pdf; and
http://www.blm.gov/pgdata/etc/medialib/blm/ca/pdf/palmsprings/desert_sunlight.Par.56634.File.dat/Desert%20Sunlight%20FEIS%20chapter%204.pdf.

Other than the ~3,000-acre reduction in the Modified Project footprint, the only feature of the Modified Project that substantially differs from the Approved Project in respect to attracting birds, bats, and insects is the photovoltaic (PV) technology (i.e., panels) compared to the concentrating solar trough technology (i.e., mirrors). All other features (e.g., fence, onsite buildings, roads, transmission line, lighting, etc.) of the Modified Project are similar or the same as those for the Approved Project and have been previously evaluated for the Approved Project. Therefore, the following discussion focuses on the potential impacts on birds, bats, and insects as they relate to collision risk with PV panels due to polarized light.

No formal studies have been conducted at large-scale solar PV facilities on the impacts of polarized light on birds, bats and insects; therefore, it is still unclear exactly how and to what extent PV panels pose a threat to birds and bats, but in general it is assumed to be the same as mirrors, as was previously evaluated for the Approved Project. When viewed from a distance or an elevated position, the PV array may potentially appear to be a water body to migrating water birds and bats during daylight hours or on nights when the moon is full to migrating water birds and bats; however, this interpretation is currently speculative and not supported by empirical research. Some research has suggested that birds do mistake objects with similar optical properties to PV panels (e.g., opaque plastic sheets) for water (e.g., Bernath et al. 2001[2]) but the cause of such mistakes has not been established. It is possible that birds could mistake the PV array for a body of water and attempt to land on the panels and be injured or killed or become trapped or exhausted on the ground near the panels.

Recent research on bats indicates that the echo-reflection properties of smooth objects can lead them to mistake these objects for water, as demonstrated by repeated attempts to drink from such objects (Greif and Siemers 2010). This research also indicated that textured objects do not elicit drinking behavior. Bats that attempt to drink from smooth PV panels may potentially be more subject to collision, although no collisions were observed during experiments (Greif and Siemers 2010[3]), and a greater danger may be exhaustion from the apparent inability of bats to learn from initial drinking attempts in the lab. There is evidence; however, that bats may learn from context to avoid non-water surfaces in situations where water is available as an alternative (Russo et al. 2012[4]).

Most insects require water to drink and may be attracted to the PV panels if the array was mistaken for a body of water. Recent research suggests that many insects are sensitive to polarized light pollution and that it may influence their behavior and even

[2] Bernath, B., Szedenics, G., Molnar, G., Kriska, G., Horvath, G. 2001. Visual Ecological Impact of a Peculiar Waste Oil Lake on the Avifauna: Dual-choice Field Experiments with Water-seeking Birds Using Huge Shiny Black and White Plastic Sheets. *Archives of Nature Conservation and Landscape Research* 40**:**87–107.
[3] Greif, S. and B. M. Siemers. 2010. Innate recognition of water bodies in echo-locating bats. Nature Communications, 1:107, DOI: 10.1038/ncomms1110, www.nature.com/naturecommunications.
[4] Russo D, Cistrone L, Jones G. 2012. Sensory Ecology of Water Detection by Bats: A Field Experiment. PLoS ONE 7(10): e48144. doi:10.1371/journal.pone.0048144

attract them to PV panels (e.g., Horvath et al. 2009, Horvath et al. 2010[5]). If the PV panels attract insects, it may create a concentrated food source for insect-eating birds (e.g., swallows) and bats. This could potentially pose a greater collision risk to these species when feeding, although both are adept fliers and most bats use echolocation to locate their prey and to avoid other objects, including water and therefore presumably the panels which may resemble water.

Note, PV panels have a low-reflectance surface with non-reflective coating (see Section 6.2.3.1 of the BSPP Revised Petition for Amendment), while the surface of a parabolic mirror is highly reflective. The PV panels are specifically designed to minimize reflection of incident sunlight while maximizing the transmission of sunlight through the glass surface to the underlying solar cells. The efficiency of the PV panel is dependent on absorbing as much of the incident sunlight as possible in the solar cells. Manufacturer documentation of the reflection from PV high transmission low reflectance glass with non-reflective coatings indicated that PV panel surface glass is much less reflective than standard window glass and can be approximately 5 percent reflective for a normal incidence ray compared to approximately 20 percent for standard glass. Therefore, the potential for the surface of a PV panel to be mistaken for a body of water is substantially less than the potential would have been for the Approved Project.

