June 10, 2019

Department of Toxic Substances Control
Hazardous Waste Management Program
P.O. Box 806
Sacramento, CA 95812-0806

Attention: Acting Director Meredith Williams and DTSC staff

Subject: Photovoltaic modules (PV modules) – Universal Waste Management Proposed Regulation Text R-2017-04

Submitted via e-mail regs@dtsc.ca.gov

Acting Director Williams and DTSC staff,

We provide this summary of comments regarding subject proposed rule-making of the Department of Toxic Substances Control (DTSC) to promote PV recycling in the state of California and in its efforts to develop universal waste management regulations for PV modules.

The following organizations have contributed to the comments in this letter:

The **Solar Energy Industries Association (SEIA®)** is the national driving force behind solar energy. We are building a strong solar industry to power America through advocacy and education. As the national trade association in the U.S., we represent all organizations that promote, manufacture, install and support the development of solar energy. SEIA works with its 1000-member companies to champion the use of clean, affordable solar in America by expanding markets, removing market barriers, strengthening the industry and educating the public on the benefits of solar energy.

Since 1977, the **California Solar and Storage Association (CALSSA)** has advanced the common interests of the solar industry, helping make California's solar market the most robust in the United States.

Comprised of over 500 contractors, manufacturers, distributors, developers, engineers, consultants and educational organizations, CALSSA represents a diverse membership committed to growing the California solar industry, including storage and solar thermal technologies. CALSSA engages with local and state decision-makers to ensure California remains a solar energy leader through good public policy and regulations that provide clarity, transparency, and certainty.

The **California Product Stewardship Council (CPSC)** and its affiliate, the **National Stewardship Action Council (NSAC)**, represent hundreds of local government and private sector partners. CPSC's mission since 2007 has been to shift California's product waste management system from one focused on government-funded and ratepayer financing to one that relies on producer responsibility in order to reduce public costs and drive improvements in product design. CPSC was so successful in this area that they created NSAC, a national organization in 2015, with the vision of achieving a Circular Economy in the United States. This is why we are excited to collaborate with the solar industry who also support the Circular Economy approach.

We support the DTSC's efforts to designate and manage waste PV modules, that would otherwise be characterized as a California-only hazardous waste, as a Universal Waste; understanding that not all waste PV modules are characterized as a California-only hazardous waste nor as a Resource Conservation and Recovery Act (RCRA) characterized hazardous waste. Our organizations support the on-going development of practical PV module regulations.

We encourage the DTSC to develop solutions that continue to encourage solar and related stakeholder companies to act positively. Our industry has come to the table proactively to manage the currently low levels of waste so that we can create a responsible environment for the future. We encourage California to continue its work in setting up a model for the rest of the country as it is known to do overall with solar and renewable energy technology, investment, policy and jobs growth. DTSC should design regulations that gives advantages to waste handlers that are managing waste PV by recycling. The regulations should support the legislative waste hierarchy of reuse, refurbishment, recycling and then disposal. The regulations should also encourage this activity within California for the creation of new businesses and jobs and ensure that these materials are managed to California standards.

In support of these efforts, we would like to highlight the following comments and also refer to the attachment which contains specific comments, revisions and changes to the proposed regulation language. We would offer to discuss any of the points or comments at an in-person meeting if the opportunity is available to do so.

1. Section 66260.10, page 6, lines 17-27: Definition of a PV module

This definition currently includes separate external components such as inverters and energy storage (batteries) that are not integral to the actual PV module itself. Currently, the components that are directly attached to a PV module are a junction box, wiring/cables, and connectors; some PV modules may include a micro-inverter.

We note that batteries and electronics such as inverters are already covered under universal waste regulations and do not need to be included in these proposed regulations. Similarly, wires and cables can be recycled already as scrap metal and DTSC should encourage this practice.

Reference the images below of a typical PV system and a string inverter. Note that a PV inverter itself is a wholly separate product in a PV system. PV inverters can be recycled in a similar manner to e-Waste as they do not contain the same materials as PV modules such as laminate and tempered glass.

