

## The Solar Photovoltaic Systems Recovery, Reuse, and Recycling Working Group

### Meeting Minutes

Monday, June 17, 2024, 1:00pm-3:00pm E.T.

Meeting Location: Online via Google Video

#### Attendees

Member Names	Affiliation	<i>Present</i>
Sen. Benjamin Brooks	Senate of Maryland	X
Del. Mike Rogers	Maryland House of Delegates	X
Tyler Abbott, Chair	Maryland Department of the Environment, designee	X
Evie Schwartz	Maryland Energy Administration, designee	X
Josh Kurtz	Maryland Department of Natural Resources, designee	
David Chy	Public Service Commission	X
Diana Menendez	Chesapeake Climate Action Network	X
Pearl Donohoo-Vallett	Pepco Holdings	X
David Beugelmans	Gordon Feinblatt, LLC	X
Stacey Onoh/Oriaifo	Exelon	X
Scott Elias	CleanCapital	X
Bob Sadzinski	Maryland Department of Natural Resources	X

#### Non-members

Stephanie Vo, Andrew Kays, David Comis, Kimberly Shiloh, Neel Vasavada, Robert Nicholson, Shannon McDonald, Victoria Nellis, Mike Rogers, Kathleen Kennedy, Steve Hellem, Duwane Rager, Bradley Baker, Kimberly Shiloh, John Miller

## Roll Call and Meeting Overview - Current state of solar photovoltaic systems

- Welcome by Tyler Abbott, Chair
- Roll call of members and overview of meetings by Bradley Baker

## SEIA Presentation by Bob Nicholson, Manager of Sustainability and PV Recycling at SEIA

- Framework in the US
  - 300 M panels with 25-30 year life expectancy
  - 80% of all panels deployed in the last 7 years
    - we're still early in the recycling process
- Important point is that some panels do contain hazardous materials
- Current recycling models - 2 approaches
  - High value model
    - value of material collected exceeds costs of recovery → high recovery rates
  - Low value model
    - cost to recovery value can exceed the actual value
- PV panels are low value
  - Tipping fee business
  - The cost of recycling is lowering
- Common recycling processes - 2 main ways
  - Mechanical sort and separation
  - Thermal/smelting
- Greatest challenge
  - Managing glass (80% of panel)
    - Heavy and low value
  - Need to develop markets for the glass
  - Think Pozzotive - example company that is using glass as an additive in concrete
  - Lots of ongoing projects that are looking for end uses for glass
- Refurbish and resale is important, before recycling
  - Keep an eye on ultimate handling of the panels (especially in international markets)
- SEIA
  - Recycling partner program to grow recycling infrastructure for panels
  - 10 recycling partners who have gone through a due diligence process (includes site audit, process confirmation, regulatory compliance review, mass balance review, etc.)
  - Expect the number of recycling partners to double over next year
  - Developing standards around recycling
  - More manufactures will likely be involved with their own programs
- SEIA National Policy Framework
  - Decommissioning funding and plan from utility-scale solar
  - Decommissioning agreement could live in PPA for third-party owned solar
  - Customer take responsibility for EoL
  - Any recycling requirements should be phased in and take into consideration current contractual arrangements and industry practice
    - Don't want to box out future technologies
  - Industry that we're building is ahead of the volume we're expecting
  - Solar is one industry but who owns it plays into regulation and EoL management

## Clean Capital Presentation by Scott Elias, VP of Policy at CleanCapital

- CleanCapital has experience with decommissioning
- Federal PV Recycling Regulations
  - Today's solar doesn't present extreme environmental hazards and this has been tested
    - Materials of concern are contained, even in landfills
  - No national PV recycling rule - governed by RCRA and state policies
    - TCLP test - determines if panel is hazardous
  - Not yet a universal waste, ongoing conversation whether this will improve recycling collection
  - EPA proposed universal waste rule
    - modifies to cover waste of solar panels
    - slated to come Summer 2025
  - Question: Have there been discussions of regional processing facilities for solar panels?
    - Nicholson: I don't see the need for a regional processing facility. We have processing capacity in the southern US.
      - Area of focus should be on collection - SEIA would like to see regional collection and allow current recycling facilities continue to grow
    - Sen. Brooks: 80% made up of glass - wouldn't this be easy to recycle?
      - Elias: The question is not can it be recycled but more about the costs.
      - Nicholson: The challenge is that recycling glass is costly - as a recycler, you don't get paid for the glass. We want to create markets to get recycling costs down to landfill costs
      - Baker: HB154 - charged with bringing recycling markets to Maryland
- State PV Recycling Policies
  - California
    - PV panels classified as universal waste in 2021
      - CA regulations classify all panels as UW unless tests show its not hazardous
    - Financial burdens for setting up PV recycling facilities in CA
      - Proposal to require department to manage panels differently
    - Another proposal for all panels to have an EoL management plan
  - Washington
    - PV panel Stewardship and Takeback Program (2023)
    - Onus is on manufacturer
    - Industry perspective: created uncertainty and liability for manufacturers
    - Leads to unknown costs, which can increase costs to consumers
    - No consensus that this is about the right approach
  - New York
    - Niagara County - requires manufacturer to have plan for EoL
      - resulted in cancellation or halting of projects
    - Tax credits for solar panel recycling companies
  - New Jersey
    - Solar Panel Recycling Commission
      - Recommendations
        - Incentives for construction of PV Recycling in NJ
        - PV Panels as universal waste
        - Continued use of panels beyond nominal lifespan
  - North Carolina
    - Report on regulations for utility scale wind and solar

