



August 11, 2010

Department of Toxic Substances Control (DTSC)
P.O. Box 806
Sacramento, CA 98512-0806,

Attention: Ellen L. Haertle, MS-22
ehaertle@dtsc.ca.gov

Re: Solar regulations regarding the exemption of hazardous panels

Dear Ellen Haertle and DTSC,

Attached are comments from the Silicon Valley Toxics Coalition (SVTC) in reference to DTSC's Proposed Standards for Management of Waste Solar Panels Department Reference Number: R-2010-01.

As expressed previously, we have grave concerns regarding DTSC's effort to deregulate hazardous waste. The proposed reclassification of PV waste leaves in place a system with no accountability. The only treatment option that can hold manufacturers accountable for product and hazardous waste stewardship is pre-financed extended producer responsibility (EPR). EPR fits with California's Green Chemistry Initiative, and a well-designed EPR can foster eco-design and green innovation.

Recent reports on TCLP, TTLC, and STLC from the Non-Toxic Solar Alliance (NTSA), the Norwegian Geotechnical Institute (NGI), and a review of both studies by the Wuppertal Institute for Climate, Environment, and Energy all suggest that a number of PV modules sold in California fail toxicity tests. Panels based on Cadmium compounds (cadmium sulfide (CdS), cadmium telluride (CdTe), cadmium stannate) are among the failing panels, making them hazardous waste. From our estimates, California utilities and homeowners will be responsible for the disposal of 900,000 pounds of cadmium based on the total planned, announced, and installed PV in California's regional grid. Yet, with the current capacity to recycle CdTe in the US, it will take 155 years to recycle this waste. Without a pre-financed collection scheme, no one will build the necessary infrastructure to recycle PV modules.

In addition, DTSC's rules do not address any environmental justice (EJ) consideration as is required by DTSC's own Environmental Justice Policy (2008). EJ considerations in this rule include, but are not limited to concerns regarding worker safety in handling hazardous end-of-life (EOL) modules.

It is important to note that a recent European Union decision to grant a four-year exemption to the Restriction on Hazardous Substances (RoHS) was based on the apparent efforts of PV Cycle and European PV Industry Association (EPIA) to establish a national recycling and collection scheme. No similar model of EPR is being proposed by SEIA or any US-based solar or PV industry association.

Finally, what are the benchmarks in the proposed rules to determine whether or not the manufacturer in question should be granted an exemption? What constitutes a solar panel "reclamation (recycling) program"? What kind of recycling rates are anticipated? Will it be administered by each solar panel vendor,

or will the industry pool its resources to build out a more comprehensive infrastructure? How much will be set aside to pay for the collection and recycling scheme? Will the money be set aside in escrow or bonded to ensure that PV modules are not orphaned when a company goes out of business?

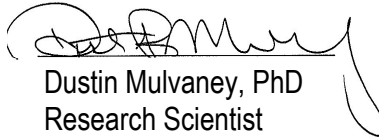
Enclosed are three attachments. Firstly, you will first find our overall comments to the proposal in Attachment A. Attachment B contain answers to your specific questions for participants. Lastly, we have commented on some of the specific language proposed for the regulation in Attachment C.

Thank you again for considering these detailed comments and suggestions. We welcome an opportunity to discuss these with you at your earliest convenience. Please feel free to contact Sheila Davis (sdavis@svtc.org) or Dustin Mulvaney (dustin.mulvaney@gmail.com) at 408. 287. 6707 if you have any further questions.

Sincerely,



Sheila Davis
Executive Director



Dustin Mulvaney, PhD
Research Scientist

Attachment A

Important issues missing from DTSC's regulatory framework for end-of-life PV

SVTC is gravely concerned that DTSC does not have the regulatory authority to develop the necessary recycling programs to support the declassification of hazardous PV to universal waste. SVTC strongly supports a recycling program that includes all types of PV modules sold in the State of California and support the State of California's resources conservation, recycling, renewable energy and green chemistry goals.

DTSC's effort to deregulate hazardous PV modules without considering the cost or extending the financial responsibility of end-of-life management to manufacturers risks instituting sham recycling that will cause further harm to human health and the environment. The following important issues are missing from DTSC's regulatory framework for end-of-life PV.

