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July 11, 2013

VIA ELECTRONIC MAIL
(regs@dtsc.ca.gov)

Ms. Manpreet Singh, Regulations Coordinator
Department of Toxic Substances Control
Regulations Section, MS 23A
P.O. Box 806
Sacramento, CA 95812-0806

RE: Comment on the Proposed "Standards for Management of Hazardous Waste Solar Modules," DTSC Ref. No. R-2010-01; OAL Notice File No. Z-2012-0802-01

Dear Ms. Singh:

Soitec Solar Industries LLC (Soitec) offers the following comments on the Department of Toxic Substance Control's (Department) Proposed "Standards for Management of Hazardous Waste Solar Modules," open for public comment from June 27, 2013 to July 11, 2013.

I. SOITEC'S CONCENTRATED PHOTOVOLTAIC (CPV) TECHNOLOGY DIFFERS FROM PHOTOVOLTAIC (PV) TECHNOLOGY

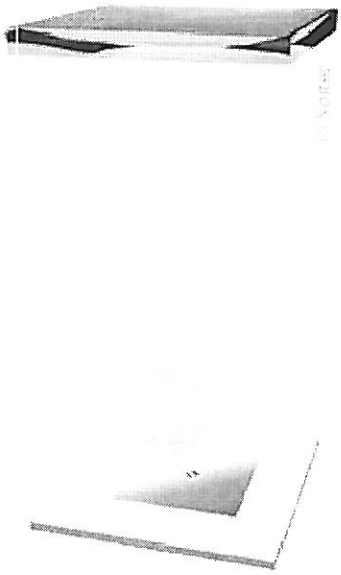
Soitec is a world leader in manufacturing revolutionary semiconductor materials for the energy industry. This expertise led to Soitec's development of innovative concentrated photovoltaic (CPV) technology, which uses optimized multi-junction solar cells in which different types of solar cells are stacked on top of one another, combined with a magnifying Fresnel lens and dual-axis tracking system, to concentrate the sun's waves to achieve high solar efficiencies. *See* Figure 1, Soitec CPV Solar Cell; *see also* http://www.soitec.com/en/technologies/concentrix/ (a short video is embedded in the webpage, which graphically renders Soitec's CPV module technology); Figure 2, Soitec CPV Module.

Each solar cell type is designed to convert a certain range of the solar spectrum: short wave radiation, medium wave radiation and infrared. The energy yield and the potential of these high-efficiency cells are enormous. In the laboratory tests, efficiencies of more than 41% have been achieved. This is almost double the efficiency of conventional PV solar cells.

Soitec's CPV modules use Fresnel lenses to concentrate sunlight 500 times and focus it onto the small, highly efficient multi-junction solar cells. By using concentrating optics to focus the sunlight on these multi-junction solar cells, it is possible to minimize the amount of semiconductor material needed to generate solar energy down to a small fraction, using solar cells of only a few square millimeters. This principle enables the manufacturing of CPV modules that are both highly efficient and very low in heavy metal concentrations when compared to traditional PV modules.

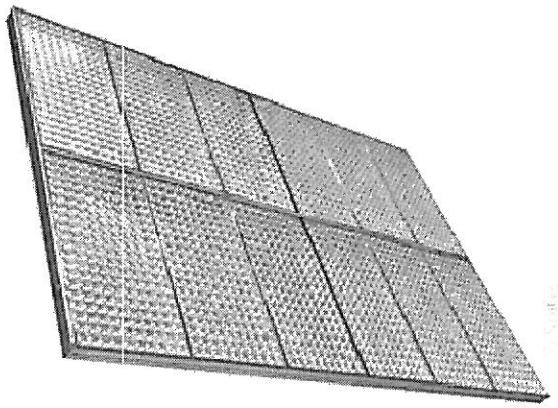
For example, the solar cells used in each CPV solar cell are very small (7 mm^2 per piece). In comparison, the weight of a CX-M500 CPV Module is 210 kg, of which the solar cells are merely 0.017 kg (or less than 0.01%). Figure 1, below, graphically illustrates the Fresnel lens, focusing sunlight onto the solar cell, of which a very small portion is the multi-junction solar cell.

