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PETITION FOR CHANGE OF THE PROJECT DESCRIPTION IN THE FINAL DECISION TO INSTALL AND OPERATE A STIRLING SOLAR DISH PALOMAR ENERGY CENTER (O1-AFC-24C)

By:

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SAN DIEGO, CALIFORNIA

Submitted to:

CALIFORNIA ENERGY COMMISSION

SEPTEMBER 2010

PETITION FOR CHANGE OF THE PROJECT DESCRIPTION IN THE FINAL DECISION TO INSTALL AND OPERATE A STIRLING SOLAR DISH PALOMAR ENERGY CENTER (O1-AFC-24C)

1.0 INTRODUCTION

San Diego Gas & Electric Company (SDG&E) is filing this petition for a proposed amendment of the project design as described in the Final Decision for the Palomar Energy Center (PEC), Docket 01-AFC-24 pursuant to 20 Cal. Code Regs. Section 1769(a)(1). San Diego Gas & Electric (SDG&E or "the applicant") is proposing to install one 25 KW Stirling Energy Systems SunCatcher ("the SunCatcher") at the existing Palomar Energy Center (PEC). The SunCatcher generates solar-electric power via modular concentrating solar power technologies. The electricity generated from this dish will be connected directly to the PEC internal electrical system and serve to provide a portion of on-site power consumption at the plant. None of the power generated will reach the electric grid. In addition to serving internal power needs, the installation will be available for public viewing and education concerning this unique technology for solar power generation primarily via on-site video.

2.0 DESCRIPTION OF PROPOSED MODIFICATION (Sec. 1769(a)(1)(A))

No changes are requested to the PEC Conditions of Certification or to any Verification. The proposed location for the SunCatcher is in the southeast corner of the property. A site plan, pictures of the unit, and visual simulations are included in Appendix 1. Installation of the SunCatcher will create minimal ground disturbance. A 24-inch diameter pole will be installed to support a 38-foot high by 40 foot in diameter dish composed of parabolic mirrors. These mirrors collect and focus solar energy onto the heat exchanger of the Power Conversion Unit (PCU) which powers the 2-cylinder Stirling

engine. The Stirling engine will be filled with hydrogen gas which is used as a working fluid. When heated by the sun, this fluid pushes pistons that run the engine which in turn generates up to 25 kW of energy. Using sophisticated software, the dish follows the sun's path throughout the day for maximum efficiency. Each SunCatcher operates independently and generates grid-quality electricity. The SunCatcher currently holds the world's record for the conversion of sunlight into electricity (31.25 percent). The SunCatcher technology is more fully detailed in the Presiding Member's Proposed Decision for the Imperial Valley II Solar Project approving the application of Stirling Energy Systems Solar Two, LLC to install up to 709 MW of capacity utilizing the SunCatcher technology at a location in Imperial County. (CEC-800-2010-006-PMPD). SDG&E has entered into an agreement to purchase 300 MW of the output from the facility. The purchase agreement has been approved by the California Public Utilities Commission.

3.0 NECESSITY (Sec. 1769(a)(1)(B))

The SunCatcher unit will meet part of the internal power needs at the plant by providing renewable generation at the plant site. This use of advanced technology is consistent with SDG&E's goals of meeting State energy policy goals and furtherance of its Smart Grid vision and roadmap. Installation of a SunCatcher unit at the PEC will also enable local schools, stakeholders, officials and policy makers will be able to see real-time generation production by the system without travelling to the Imperial Valley. On-site video will be available to be fed to an informational kiosk off-site and potentially other locations.

4.0 TIMING (Sec. 1769(a)(1)(C) and (D))

SDG&E assumed ownership of the PEC about three years after issuance of the Final Decision and certification to Palomar Energy, LLC. Since taking ownership of the plant in 2006, SDG&E has continued to review the engineering and design of the plant in order

to better serve the needs of SDG&E ratepayers. The SunCatcher technology was not commercially available at the time of licensing of the PEC. The addition of the SunCatcher does not change or undermine the assumptions, rationale, findings, or other bases of the Final Decision. The change complies with all laws, ordinances, regulations and standards and does not have a significant environmental impact, as further described below.

5.0 ANALYSIS OF THE EFFECT OF THE MODIFICATIONS ON THE ENVIRONMENT (Sec. 1769(a)(1)(E))

The requested equipment change will have no significant effects on any of the technical areas analyzed in the August 2003 Final Commission Decision. Please see Table 1 below.