It is not possible to obtain post-construction mortality data prior to operating the Modified Project that would provide any degree of certainty beyond mere speculation that the Modified Project would pose a significant collision risk to birds and bats. Pre-construction survey data at the site will not provide an indication of avian behavior in and around the arrays. Avian behavior at other solar sites may be useful, but ultimately it is the avian behavior at the BSPP that is necessary to develop appropriate monitoring and adaptive management techniques. Using site-specific information gathered after the facility is constructed and implementing adaptive management techniques has been the resource agencies' strategy for decades because it is a sound approach to addressing unknown, potential impacts. Given the lack of research-based, post-construction data on the impacts of polarized light pollution and other potential threats to birds and bats, the Applicant will develop and implement a Bird and Bat Conservation Strategy (BBCS), as required by BIO-15. The BBCS will outline the process for determining the details of operational impacts on birds and bats, and will provide site-specific adaptive management measures designed to help address those impacts.

CEC DATA REQUEST 20b:

> Please provide an evaluation of the various types of PV technology that the BSPP owner is considering constructing, such as fixed-tilt system or single-axis tracking, and the potential adverse effects associated with each technology type on birds, bats, and insects.

[5] Horvath 2009. G. Horvath, G. Kriska, P. Malik, and B. A. Robertson. 2009. Polarized light pollution: a new kind of ecological photopollution. *Frontiers in Ecology and the Environment* 7:317–325.
Horvath 2010. G. Horvath, M. Blaho, A. Egri, G. Kriska, I. Seres, and B. Robertson. 2010. Reducing the Maladaptive Attractiveness of Solar Panels to Polarotactic Insects. *Conservation Biology* 6:1644–1653.

BSPP DATA RESPONSE 20b:

The Applicant is considering fixed tilt and single-axis tracking mounting systems for the Modified Project, and both crystalline silicon and thin film panels may be used. The following response provides background information on the systems that might be used and an analysis of the differences.

Background Information on PV types and Tracking Systems

The BSPP would involve the installation of PV modules with the capacity to generate a total of 485 MW of power under peak solar conditions. The PV modules that make up the arrays have the capability to convert the sun's energy into DC electricity, each producing a relatively small amount of electricity, about several hundred watts each at rated conditions. Modules are electrically connected in series and parallel arrangements. A series arrangement increases the collective output voltage and a parallel arrangement increases the current to the desired levels for the DC collection system.

The modules being considered for this Modified Project are produced by a number of manufacturers of both crystalline silicon and thin film modules. This technology is changing rapidly primarily in the areas of cost and efficiency. For reasons of availability to support the Modified Project delivery requirements and to allow NextEra Blythe Solar to capitalize on the latest technological advances, multiple manufacturing sources might be utilized.

At this time, NextEra Blythe Solar has not selected whether it would install a fixed tilt or single axis tracking modular system or a combination of both systems. While both systems are similar in how they generate and distribute electricity, the orientation and technique for collection of the sun's energy are different.

Photovoltaic Modules

The solar PV modules, also referred to as panels, convert solar energy into DC electricity. Different materials display different electricity generation efficiencies; higher efficiency panels produce more electricity per given area, but cost more per panel area. Materials commonly used for PV solar cells include monocrystalline silicon, polycrystalline silicon, amorphous silicon, cadmium telluride (CdTe), and copper indium gallium selenide. Several of the PV cells currently available are manufactured from bulk materials that are cut into very thin wafers, i.e., between 180 to 240 micrometers thick. Others are constructed from thin-film layers. NextEra Blythe Solar is considering the installation of both polycrystalline and CdTe solar cells. Both technologies are proven and viable for utility-scale PV plants.

Silicon is the traditional material choice for PV panel cells, and NextEra Blythe Solar is considering polycrystalline silicon PV modules for use at the BSPP. NextEra Blythe Solar is also considering the use of thin film CdTe panels as one of its technology options. A CdTe solar panel uses solar cells constructed in a thin semiconductor layer (also known as a "thin film") to absorb and convert sunlight into electricity.