- **Provision for Extended Producer Responsibility (EPR).** Who is responsible for paying? The proposed regulations do not require manufacturers or "producers" to support the cost of recycling. There is an inaccurate assumption that hazardous waste recycling is profitable and that there will be a profit motive in the collection and processing. All hazardous waste has a cost associated with it. Estimates on the costs of recycling PV range from \$0.02/watt for crystalline silicon PV modules in large shipments in 20 ton containers (Fthenakis 2000) to \$0.04-\$0.05/watt for CdTe PV modules (Bohland et al. 1997) to \$0.08-\$0.11/watt for CIGS modules like those manufactured by six Bay Area startups. Based on total announced, planned, and installed PV capacity in California, the cost of recycling would be over \$800 million. Weakening the law without identifying who will pay the cost of recycling will lead to irresponsible and sham recycling.
- **Enforcement.** DTSC doesn't have the capacity, or the resources, to enforce a universal waste rule for solar panels. The current electronic universal waste recycling program is mismanaged and riddled with abuses. DTSC doesn't have the resources to enforce compliance for domestic recycling or the export of electronic waste. No state official has travel out of state to investigate fraudulent claims and the state has paid an estimated \$30 million in ineligible claims as a result. (<http://www.sacbee.com/2010/07/18/2897609/californias-pioneering-e-waste.html#storylink=scinlineshare#ixzz0wEVFJMXI>) DTSC should not propose new universal waste regulations without identifying who will manage and pay for regulatory enforcement.
- **Labeling.** The proposed regulations do not include provisions for product labeling. In order to facilitate proper and safe recycling, all solar PV should be labeled for the benefit of the customers. Without a labeling regime, customers (and other generators) who put their modules in a landfill cannot be held responsible for complying with hazardous waste laws. The label used in the DTSC workshop

presentation is insufficient for an effective recycling scheme. In addition to mandatory labeling, there needs to be more discussion about the size and permanence of labels and what information is required.

- **Pre-Market Testing.** All PV panels that enter the market should be tested for hazardous materials. Testing will allow DTSC to track panels that require special handling when they become waste. Pre-market testing is also a prerequisite for product labeling, EOL handling, and will allow the state government to track PV modules that require special EOL management,
- **DTSC testing protocols and regulatory thresholds.** DTSC doesn't have testing methods for emerging materials such as nanoparticles. DTSC also has no regulatory threshold for tellurium.
- **Nanomaterial and Hazardous waste characterization.** It is unclear if nanomaterials will be characterized as hazardous waste by DTSC. The proposed Green Chemistry regulations include nanomaterials as a chemical of concern. However, it is unclear how the Green Chemistry regulations will apply to EOL. Most state hazardous waste regulations are based on TSCA's definition of hazardous waste. However, TSCA only considers certain types of nanomaterials as hazardous.
- **Domestic recycling (treatment).** Although the proposed regulations only exempt products that are recycled (i.e., treated) domestically, there is very little incentive for recyclers to invest in hazardous waste recycling/treatment facilities based on a voluntary recycling program. The materials risk being illegally dumped, mishandled by recycler, or land filled without adequate treatment facilities.
- **Household hazardous waste.** If households and small quantity generators are not included in the universal waste rule then local governments will be responsible for the cost of hazardous waste handling of end-of-life panels. Local governments can't afford this additional waste stream.

Attachment B

Responses to questions for participants

Include examples and supporting documentation, especially in your response to Questions to Participants

1. *Should treatment of solar panels be allowed? For example, should some level of simple disassembly of the solar panels (e.g., removal of metal frames, wires) be allowed? Will that facilitate reclamation? Who should conduct such treatment?*

If disassembly facilitates recycling than it should be allowed. Aluminum and copper are low hanging fruit in terms of recycling, and they could be of value. However, recycling the materials should not come at the expense of disposing of the remaining materials. Also, the removal of frames could make it more likely that the panel is broken, possibly releasing cadmium or lead into the environment.

2. *Do we integrate the proposed chapter 23, article 8 standards into existing chapter 23 standards?*

The universal waste option for PV is not a sufficient response to ensuring takeback and recycling. Other articles regulated as universal waste—lamps, thermostats, and batteries—have very low rates of recycling.

3. *Under the proposed exemption in 66261.6, will transport directly to a reclamation facility allow for current solar panel recycling activities that are already in-place by some solar panel manufacturers? Will this allow for 3rd party entities to receive solar panels with ultimate disposition to a reclamation facility?*

NA

4. *Are solar panel transporter requirements enough? Is reference to chapter 23 universal waste transporter requirements enough? Should there be specific shipping paper requirements and tracking of shipment?*

If PV modules are known to be hazardous, then their transport should be tracked to monitor recycling rates and to ensure that it is disposed of properly.