- Included order of preference for EoL management (includes reuse and refurbishment/repair)
  - Texas
    - Example of industry best practice: solar developers must have EoL management plan (2021 legislation)
    - Financial assurances

### Overdrive Presentation by Neel Vasavada

- Mission of Overdrive: reducing the use of fossil fuels at live events - solar is one tool to accomplish this
  - Not a lot in common with residential, community, or utility solar
- Degradation rates are low, lower in the field than we've been quoting
  - Less degradation in commercial
  - Would redistribution have cost efficiencies?
  - What is the definition of end-of-life?
- This is more of a cultural issue than a technical issue
  - the live events industry can help with the misinformation
    - generates a lot of data, provides a large scale platform that is visible
- This is a cost effective and reliable solution to diesel generators
  - Modularity - PV scales easily and efficiently
  - Energy aggregation
  - Flexible, potential resilience
  - Focusing on disposal or recycling leaves things on the table
- Can deploy very quickly - 240K per truck
- There are a lot of panels on the second life markets
- There are things that don't necessarily matter - should we be focusing on recycling or disposing?
  - matched panels
  - degradation
  - Balancers/microinverters
- There is a lot of opportunity to repurposing solar and democratizing energy
- Big on sharing data for e.g. case studies to combat misinformation
- Baker: What's the dollars per watt that you get your panels at?
  - Vasavada: Realistically, free. There are some folks that are trying to just get rid of them. 10 cents per watt or less
    - Footprint Project - disaster relief organization using sustainable energy systems. So many solar panels are being donated that it's becoming unimaginable. Lots of underutilized solar as it is.

### Discussion

- John Miller: When utilizing older solar panels, what role would the state play in facilitating this at a larger scale?
  - Vasavada: Interesting to see numbers on what people are expecting around panel removal. From state level, could we have the same focus on reuse and redistribution rather than recycling
- Vasavada: Is there an equal amount of energy/attention going into reuse?
  - Elias: Depends on different states. The law that created this commission is requiring us to look at recycling in part.
  - Abbott: Not just recycling, we will look at other EoL management in this working group.

- David Comis: One concern is the damage rate when decommissioning arrays during transportation. What do you do for transportation?
  - Vasavada: It's not that complicated. We designed a mechanism that panels can sit vertically, not much training for the workers. We favor mounts that don't need fasteners or tools and we haven't had issues. Company PV Pallet is doing this. They're a lot more durable than expected—rated for hail. Difference in practices.
    - It can be expensive to custom design, but it doesn't need to be expensive.
- Sen. Brooks: Commercial application or?
  - Vasavada: It's an example. The PV can be used in many ways and that enhances the reuse potential. There aren't many other power generators that are that flexible.
- Evie Schwatz: There's an assumption that decommissioning only happens at the end of life - there are systems being decommissioned at, e.g., seven years. Concerns about damage because decommissioning is being done by construction workers who are not specifically trained for solar.
- Nicholson: From the association's perspective, we are focused on reuse and refurbishment. Our view is long-term, looking at infrastructure we'll need in 40 years so that we're not creating another environmental issues with panels stacking up. Reuse volumes won't match the volumes coming out of the industry, so we'll need an option of recovering materials.
- Vasavada: If we can support the reuse market by providing very visible use cases, then the music industry has done its part.
- Baker: Are there other markets outside of concerts that Overdrive is looking at?
  - Neel: Developing sustainable energy for remote agriculture (e.g. greenhouses); remote medical clinics in Kenya.
- Comis: SEIA's position is that regional recycling is not needed - did I understand that correctly?
  - Nicholson: The reason is because we see acceptable growth in private facilities, if there is a regional focus it should be focused on collection.
  - Comis: I know current systems don't get lead or silver out.
    - Nicholson: What we're seeing right now is that facilities will send the metals along to other companies (smelting, chemical recovery). Once current recyclers are finished, they'll send the metals downstream for further processing.
      - Could be made cost-effective and requires volume and scale. Solar panel recyclers won't become a copper mill, but maybe a copper mill could become a solar panel recycler.

### Open to the public

- No public comment.