The system would incorporate high-efficiency commercially available solar PV panels that are Underwriters Laboratory-listed or approved by another recognized testing laboratory. By design, the solar PV panels absorb sunlight to generate electrical output and, therefore, are manufactured with anti-reflective glass to maximize the electrical output capacity. In addition, due to the limited rotation angles, the solar PV panels are not designed for reflecting the sun's rays upon any ground-based observer off-site. These panels would be protected from impact by tempered glass, and would have factory-applied ultraviolet and weather-resistant "quick connect" wire connectors. PV modules can be mounted together in different configurations or "blocks" (also referred to as "arrays") depending on the equipment selected. The BSPP arrays primarily would be organized into approximately 2 MW blocks, with some additional arrays configured in smaller capacity blocks to utilize land space efficiently. Although the acreage of each block would depend on the technology, spacing, mounting equipment, and other design criteria subject to change in detailed engineering, each full-size 2 MW block is expected to cover approximately 15 acres.

Since the electrical ratings for the panels, inverters, and other PV equipment vary based on the manufacturer, the DC collection design also varies depending on the chosen technology. The PV modules would be electrically connected in series, and groups of these series-connected modules would be connected by wire harnesses to the combiner boxes. The combiner boxes in turn feed an inverter in the PCS via DC cables. The PCS would be located within each block, and would be on concrete vaults, slabs, or pier foundations. The PCS would include the inverters and step-up transformers required for converting the low voltage DC electricity to medium voltage AC electricity.

The transformers in the PCS step up the voltage from the inverter AC output to that required by the on-site AC collection system. The AC collection system conducts the electricity from each PCS at 34.5 kV to the feeder circuit breakers and the 34.5/230 kV unit step-up transformers (SUTs) for each 125 MW or 110 MW unit. Overhead or underground lines then conduct the electricity from the SUTs to the on-site switchyard. The electricity is then routed to the CRS via the gen-tie line.

Panel Supporting System

Fixed Tilt System

A fixed tilt racking system utilizes a metal framework structure or support table to which the modules are attached. The PV panels are mounted on the rack in a permanent "fixed" position tilted towards the south at approximately 30 degrees to optimize production throughout the year without any mechanical movement. These racks are simple, open "table" constructions. A fixed tilt system can generally follow the slope of the terrain which simplifies grading requirements. The support posts may vary in height above the ground surface to accommodate the variations in terrain. The total height of the structure with panels would be approximately 9 feet depending on the racking system configuration and tilt angle selected.

Single-Axis Tracking System

A single-axis tracking system optimizes production by rotating the panels to follow the path of the sun throughout the day. The central axis of the tracking structure is oriented north to south and is constructed to rotate the panels east to west while limiting self-shading between rows. The system utilizes a method called “back-tracking” which consists of rotating the panels back toward a more horizontal position to avoid shadowing between the adjacent panels in the early morning and late afternoon hours of operation.

Each tracking assembly consists of one or two steel torque tubes, supported by posts, on which rests the frames for the PV modules. Each tracker holds 30 to 90 PV modules mounted on this metal framework structure; the wide range is due to the variation in tracker and module technology. The steel structure would be able to withstand high-wind conditions (up to 90 miles per hour), site-specific wind gust and aerodynamic pressure effects, and seismic events.

One of two types of single-axis tracking systems would be selected for the BSPP. Tracker Option 1 is a “ganged system” that would use one motor to control multiple rows of PV modules through a series of mechanical linkages and gearboxes. By comparison, Tracker Option 2, a stand-alone tracker system, would use a single motor and gearbox for each row of PV modules.

The drive unit typically consists of a bi-directional AC motor or a hydraulic system utilizing biodegradable fluid. The drive unit would be connected to an industrial-grade variable-frequency drive that translates commands from the control computer.

The tracker controller would be a self-contained industrial-grade control computer that would incorporate all of the software needed to operate the drive system. The controller would display a combination of calibration parameters and status values, providing field personnel with a user-friendly configuration and diagnostic interface. The controller monitor would enable field adjustment, calibration, and testing. The single-axis tracking control system also communicates with, and receives instructions from, the central control system via a Supervisory Control and Data Acquisition (SCADA) system.