5. *Proposed inclusion of solar panels into universal waste management scheme does not include existing household or conditionally exempt small quantity universal waste generator universal waste exemptions. Is this necessary to ensure that only universal waste solar panel handlers manage solar panels (e.g., trained solar panel installers)? Does this support current solar panel manufacturer take-back models and provide a more pro-active approach to mitigate the impact on local solid waste collection facilities/resources?*

The only take back model currently in the industry is administered by a company that almost exclusively sells to large customers. There is currently no take back model for homeowners. Because of the nature

of PV installation, it is likely that trained installers will be onsite for decommissioning. However, the decommissioning will have to be paid for by customers as currently proposed, making it less likely that PV will be effectively recycled.

6. *Is there a need for annual reports? If so, what kind of information should be provided to DTSC, and who should provide this information?*

An annual report should monitor recycling rates and overall policy effectiveness.

7. *Are the regulations clear on the definition of a solar panel? Are visual standards enough? How broken is broken? Is a definition for solar cell needed as well?*

The definition of solar panel is currently too subjective.

8. *Does DTSC need information (i.e., notification) to identify "solar panel vendors"? If so, what kind of information is needed, and how frequently would that initial information be updated (e.g., annually, owner name/address changes, etc.)?*

NA

Attachment C

Comments on the specific sections and language

§ 66260.10. Definitions.

“Solar panels” does not include physically damaged, deteriorated, or altered solar panels (or components thereof), that are no longer recognizable as intact or broken solar panels, nor does it include solar powered electronic devices that have solar cells incorporated into their structures.”

COMMENT: The definition of solar panel needs to be more specific. Recognizable to whom? Are there less subjective criteria? It seems that even a shredded solar panel could still be recognizable.

§ 66261.6. Requirements for Recyclable Materials.

(8)(B) Only intact solar panels shall be managed. Any solar panel or container of solar panels that shows evidence of leakage or damage that could cause a release of hazardous constituents to the environment shall be managed in accordance with article 8 of chapter 23 of this division.

COMMENT: The definition of intact panel should be explicitly stated. What is the benchmark for evidence of leakage? Does a cracked module constitute evidence of leakage or damage?

(8)(C) A solar panel or container of solar panels shall be labeled with one of the following phrases: "Solar Panels Not Scrap Metal", or "Solar Panels Not CRT Glass".

COMMENT: Since the container is not going to remain with the panels it seems that both the panel and the container should be labeled. Also, it's not clear why PV needs to be distinguished by saying “not scrap metal” or “not CRT glass.”

PROPOSED LANGUAGE: (8)(C) A Each solar panel ~~or~~ and container of solar panels shall be labeled with one of the following phrases: "Solar Panels Not Scrap Metal", or "Solar Panels Not CRT Glass".

(8)(D) Any spills or releases of a solar panel or components thereof shall be cleaned up immediately.

COMMENT: What does “cleaned up” mean? What does “immediately” mean? Also, it should be required that spills or releases be reported.

PROPOSED LANGUAGE: (8)(D) Any spills or releases of a solar panel or components thereof shall be reported within 24 hours, any contaminants shall be cleaned up to non-detect levels, and cleanup should ensue immediately.

§66261.9. Requirements for Universal Waste.

Universal Waste Option

COMMENT: In general most of the wastes listed in the universal wastes section have very low recycling rates.

§66273.8. Exemptions.

(c) The exemptions provided for in subsections (a) and (b) of this section shall not be applicable to the management of universal waste solar panels.

COMMENT: It is very important that households not be exempted since a great number of modules installed will be on home rooftops.

§66273.9. Definitions.

"Solar panel" means any photovoltaic module, photovoltaic panel, or other photovoltaic device that collects energy from the sun for the purpose of converting light into electricity for general electricity grid use.

COMMENT: General electricity grid use does not account for any PV modules that would be sold for off grid applications (e.g. off grid homes, water pumping systems, etc.)

PROPOSED LANGUAGE: "Solar panel" means any photovoltaic module, photovoltaic panel, or other photovoltaic device that collects energy from the sun for the purpose of converting light into electricity for general electricity ~~grid~~ use.