Figure 1. Soitec CPV Solar Cell



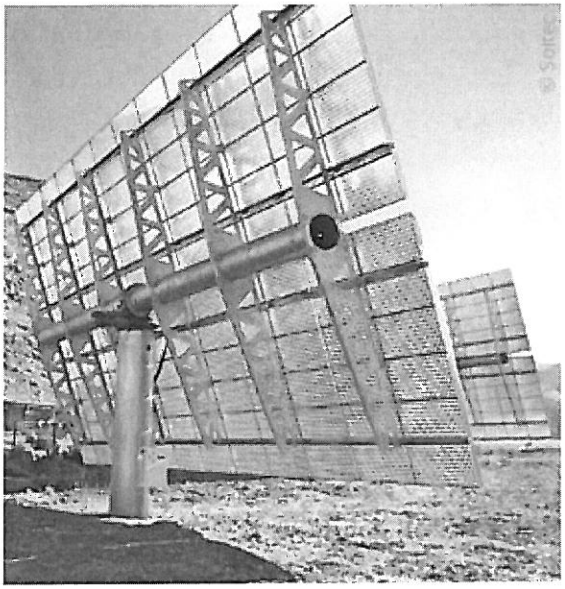
CPV modules are made with different materials than PV modules, including less heavy metals. Unlike the PV modules described in the Department's Initial Statement of Reasons (ISOR) for the current rulemaking, Soitec CPV modules consist of an aluminum frame with numerous tiny silicon solar cells implanted on a bottom plate in the frame, overlaid with concentrating optics to focus the sun's rays. *See* ISOR at 7 (Oct. 2012). *See* Figure 2, below.

Figure 2. Soitec CPV Module



CPV technology requires the use of a dual-axis tracking system to ensure that concentrated sunlight remains focused directly on the solar cells with a high degree of precision throughout the day, delivering constant power output. A proprietary application and algorithm position the tracker. Astronomical positioning is used and DC power output is monitored to calculate the next optimum position for maximum power generation. *See* Figure 3, below.

Figure 3. Soitec CPV Module Tracking System



In October 2012, Soitec's CPV modules were analyzed for heavy metals pursuant to the procedures described in Title 22, CCR § 66265.13, for Soluble Threshold Limit Concentrations (STLC) and Total Threshold Limit Concentrations (TTCL). The results of the analysis demonstrated that the Soitec CPV modules have detectable levels of nickel, copper, and vanadium, but in each case, the levels were below the STLC and TTLC regulatory limits. No other toxic metals were present in detectable amounts.

Soitec has chosen the State of California as a key location for its development of innovative CPV modules, and California has partnered with Soitec to encourage this promising technology. In 2011, the California Public Utilities Commission (CPUC) approved 300 MWp of PPAs, which are expected to use Soitec's technology. In 2012, Soitec opened its North American solar manufacturing facility in San Diego, California. Once at full capacity, the factory will have created California jobs for over 400 people. The factory is equipped with a state-of-the-art automated production line, which has the capacity to supply hundreds of MWp of contracts for utility-scale projects throughout the United States and overseas every year.

In 2013, two of Soitec's development projects were designated by Governor Brown as "Environmental Leadership" projects under the Jobs and Economic Improvement Act of 2011 (AB 900), which is intended to encourage California's economic recovery by providing a streamlined CEQA review process for construction projects that qualify as an environmental leadership development project and will make a substantial financial investment within California, create new high wage and highly skilled jobs, and will not result in any net additional greenhouse gas emissions. *See* Pub. Res. Code § 21178 *et seq.*

II. SOITEC'S COMMENTS ON THE PROPOSED RULEMAKING

A. Sections 66260.10 and 66273.9: Is the Definition of "PV Module" Intended to Encompass CPV Module Technology?

As a threshold question, Soitec requests that the Department consider that the definition of "PV module" should not encompass Soitec's CPV modules.

The Department's ISOR suggests that the intent of the rulemaking is to regulate PV modules, not

CPV modules. In the ISOR, the Department defined solar modules by reference to conventional PV modules. "Solar modules are a form of photovoltaic technology where a semiconductor material, such as silicon, cadmium telluride, or copper indium selenium, is encapsulated between two sheets of tempered glass." ISOR at 7. As part of its rationale for proposing the regulations at issue, the Department pointed to available information that "indicates that some solar modules are likely to exhibit the characteristic of toxicity due to heavy metals (e.g., cadmium, copper, lead, and selenium) and thus would be classified as hazardous waste if disposed." *Id.* at 8.

In contrast, Soitec's CPV modules employ optimized multi-junction solar cell technology that requires significantly smaller amounts of heavy metals to produce the equivalent amount of electricity. Furthermore, CPV modules are not constructed as PV modules are, and do not exhibit characteristics of toxicity due to heavy metals (e.g., cadmium, copper, lead, and selenium).