Table 1

Review of Effects of Installation and Operation of Emergency Engine

TECHNICAL AREA	**SIGNIFICANT ENVIRONMENTAL IMPACT (Y/N)?**		**NOTES**
AIR QUALITY		N	no change
CULTURAL RESOURCES		N	Area for construction is prior disturbed area
EFFICIENCY		N	No impact
GEOLOGICAL HAZARDS		N	No change

TECHNICAL AREA	**SIGNIFICANT ENVIRONMENTAL IMPACT (Y/N)?**		**NOTES**
HAZARDOUS MATERIALS HANDLING		N	Hazardous Materials Inventory log will be updated. See further discussion below.
LAND USE		N	No change
NOISE		N	No Change
PALEONTOLOGICAL RESOURCES		N	Area for construction is prior disturbed area
BIOLOGICAL RESOURCES		N	Area previously disturbed.
PUBLIC HEALTH		N	no change
RELIABILITY		N	no change
SOCIOECONOMICS		N	No change
SOILS		N	No change
TRAFFIC AND TRANSPORTATION		N	Construction traffic minimal
T-LINE SAFETY AND		N	No change

TECHNICAL AREA	SIGNIFICANT ENVIRONMENTAL IMPACT (Y/N)?		NOTES
NUISANCE			
TRANSMISSION SYSTEM ENGINEERING		N	No change
VISUAL RESOURCES		N	Structures will meet painting and visual requirements of Final Decision; See plot plan in Appendix 2. See further discussion below.
WASTE MANAGEMENT		N	No change
WATER RESOURCES		N	No change
WORKER SAFETY		N	No change

Hazardous Materials Handling

The Stirling engine will contain 4.2 quarts of standard motor oil, 8.4 gallons of Ethylene Glycol, and approximately 600 cubic feet of pressurized hydrogen gas. The hazardous materials inventory log and Storm Water Pollution Prevention Plan will be updated to reflect these changes. A spill kit will be available on site to contain any spills that occur. The hydrogen gas is not regulated for emissions but the compressed gas cylinders will be

added to the site hazardous materials inventory. Hydrogen is already stored on the PEC site in larger quantities. This gas is used for generator cooling.

Visual Resources

The SunCatcher will not be visible from most points outside the project site. The structure will not exceed the height of adjacent buildings. See Appendix 1 for site plans and visual renderings. The location of the unit will be in the southeast corner of the PEC site. It will be visible to the immediate east and south. The location of the unit is adjacent to and above the loading dock area and large driveway area of a commercial bakery. The other points from which the unit could be visible are to the west from Citracado Way from passing traffic for a few seconds and from the south from an undeveloped lot. Simulations from these locations are included in Appendix 1. The SunCatcher will appear similar to a large radio signal receiver and will add another feature to an existing large industrial site adjacent to commercial land uses. The unit will be observable by a very limited number of viewers. It will not be observable from any of the Key Observation Points identified in the course of the original licensing of the PEC. The unit will also meet surface treatment requirements condition of certification VIS-3. Paint color on any paintable surfaces will match the current plant structure paint color as approved by the Compliance Project Manager. The SunCatcher location will maintain ten feet of space from the property line per Condition VIS- 9. . Included in Appendix 2 is a glare and glint study that was conducted in the course of the proceeding to license the Imperial Valley Solar Project to address any visual impact from an aerial perspective. The glare was found to be minimal and is the same amount of glare typically seen from the reflection of a lake even from a field comprised of thousands of units.

6.0 COMPLIANCE WITH LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS) (Sec. 1769(a)(1)(F))

As required by the Condition VIS- 9 the unit will be set back the required ten feet from the property line. The equipment change will not affect compliance with any other LORS requirement. Therefore, the proposed modification is not anticipated to impact SDG&E's ability to comply with the applicable LORS, as listed in Appendix A of the Commission Final Decision.

7.0 POTENTIAL EFFECTS ON PUBLIC AND NEARBY PROPERTY OWNERS (Sec. 1769(a)(1)(G and I))

The requested modification will not have any environmental impacts and will comply with all applicable LORS. Thus, the proposed equipment change is not anticipated to affect nearby property owners or parties in the application proceedings or the public

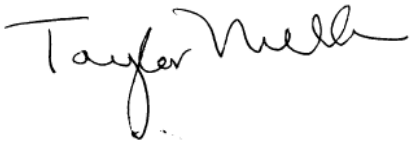
8.0 LIST OF PROPERTY OWNERS (Sec. 1769(a)(1)(H))

A list of property owners 1,000 feet of the plant site has previously been provided to the Commission CPM.