§ 66273.82. Notification Requirements for Handlers of Universal Waste Solar Panels

(4) A list of all of the types of universal waste solar panels managed by the handler (e.g., thin-film, crystalline silicon)

(5) A statement indicating that the handler of universal waste solar panels is accumulating more than 5,000 kilograms of universal waste solar panels at one time and the types of universal waste solar panels (e.g.,

thin-film, crystalline silicon) the handler of universal waste solar panels is accumulating above this quantity.

COMMENT: The generic term thin film is not an appropriate identifier of the type of waste. The thin films should note what kinds of semiconductor layers the panel is made from.

PROPOSED LANGUAGE: (4) A list of all of the types of universal waste solar panels managed by the handler (e.g., thin-film CdTe/CdS, thin-film CIGS/CdS, thin film amorphous silicon, thin-film CIGS/InP, crystalline silicon)

(5) A statement indicating that the handler of universal waste solar panels is accumulating more than 5,000 kilograms of universal waste solar panels at one time and the types of universal waste solar panels (e.g., thin-film CdTe/CdS, thin-film CIGS/CdS, thin film amorphous silicon, thin-film CIGS/InP, crystalline silicon) the handler of universal waste solar panels is accumulating above this quantity.

§66273.83. Waste Management and Response to Releases.

(a)(1) A handler of universal waste solar panels shall contain any solar panel in a container or package that is structurally sound, adequate to prevent breakage of the solar panel, and compatible with the contents of the solar panel. Such a container or package shall lack evidence of leakage, spillage or damage that could cause leakage under reasonable foreseeable conditions.

(3) A handler of universal waste solar panels shall immediately clean up and place in a container any solar panel that is broken and shall place in a container any solar panel that shows evidence of breakage, leakage, or damage that could cause the release of solar panel glass or other hazardous constituents to the environment under reasonably foreseeable conditions. The containers shall be structurally sound, compatible with the contents of the solar panels and shall lack evidence of leakage, spillage or damage that could cause leakage or releases of solar panel glass or other hazardous constituents to the environment under reasonably foreseeable conditions.

COMMENT: The evidence of leakage, spillage, and particularly damage that could cause leakage needs to be more clearly defined.

(b)(1) A solar panel generator shall determine whether any material resulting from such a release is a hazardous waste, and if so, shall manage the hazardous waste in compliance with all applicable requirements of this division. The handler of universal waste solar panels is the generator of the hazardous waste resulting from the release, and is subject to the requirements of chapter 12.

COMMENT: Since pv is not labeled based on semiconductor type, it is not clear that the solar panel generator will even know what constituent materials the panel might have. To put the onus on the generator to determine if the release is a hazardous waste is not the best way to do this. If panels were labeled, it would be easier. It seems like part of the condition should be to label the product as hazardous waste, or at

least naming the constituent semiconductor and TCO layers.

(c) Hazardous waste consisting only of broken, or otherwise damaged solar panels, but that still satisfy the definition of solar panel in section 66273.9 may be managed as universal waste provided that the broken, or otherwise damaged solar panel is repackaged according to the standards of this section.

COMMENT: Since the definition earlier in the rules says broken panels cannot be considered solar panels, it is not clear how it could still satisfy the definition. Please clarify.

§ 66273.84. Labeling/ Marking.

(a) A handler of universal waste solar panels shall clearly label or mark solar panels (i.e., each solar panel), or a container or pallet in which solar panels are contained with the following phrase: "Universal Waste—Solar Panel(s)".

(b) In lieu of labeling individual solar panels and/or containers or pallets of solar panels pursuant to subsection (a) of this section, a handler of universal waste solar panels may accumulate universal waste solar panels within a designated area demarcated by boundaries that are clearly labeled with the following phrase: "Universal Waste—Solar Panel(s)".

COMMENT: This is not clear. Will simply a magic marker on cardboard suffice? It seems that the label should at least have stipulations about text or label size.

References

Bohland, J., I. Anisimov, and T. Dapkus. 1997. Economic Recycling of CdTe Photovoltaic Modules. In *PVSC*. Anaheim, CA.

DTSC. 2008. DTSC Environmental Justice Policy.

http://www.dtsc.ca.gov/GetInvolved/upload/OEA_POL_EJ_7-08.pdf

Fthenakis, Vasilis. 2000. End-of-life mangement and recycling of PV modules. *Energy Policy* 28:1051–8.