Furthermore, in October 2012, Soitec's CPV modules were analyzed for heavy metals using the STLC and TTCL methods. The results of the analysis demonstrated that the Soitec CPV modules have detectable levels of nickel, copper, and vanadium, but in each case, the levels were below the STLC and TTLC regulatory limits. No other toxic metals were present in detectable amounts.

B. Section 66273.7.1(b)(2): Confirm That A PV Module That Is Not Characteristically Hazardous Is Not A Universal Waste

Section 66273.7.1(b)(2) would exclude PV modules from coverage under Chapter 23 that "do not exhibit a characteristic of a hazardous waste as set forth in article 3 of chapter 11 and that are not otherwise identified as hazardous waste pursuant to chapter 11 of this division;"

The proposed regulations also would amend § 66261.9(a)(8) to add "PV modules, as described in section 66273.7.1, subsection (a)" to the list of wastes known as "universal wastes." It appears that the proposed amendment to § 66261.9(a)(8) is the only place in Chapter 11 of Division 4.5 that references PV modules.

Soitec requests that the Department clarify that the proposed amendment to § 66261.9(a)(8) would not prevent a PV module that otherwise is not characteristically hazardous from taking advantage of the exemption set forth in § 66273.7.1(b)(2), simply by virtue of the fact that § 66261.9(a)(8) lists PV modules as a universal waste. Such an interpretation would appear to defeat the purpose of the exemption provided in § 66273.7.1(b)(2).

C. Section 66273.7.1(b)(6): Confirm that Refurbishment Includes Remanufacture of a CPV Module

Section 66273.7.1(b)(2) would exclude PV modules from coverage under chapter 23 if they are "no longer identified as a waste (e.g., a discarded PV module[] that is refurbished and is returned to service)."

Due to the technological differences between CPV technology and PV technology, it is conceivable that Soitec could remanufacture existing CPV modules by removing useable components from one module and combining those components with new or recycled components from another module.

Soitec requests that the Department confirm that such remanufacturing would fall within the scope of § 66273.7.1(b)(6) exemption, or in the alternative, amend § 66273.7.1(b)(6) to read: "PV modules that were previously identified as waste pursuant to chapter 11, but are no longer identified as a waste (e.g., a discarded PV module that is refurbished or remanufactured and is returned to service)."

D. Section 66261.6(a)(8)(F): Confirm that a PV Module Vendor Need Not Register As A Universal Waste Handler

Section 66261.6(a)(8)(F) would permit a PV module vendor to conduct manual disassembly of PV modules, so long as the conditions of § 66261.6(a)(8) are met. Soitec requests that the Department confirm that a PV module vendor conducting such manual disassembly need not register as a universal waste handler. *See, e.g.,* § 66273.32(g)(1).

E. Section 66261.6(a)(8)(I): Clarifying That A PV Module That Is Exempt Under Section 66273.7.1(b)(2) Would Not Be Subject to Universal Waste Export Restrictions

Section 66261.6(a)(8)(I) would prohibit any person from "exporting PV modules unless export is conducted in accordance with applicable export requirements for universal waste as described in Article 4 of Chapter 23 of this division." This raises the possibility that a PV module that qualifies for the exemption from regulation as a universal waste under § 66273.7.1(b)(2) because it does not exhibit characteristics of a hazardous waste could nonetheless be required to comply with the export restrictions applicable to universal wastes as set forth in Article 4 of Chapter 23 of Division 4.5, simply by virtue of the fact that the device fits within the expansive definition of "PV module."

Soitec requests that the Department confirm that the intent of the proposed export restriction in § 66261.6(a)(8)(I) is that it not apply to a PV module that qualifies for the exemption from regulation as a universal waste under § 66273.7.1(b)(2) because it does not exhibit characteristics of a universal waste. Furthermore, Soitec requests that the Department revise § 66261.6(a)(8)(I) to clarify that the export requirements for universal waste do not apply if the PV modules in question do not exhibit characteristics of hazardous waste.

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Soitec appreciates the opportunity to submit comments to the Department in furtherance of its development of the proposed regulations on the management of waste PV modules. Please direct any questions regarding the substance of these comments to Mr. Mark Richards, General Counsel and Legal Director, mark.richards@soitec.com, (858) 746-9000.

Very truly yours,

Karl Friedrich Haarburger
Chief Operating Officer
Soitec Solar Industries LLC