9.0 SUMMARY OF REQUEST

As demonstrated above, the requested change to the PEC's Final Decision is not anticipated to have an adverse effect on the public or the environment. The change will not affect compliance with applicable LORS. Accordingly, SDG&E requests Commission approval of the proposed modified conditions in accordance with Title 20 CCR Section 1769.

Respectfully Submitted,



Taylor O. Miller
Counsel to SDG&E

Dated: September 3, 2010

APPENDIX 1

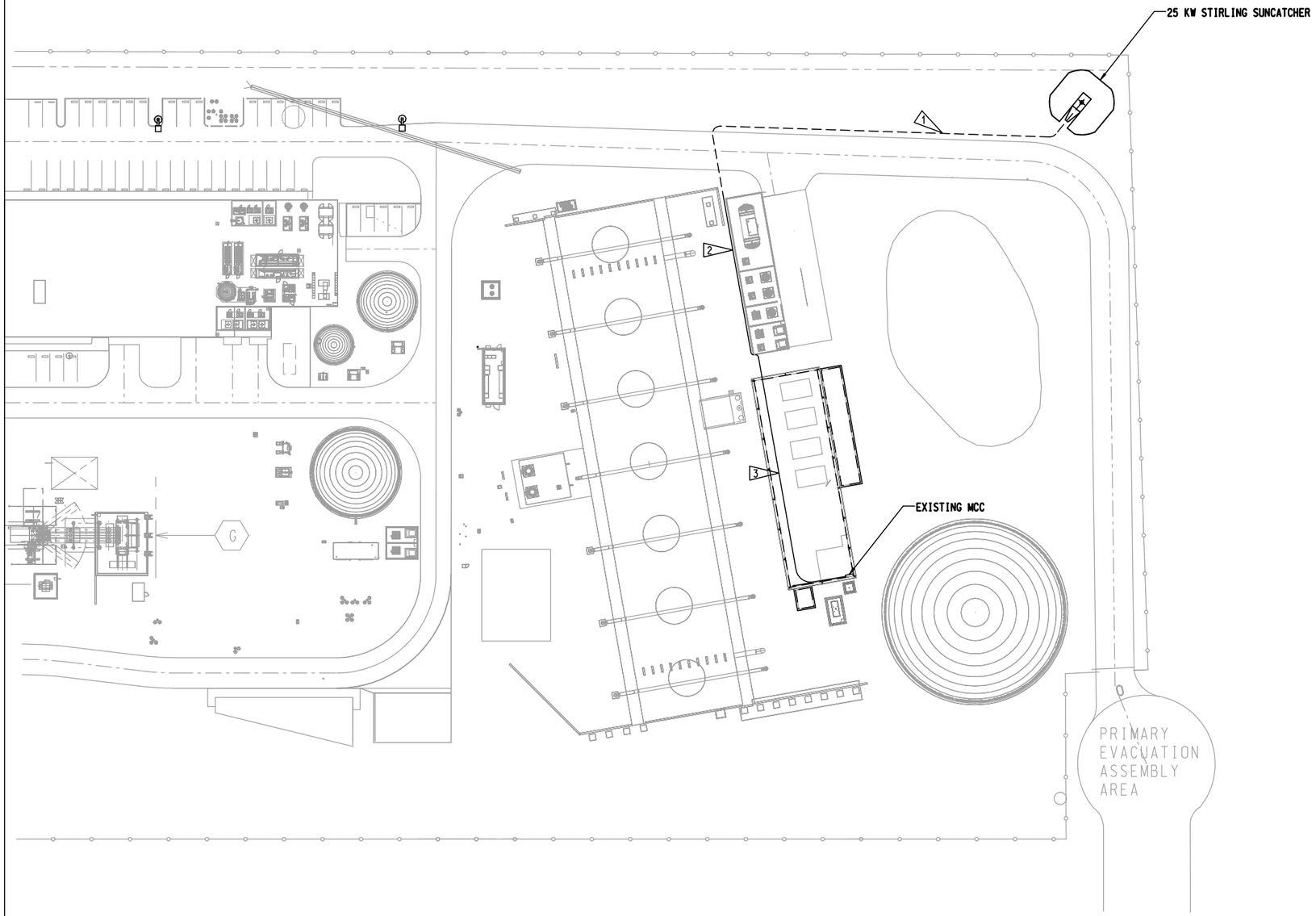
SITE PLAN AND VISUAL SIMULATIONS OF

APPENDIX 2

GLINT & GLARE STUDY

KEYED NOTES

1. CONDUIT ROUTED UNDERGROUND FROM SES SUNCATCHER TO EXISTING CONCRETE RETENTION WALL NEAR COOLING TOWER CHEMICAL FEED AREA.
2. CONDUIT ROUTED ABOVE GRADE ON EXISTING CONCRETE RETENTION WALL TO EXISTING CABLE TRAY AT END OF CONRETE RETENTION WALL NEAR EXISTING CHILLER BUILDING.
3. CABLES ROUTED IN EXISTING CABLE TRAY TO EXISTING MCC INSIDE CHILLER BUILDING.



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40 0 40 80

SCALE IN FEET

SCALE: 1" = 40'-0"

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INTER-DISCIPLINE REVIEW							
DISC	ARCH	CIVIL	ELECT	HVAC	I&C	MECH	STRUCT
DATE	*	*	*	*	*	*	*
INIT	*	*	*	*	*	*	*

REV	REVISIONS	DATE	DRN	DSGN	CKD	APPD
A	ISSUED FOR REVIEW	08/30/10	DFH	JDV	JDV	JDV

DSGN	JDV	08/26/10
DRN	DFH	08/26/10
CKD	JDV	08/26/10

SCALE: 1"= 40'-0"

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SEMPRA ENERGY RESOURCES, LLC

PALOMAR ENERGY PROJECT
ESCONDIDO, CALIFORNIA

CONCEPTUAL SITE LAYOUT
SES SUNCATCHER PROJECT

JOB NUMBER 120627

REV A

DRAWING NUMBER ESK1-1

Disclaimer: The visual simulation is only a representation of the proposed addition of a new concentrated solar collector. The structure location and height may change pending approval of final design and engineering.

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Glint and Glare Study