Comparison of Systems

The currently available designs for fixed and tracking systems are very similar (Table 1), and the small differences in design are not expected to have a substantially different impact on birds, bats, or insects. The movements of the tracking systems are generally slow, small and incremental rotations throughout the day and, therefore, should not have a substantially different impact on birds, bats, or insects than a fixed tilt system. The panel materials (thin film and crystalline silicon) also vary, but are encapsulated in glass such that the differences are largely limited to their functionality and efficiencies, which would not have a bearing on impacts to birds, bats, or insects. In addition, all designs have approximately the same anti-reflective properties and are expected to have similar potential impacts. Although PV system designs vary, the differences among available designs and technologies are small enough that they are not expected to have differing impacts on birds, bats, and insects.

Table 1. Comparison of Fixed Tilt to Tracking Designs[1]

PV Technology[1]	Height From Ground Surface To Bottom Of Panels	Height from Ground Surface to Tallest Point	Diameter of Posts[2]	Post Spacing	Panel Spacing
Fixed-tilt	2 feet (minimum)	7 - 11 feet	4 - 6 inches	10 - 20 feet	15 – 25 feet
Tracking	2 feet (minimum)	7 - 11 feet	4 - 6 inches	10 - 20 feet	15 - 35 feet

[1] Note that specifications are approximate generalizations based on conceptual racks and are not site-specific or technology specific. Additionally, PV technology is quickly advancing; therefore, these specifications are subject to change.
[2] Post diameter is dependent on the structural design of the posts which is dependent on the geotechnical data, rack/tracker size, and post spacing.

At this time, NextEra Blythe Solar has not selected whether it would install a fixed-tilt or single-axis tracking modular system or a combination of both systems. A fixed-tilt system would always be at the same angle with respect to the sun while a tracking system will vary throughout the day. Both systems would be oriented on a north-south axis. All types of PV are designed to minimize reflection, and hence the potential for reflection from either type of technology would be negligible. Furthermore, potential reflection from the metal footing and supports for the two technologies would also be negligible, and the reflection from both types of PV would be basically the same.

CEC DATA REQUEST 20c:

Please identify facility design measures, such as installing non-polarizing white borders or white grids intermittently between polarized dark surfaces, non-reflexive flat-plate panels, and other minimization and mitigation measures that would offset any negative ecological impacts.

BSPP DATA RESPONSE 20c:

The Reduction of the Modified Project's footprint by approximately 3,000 acres (reduced from 7,000 acres for the Approved Project) is the most significant facility design change that would provide the greatest offset of any negative ecological impacts. The reduction in footprint would inherently reduce impacts on wildlife habitat, reduce collision risks, and reduce reflection by approximately 40 percent compared to the Approved Project.

Despite the recent avian fatalities at solar projects under construction, the impacts of solar projects on birds remain unclear and largely speculative. Therefore, to identify specific facility design measures that would avoid impacts related to polarized light would be premature. The Applicant is committed to working with the agencies to understand the risks that solar development poses to avian species and to avoid, minimize, and mitigate those risks to the extent practicable once they are better understood. This understanding will be accomplished by creating and implementing, in conjunction with the US Fish and Wildlife Service, California Department of Fish and Wildlife, CEC, and Bureau of Land Management, a thorough Bird and Bat Conservation Strategy (BBCS) that employs a post-construction mortality monitoring plan with an adaptive management component to address unforeseen issues.

Technical Area: Socioeconomics

CEC STAFF BACKGROUND: CONSTRUCTION WORKFORCE AND SCHEDULE

The Blythe Solar Power Project (BSPP) Revised Petition to Amend (RPTA) presents the number of construction workers needed for the project during peak construction and the average number of construction workers needed. With the change in technology and project size proposed in the RPTA, staff requires additional information.

CEC DATA REQUEST 21:

> Please provide a construction schedule presenting the trades required for construction of the proposed modified BSPP and the number of employees required by trade on a monthly basis for the duration of construction.

BSPP DATA RESPONSE 21:

A construction schedule has been provided in Attachment DR 21.