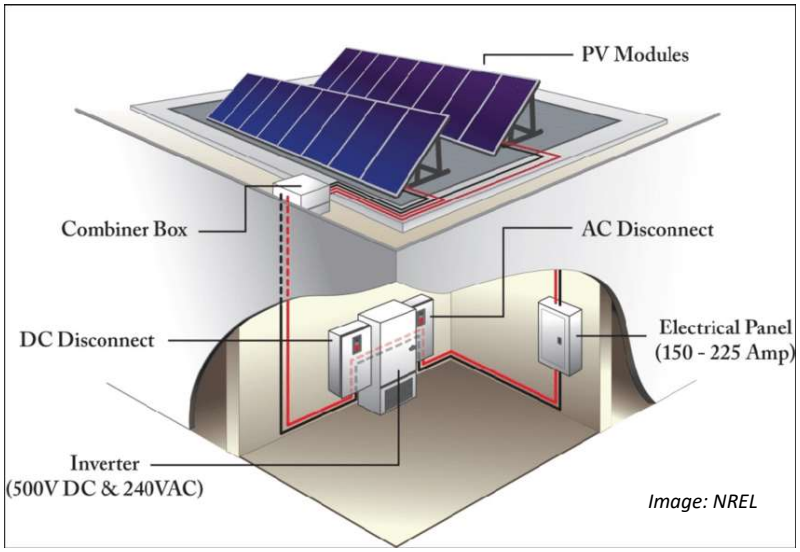


Image: NREL

The graphic below reflects a PV system, inverter and an energy storage system. The energy storage system contains batteries and is typically installed with the building or a separate structure and connected to the inverter.

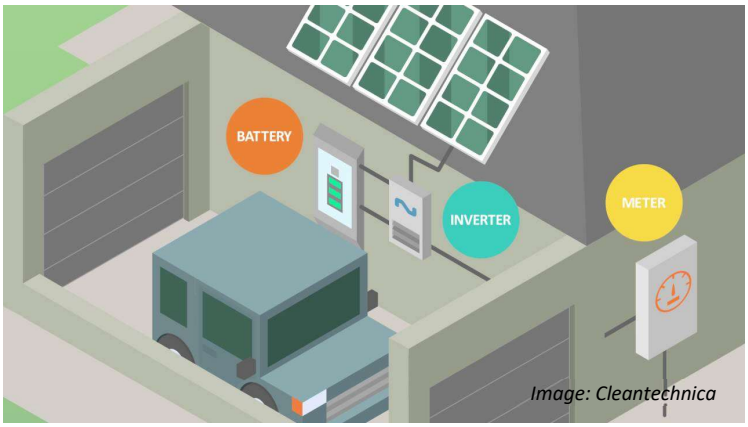
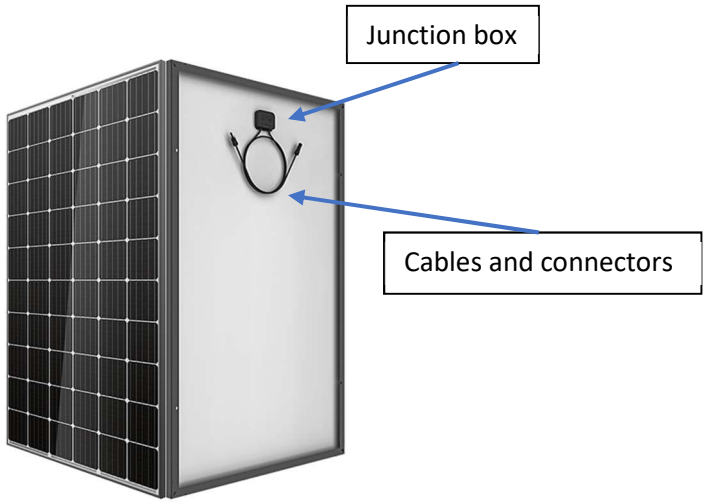
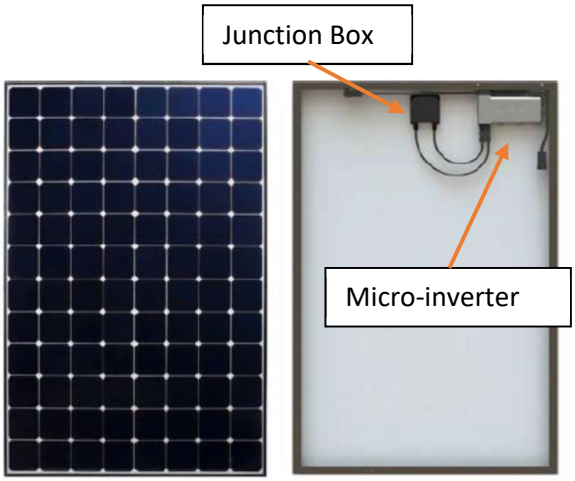


Image: Cleantechnica

The typical components that are directly attached to a PV module are a junction box, wiring/cables and connectors.



Some PV modules may have a microinverter attached.



This clarification identifying the correct directly connected components such as the junction box, wiring/cables, connectors, and, if included, micro-inverters is an important distinction since the weight threshold in Section 66273.32 would be negatively affected if a separate inverter or batteries were to be included in the definition.