Since the SES Solar Two project will be located in proximity to major roadways, there are often questions about whether there is any risk to motorists or spectators from glint shining outside the plant's boundary and if the sun's image can be reflected from the mirrors into oncoming cars or aircraft. Potential glint reflecting off the system is minimal but will be analyzed below.

The SunCatcher is a parabolic dish that tilts in elevation and rotates in azimuth to track the sun. It has the capability to rotate to almost any position. SunCatchers are covered with mirrors that concentrate light on a single point 22 ft from the dish surface. The SunCatcher is designed to efficiently capture and use the sunlight that is incident upon it. During operation, very little light reflected from the mirrors escapes the system.

A glint analysis needs to consider any combination of sun position, dish angle, and observer position. The analysis also needs to consider normal and abnormal operating conditions.

The SunCatcher is designed with its Power Conversion Unit (PCU) at the focal point of the parabolic dish. During operation, by design, the image of the sun is reflected from the mirrors onto the PCU where it is absorbed. The sun light striking the dish mirrors is not reflected in any other direction. It is not possible to see the image of the sun reflected in the mirrors while it is generating power.

When a temporary cloud passes overhead, the SunCatcher enters an offset tracking mode. The SunCatcher repositions 10 degrees off sun while still tracking. This mode is designed to place the focus of the sun 10 degrees above the PCU in order to prevent the PCU from being damaged when the sunlight returns. Beyond the focal point, at the PCU the concentrated light quickly returns to ambient level at approximately 50 ft from the vertex of the parabolic dish. The reflected light at this point is no brighter than the sun light as it strikes the earth. This is illustrated in Figure One.