CEC STAFF BACKGROUND: OPERATIONS WORKFORCE

The BSPP RPTA presents the total number of operations workforce that would be employed on the project and compares the proposed modified BSPP workforce with the operations workforce needed for the approved project. Additional detail is required for staff's analysis.

CEC DATA REQUEST 22:

> Please provide a list of positions for the operational workforce required for the proposed modified BSPP, including the number of employees required for each position type.

BSPP DATA RESPONSE 22:

Approximately 15 positions will make up the operational workforce at the BSPP. The positions will consist of the following:

- Production Technicians- 14
- High-Voltage Technician- 1

CEC STAFF BACKGROUND: FISCAL BENEFITS

The BSPP RPTA presents summaries of the modified project's total economic impacts/benefits from construction and operation in Tables 6.3-1 and 6.3-2. Additional detail is required for staff's analysis.

CEC DATA REQUEST 23:

Please provide updated approximate values for the modified project's Fiscal, Non-Fiscal, Direct, Indirect, and Induced Benefits, as listed in Socioeconomics and Environmental Justice Table 10, BSPP Economic Benefits, on page C.8-34 of the July 2010 *Blythe Solar Power Project Revised Staff Assessment* (http://www.energy.ca.gov/2010publications/CEC-700-2010-004/CEC-700-2010-004-REV1-PT2.PDF).

BSPP DATA RESPONSE 23:

The referenced Table 10 in the Revised Staff Assessment was based on information from the BSPP Application for Certification (AFC) for the Approved Project (Solar Millennium, 2009). The fiscal impacts and benefits presented in the AFC were derived from an analysis prepared by AECOM using the IMPLAN model, an economic impact modeling tool that uses region-specific information by industry to estimate the secondary impacts of economic stimuli. The AFC provided fiscal estimates based on data from the seven counties nearest to the BSPP in California and Arizona, i.e., Riverside, San Bernardino, San Diego, Imperial, La Paz, Yuma, and Maricopa Counties, and the results were presented in 2009 dollars.

In order to update this table, the values for estimated employment, payroll and expenditures were obtained from Table 6.3-1 (Construction) and Table 6.3-2 (Operation) in the BSPP RPTA for the Modified Project. AECOM purchased the latest available information from the same seven counties[6], and these data were used as inputs in the IMPLAN model to calculate the State and local sales taxes and induced employment.

The updated (2011 dollars) approximate values for the Modified Project's Fiscal, Non-Fiscal, Direct, Indirect, and Induced Benefits are provided in Table 2 below.

6 http://implan.com/V4/index.php?option=com_virtuemart&page=shop.browse&category_id=1103&Itemid=13

**Table 2. Socioeconomics and Environmental Justice
Annual BSPP Economic Benefits (2011 dollars)**

Fiscal Benefits	
Estimated annual possessory interest tax	$215,000
State and local sales taxes: Construction	$967,000
State and local sales taxes: Operation	$39,791
School Impact Fee	$0
Non-Fiscal Benefits	
Construction materials and supplies	$4.3 million
Operations and maintenance supplies	$150,000
Direct, Indirect, and Induced Benefits	
Estimated Direct Employment	
Construction	348 jobs (monthly average)
Income	$43.3 million
Operation	15 jobs
Income	$1.4 million
Estimated Indirect Employment	
Construction	9 jobs
Income	$491,000
Operation	0 jobs
Income	$10,000
Estimated Induced Employment	
Construction	271 jobs
Income	$11.4 million
Operation	9 jobs
Income	$368,000

Note: All values are approximate

CEC STAFF BACKGROUND: ESTIMATIONS OF WORKFORCE RELOCATION

The BSPP RPTA makes no assumptions about the number of construction workers who would likely relocate closer to the project site, relative to the number who would commute daily during construction of the proposed modified project. Likewise, for the proposed modified project, the RPTA made no assumptions about the number of its operations workforce who would relocate. For the approved project, Energy Commission staff estimated 15 percent of the construction workers would temporarily relocate closer to the project site and 25 percent of operations workers would permanently relocate closer to the project. Energy Commission staff currently analyzing the BSPP RPTA has accepted these assumptions presented in the previous analysis of the BSPP approved project.

CEC DATA REQUEST 24:

Does the project owner have any estimates of how many construction workers and operations workers would relocate closer to the project site? If so, please provide these estimates.