Due to the lack of certainty as to where small electronic devices with embedded photovoltaic cells fall in the solid waste/hazardous waste hierarchy and based on comments by DTSC staff made at a public

meeting, a clear definition of these small should be included in the definition. The definition can be as follows:

> Calculators, landscape lights, and other small electronic devices with integrated photovoltaic cells are considered solid waste and shall be handled/processed in accordance with regulations pertaining to solid waste.

2. Section 66273.7.1(b)(4) Applicability – PV Modules

The language used to identify applicability of PV modules that are "…destined for recycling (or are recycled) by being 'used in a manner constituting disposal'" is confusing and potentially misunderstood by recyclers to mean that recycling is not allowed. This language should be better clarified by re-wording or adding an example. We did not include suggested new language in the attachment and look forward to discussions with the DTSC on the new language.

3. Section 66273.32 USEPA Notification, Department Notification, and Reporting Requirements for Universal Waste Handlers.

The threshold of >100 kg or 220 pounds is unwarranted for the PV industry and will have a significant impact on thousands of businesses who use tens of thousands of vehicles and employees to transport PV modules to installation sites and / or to disposal sites. The average residential installation uses eight to ten PV modules, each weighing 40-45 lbs. each for a minimum total of 360 lbs. This is an unreasonable administrative burden for every solar installer and service company to record, track and report for the information noted in (f)(3) of this section.

For system owners (possibly homeowners) who want to partake in a module return program or warranty return, they will typically send the modules back to manufacturer (possibly through a contracted installer or service company) and likely do not have packaging materials to meet the requirements specified in this section. Yet if they transport more than 100kg of panels without said packaging, this is prohibited per section 66273.51 Prohibitions.

In this case, this will require either manufacturers to purchase and send empty boxes out to each site for a return to comply with the packaging requirements; or it would require the system owner / homeowners to purchase the packaging material, which realistically is not sold in single units and may result in more solid waste than intended. The regulations need to encourage practical and implementable behavior. The industry and stakeholders are interested in encouraging the reduction of packaging waste not increasing it.

It is unclear whether warehouses and distribution centers must register as universal waste handlers if they may potentially receive product that may be designated universal waste. Many such facilities are leased and may not be allowed to have such waste on the premises. This potential impact is not clearly stated in the DTSC's economic impact statement and will be unfairly burdensome, onerous and costly to the solar industry. Thus, we urge the DTSC to exempt warehouses, distribution centers and other such facilities from registering as universal waste handlers' and the requirements.

4. Section 66273.73 Authorization for Treatment (Processing) Activities

The restrictions on use of chemicals, heat, or water to treat waste will stifle innovation to maximize valuable material recovery that may be employed. Similarly, this will prevent the washing of PV modules prior to recycling/processing to remove dirt and other contaminants prior to the recycling process. For recyclers, this will restrict the type of equipment and processes to recycling PV modules, thereby disincentivizing new companies or operations to be pursued. We suggest removing part (e)(2) of Section 66273.73 and adding "applications of chemicals, including water, and external heat" to the list of permissible actions in section (e)(1).

We strongly recommend that the DTSC reconsider or remove this prohibition and instead develop an exemption with industry and stakeholders to avoid unintended consequences; one example might be developing requirements to obtain a permit for photovoltaic recyclers or an accelerated permitting program for photovoltaic recyclers (e.g., add recovery of materials from photovoltaic modules to DTSC's Tiered Hazardous Waste Treatment Permitting Program as Conditional Authorization or Permit by Rule).

We believe that while meeting the universal waste regulation goals, the regulations should also encourage the innovation of PV-specific recycling processes throughout the waste management industry. SEIA currently works with recycling providers to improve their processes and develop practical and effective waste handling treatment solutions based upon our products' unique technologies and equipment. We highly encourage the DTSC to create requirements that can be use the existing waste handling and management infrastructure and upon which we can build upon for the future.

5. Economic & Fiscal Impact Statement (STD 399) and Attachment Appendix A

We have the following comments regarding STD 399, the Appendix and its attachment. From Page 4 of the Appendix:

> As of 2018, there are no businesses in California with a hazardous waste facility permit to store or treat PV modules. For the baseline, DTSC assumes that at least 10 disposal facilities that are established to manage waste PV modules. With the proposed regulation, DTSC assumes that there will be at least 10 handlers that accept waste PV modules for waste management. This assumption is based on a 2017 stakeholder workshop held by DTSC, when electronic waste recyclers expressed interest in potentially expanding their operations to manage waste PV modules. Under the proposed regulation, these handlers are authorized to accept waste PV modules as a new universal waste stream. Once the universal waste handler decides to dispose of the PV modules, they become a hazardous waste generator and must manage the waste in accordance with hazardous waste management requirements. At this point, the universal waste regulations no longer apply, and handlers must comply with full hazardous waste regulations for handling and disposal of a hazardous waste in California.