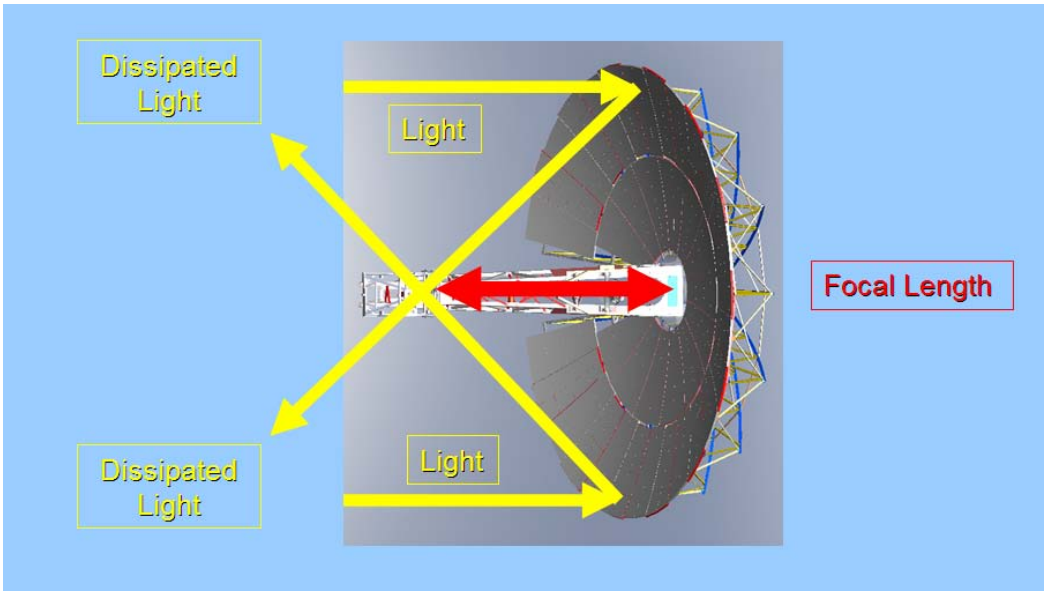

Figure One: Top view of the sunlight reflected during offset tracking

At night, the SunCatchers are stored facing North in the service position where it is tilted down at minus 22 degrees in elevation. This is also the position that the dish will be in when it is undergoing service during evening and night time hours. This position was selected because El Centro has a maximum solar declination of 23.4 degrees so that no matter the position of the sun, the mirrors will always shade themselves.

During windy periods of the day or night, the SunCatchers are stored in "Wind Stow" position with the dish pointing directly up. As the Sun moves across the sky, the light will be focused at approximately 100 ft. (maximum) from the vertex. At distances beyond this focal point, the concentrated light dissipates quickly. At twice the distance from the dish to the point where light focuses, the reflected light will be no brighter than the sun as it strikes the earth surface.

There is no hazard to passing airplanes. Glint from above has been compared to seeing the sun reflected in a lake.[1] Figure 2 below is a picture of the glint of a parabolic trough plant from a small airplane. The SunCatcher field will be similar though the glint will have a more circular appearance.

Figure Two: Image of a parabolic trough plant from a low flying airplane[1]

Occasionally, such as after maintenance work, a SunCatcher will need to move to a different position. Theoretically, the dish can be moved to any position, with the sun at any location, without causing a concentrated image of the sun to be reflected at a passerby outside the boundary fence.

The parabolic dish with the sun hitting it at an angle will focus the light in mid air close to the dish but not at the PCU. Similarly to the "Wind Stow" position, the light dissipates quickly the further away it is from the focus.

If an azimuth or elevation drive fails, the dish may be unable to move but the dish will still focus the light and the focus the light dissipates from the vertex approximately 100 ft. and with in 200 ft. the concentration will return to a normal level.

The boundary line of the Solar Two plant is a minimum of 250 feet away from the nearest SunCatcher. At this distance, any glint will be dissipated to a fraction of the intensity of the sun. The shoulder of I-8 and the Evan Hewes Highway is at least 360 feet from the nearest dish.

The intensity of light at the plant boundary and nearest roadways was calculated using first the nominal focal length of the dish to describe the glint during offset tracking and second using a wind stow or slew case where the focal distance has grown to 100 ft. The results of these calculations are provided in the table below:

Distance from Dish (ft)	Irradiance of Reflected Light Assuming Nominal Focal Distance (kW/m^2)	Irradiance of Reflected Light Assuming a Worst case Focal Distance of 100 ft (kW/m^2)
Boundary of Plant (250 ft)	0.009	0.444
Nearest Shoulder of Roadway (360 ft)	0.004	0.147

For comparison, the sun on a bright day typically has an irradiance of 1.000 kW/m^2.

[1] Letter from Jeff K. Brown, California Department of Transportation, Division of Aeronautics, to Jim Adams, California Energy Commission December 11, 2007