BSPP DATA RESPONSE 24:

The assumptions used above (15% of construction workers would temporarily relocate and 25% of operations workers would permanently relocate) are still valid assumptions and should continue to be used for the staff assessment. During Project construction the workforce is expected to average 250 to 430 employees over a 48-month construction period and the permanent operational workforce is expected to be 15 employees. Given those numbers and percentages above, approximately 38 to 65 employees may temporarily relocate closer to the Project site and approximately 4 employees may relocate permanently closer to the Project site for operational jobs.

It is important to note that there is a significant construction workforce currently working within 25 miles of the BSPP. These construction workers are working in the solar industry and will be finishing their work in 2014. Many of these same workers will be used for the construction of the BSPP, significantly reducing the number of new workers coming into the area.

CEC DATA REQUEST 25:

Data Request #25 has been withdrawn by the CEC.

Attachment DR 21

Construction Workforce Schedule by Trade

Construction Workforce Schedule by Trade

	Jul 14	Aug 14	Sep 14	Oct 14	Nov 14	Dec 14	Jan 15	Feb 15	Mar 15	Apr 15	May 15	Jun 15	Jul 15	Aug 15	Sep 15	Oct 15	Nov 15	Dec 15	Jan 16	Feb 16	Mar 16
Carpenter																		8	8	8	8
Electrician												28	28	28	28	28	28	34	34	34	34
Fencer				5				5				5	5	5	5	5	5	5	5	5	5
Glazier																		4	4	4	4
Heavy Equipment Operator	6	6	18	18	18	18	18	18	18	18	18	30	30	30	18	18	18	20	20	20	20
Insulation Installer																		4	4	4	4
Ironworker												12	12	12	12	12	12	12	12	12	12
Laborer	34	34	34	29	34	34	34	29	34	34	34	316	316	316	287	287	287	303	303	303	303
Landscaper												5	5	5	5	5	5	5	5	5	5
Mason																		4	4	4	4
Millwright												22	22	22	22	22	22	22	22	22	22
Painter																		4	4	4	4
Pile Driver												10	10	10	10	10	10	10	10	10	10
Plumber																		4	4	4	4
Pipefitter												8	8	8	8	8	8	8	8	8	8
Sheet metal worker												6	6	6	6	6	6	6	6	6	6
Supervisors/Engineer	3	3	5	5	5	5	5	5	5	5	5	8	8	8	8	8	8	8	8	8	8
Truck driver/teamster	8	8	8	3	3	3	3	3	3	3	3	24	24	24	21	21	21	24	24	24	24
Welder												12	12	12	12	12	12	14	14	14	14
Total Laborers per Month	51	51	65	60	60	60	60	60	60	60	60	486	486	486	442	442	442	499	499	499	499

	Apr 16	May 16	Jun 16	Jul 16	Aug 16	Sep 16	Oct 16	Nov 16	Dec 16	Jan 17	Feb 17	Mar 17	Apr 17	May 17	Jun 17	**Jul 17**	**Aug 17**	**Sep 17**	**Oct 17**	**Nov 17**	**Dec 17**	**Jan 18**	**Feb 18**	**Mar 18**	**Apr 18**	**May 18**
Carpenter																										
Electrician	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	6
Fencer	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	2
Glazier																										
Heavy Equipment Operator	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	12	12	12	12	14	2
Insulation Installer																										
Ironworker	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	2
Laborer	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	239	239	239	239	239	99
Landscaper	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	2
Mason																										
Millwright	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	4
Painter																										
Pile Driver	10	10	10	10	10	10	10	10`	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
Plumber																										
Pipefitter	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	2
Sheet metal worker	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	2
Supervisors/Engineer	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	5
Truck driver/teamster	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
Welder	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Total Laborers per Month	442	442	442	442	442	442	442	442	442	442	442	442	442	442		442	442	442	442	442	388	388	388	388	390	126

4,139 total disturbed acres
485 MW Total Project, Four Phases (3X125MW and 1X110MW)
48 Month Construction Schedule
22 day/month working schedule

Start Construction June 2014
Production Rates are based on 8-12 hour working day/5 day week schedule
48-month continuous construction sequencing
Numbers represent a daily average per month