This assumption will not encourage the recycling of all PV modules within the state of California if they must all then be managed as hazardous waste.

We would like to revisit the intent noted in SB489 (Monning, Chapter 419) which states (our emphasis in bold):

> (b) It is the intent of the Legislature to do all of the following:
>
> (1) **Foster a comprehensive and innovative system for the reuse, recycling, and proper and legal disposal of end-of-life photovoltaic modules.**
> (2) Encourage the photovoltaic module industry to make end-of-life management of photovoltaic modules convenient for consumers and the public, **to ensure the recovery and recycling of photovoltaic modules,** which is the most efficient and environmentally safe disposition of end-of-life photovoltaic modules, by developing a plan for recycling end-of-life photovoltaic modules in the state in an economically efficient manner.
> (3) **Reduce the likelihood of end-of-life photovoltaic modules being disposed of in landfills**.
> (c) **It is further the intent of the Legislature that photovoltaic modules should be designed for extended life, repair, and reuse, and that collection and recycling services should be promoted**.

Following then, the bill also states that:

> Article 17. Photovoltaic Modules
> 25259. The department may, by regulation, **designate end-of-life photovoltaic modules that are identified as hazardous waste as a universal waste and subject those modules to universal waste management**. The department may revise these regulations as necessary.

The assumptions of the DTSC as referred above do not fulfill the intent or statement of the original bill.

Additionally, page 4 of the Appendix states:

> The assumptions made in this analysis do not include residential installation of solar panels. This analysis assumes residential homes have a service warranty with installers that take back any damaged PV modules before the end of service life, and those wastes are already included in the total generated amount.

This assumption is incorrect. Some residential and commercial PV systems are wholly owned by the home or business owner and are not required to have a service contract with installers or operations and service / maintenance providers; which is similar to wholly owned HVAC systems. The PV systems are typically covered under a manufacturer's product warranty from the original transaction. However, the PV system owner will likely contract with an installer or service provider to remove and replace the warrantied products, but the labor and disposal costs are not part of the originally transacted system cost nor covered by the manufacturer's product warranty. Therefore, the figure of 2,849 businesses affected may be severely underestimated.

From page 12, the DTSC states:

Alternative 2. Waste Exclusion

DTSC evaluated a waste exclusion for PV modules as another alternative. With this alternative, DTSC would create, by regulation, an exemption requiring PV modules to be sent for recycling, similar to the exemption for scrap metal, and for reclamation. Reclamation is a form of recycling that recovers usable materials and hazardous constituents. This alternative could reduce or remove the regulatory requirements placed on handlers and transporters if they intend to recycle the PV modules.

While this approach encourages the recycling of PV modules, at this time DTSC is unaware of any manufacturers or third-party businesses in California or other states that are currently recovering usable materials and hazardous constituents from PV modules. In addition, this approach renders it difficult for DTSC to enforce shipments out of state, since exempted PV modules claimed to be shipped out of state for recycling could potentially end up in out-of-state solid waste landfills or any unauthorized locations or uses. Finally, the success of an exclusion of this type would depend on the identification of a sustainable recycling market for PV modules. The PV module industry has not provided any evidence to DTSC that a sustainable recycling market exists for PV modules. As such, this alternative was not considered by DTSC.

We have several objections to the assumptions and resulting action that the DTSC has taken utilizing this perspective. Currently, there aren't any businesses within California with such a permit to store or treat PV modules because that activity has been forbidden by the DTSC since the SB 489 was passed. Such businesses were and are unwilling to invest, create or undertake such activity until these current proposed regulations were in effect, fearing consequences from DTSC's enforcement arm.

Similarly, SEIA and CALSSA have shared information with the DTSC on several occasions that PV module manufacturers are recycling PV modules out of state because currently, the enforcement arm of the DTSC does not allow this activity within the state. The attached two fact sheets have been readily available on SEIA's website; with the current 2019 PV End-of-Life management factsheet replacing the 2018 version (which replaced updates in 2016 and 2017). SEIA currently operates a national PV recycling network with six recyclers who are actively recovering glass, aluminum and other constituent metals for resale to or reuse by downstream vendors. This information was covered in the 2017 DTSC Workshop on PV modules.

Therefore, if the DTSC has rejected the waste exclusion alternative because it believes there isn't an active recycling market, which is not true, it eliminates an economic incentive to enhance the in-state California recycling market. This circular logic is not productive to finding a solution. The DTSC has a number of exclusions already in place, therefore the argument that enforcement is difficult is questionable.

There are additional comments and suggestions in the attached markup of the proposed regulations.

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We are committed to working with the DTSC to ensure that the appropriate system can be developed and implemented for the benefit of California. We envision pragmatic approaches to logistics including how modules are addressed in definitions and how modules will be handled during collection and treatment.

Sincerely,

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