



Testimony of Scott Elias, Senior Manager of Mid-Atlantic State Affairs, Solar Energy Industries Association (SEIA)

To the

Senate Environmental Resources & Energy Committee and Senate Agriculture & Rural Affairs Committee
Joint Public Hearing to discuss SB 284 (Yaw) - on bonding of solar and wind installations

May 12, 2021

Good morning. I am Scott Elias, Senior Manager of Mid-Atlantic State Affairs for the Solar Energy Industries Association.

The Solar Energy Industries Association® (SEIA) is the national trade association for the United States solar industry. With more than 1,000 member companies nationwide, SEIA is leading the transformation to a clean energy economy, creating the framework for solar to achieve 20% of U.S. electricity generation by 2030. SEIA works with its 1,000+ member companies and other strategic partners to fight for policies that create jobs in every community and shape fair market rules that promote competition and the growth of reliable, low-cost solar power. SEIA has more than 30 member companies located in Pennsylvania with many more national firms also conducting business in the state. Member companies range from manufacturers; residential, community, and utility-scale solar developers; installers; construction firms; investment firms; and service providers.

The exponential increase in solar job creation fueled by rapidly declining costs is an exciting step forward to clean, renewable, accessible energy. However, this boom has generated overexaggerated concerns and misinformation about environmental and health risks related to the production and end-of-life disposition of solar equipment, particularly photovoltaic (PV) modules. As we have provided in other states, **SEIA is happy to offer a national perspective to clear up misconceptions around PV equipment end-of-life-management, to convey the steps industry diligently takes for environmental and material safety, and to ensure an evidence-based approach to decommissioning solar projects in the Commonwealth.**

First, I would like to point out that today's solar installations pose little to no risk to human or environmental health at any point in their lifecycle. Claims that PV modules release hazardous chemicals that contaminate our soil and waste stream have been largely disproven. PV modules are constructed to last 25 – 50 years, many have test results that characterize them as non-hazardous and contain only trace amounts of heavy metals enclosed in a solid matrix of polymeric and glass material, so the materials-of-concern are not bio-available for air or water exposure. While it is not encouraged by industry or researchers like the National Renewable Energy Laboratory (NREL), a 2020 study NREL led showed that

PV modules disposed in a landfill pose very limited risks to human health, even using the most conservative assumptions, and at an order of magnitude less than limits set by Federal law.¹

Second, [SEIA's National Recycling Program](#) is preparing now for larger volumes of waste to come in future years, including those solar panels that reach actual end-of-life and others that require disposal for other reasons. Similarly, inverters can be recycled like e-Waste and steel from posts and trackers can also be recycled. SEIA's PV Recycling Working Group has been actively seeking, developing and elevating the market visibility of solar recycling partners across the U.S since 2016. One of our partners has a drop-off location within the Commonwealth.

Over 95% of PV modules deployed in the U.S were installed from 2012 on and they will stay in service for more than 25 years. Nonetheless, limited waste is generated when panels are found defective or for other warranty-related claims, or damaged during production, shipment, installation or by weather events.

As reported by NREL, not many PV modules have yet to reach their end of life. Resultant PV waste is not estimated to reach even 10% of global e-Waste volumes until 2050.² Therefore, there is time to develop a useful, market-based program that will not repeat the mistakes made with e-Waste. To that end, SEIA welcomes the idea of collaborating with the Department of Environmental Protection and other stakeholders to establish and maintain a reuse, resale, and recycling market for solar equipment so that there is wide collaboration and win-win results for Pennsylvania. A summary of a North Carolina bill that takes this approach is attached and such a study might also examine the economic impact of PV recycling on existing or new workforce development, as Illinois is doing, and help lead to further development of a comprehensive national program that would improve the cost-effectiveness of PV recycling.

Third, Pennsylvania should not expect to see significant volumes of end-of-life PV for many years. Most solar modules installed in Pennsylvania were placed in service in the last 10 years, and about half of that since 2016. All of these solar modules and equipment are under lengthy warranties that manufacturers and developers provide for many years. For modules that are damaged during transport, the products can be rejected upon delivery, replacements ordered, and the manufacturer handles the disposal. Damage from extreme weather such as storms are covered by insurance. Thus, in the near term, equipment which may be returned for one of these reasons are covered under warranty or insurance, and therefore, returned and handled under the equipment manufacturers' existing warranty processes or through insurance claims.

Fourth, SEIA supports, promotes, and facilitates responsible decommissioning of solar projects; however, we believe that the approach proposed in SB 284, which charges the Environmental Quality Board with promulgating regulations which establish bonding requirements for project developers, will create unintended and severe market consequences; namely, increasing project development costs that will result in pushing energy investment and economic development to neighboring states instead of within communities across the Commonwealth.

To be clear, SEIA supports the objectives of SB 284, so I will focus the remainder of my comments around industry best practices that encourage responsible decommissioning of solar projects.

¹ *Human Health Risk Assessment Methods for PV Part 3: Module Disposal Risks*, Sinha, Heath, Wade and Komoto, IEA PVPS Task 12: PV Sustainability Report IEA-PVPS T12-16:2020, May 2020, ISBN 978-3-906042-96-1

² *Overview of PV Module End-of-Life Management*, Dr. Garvin Heath, National Renewable Energy Laboratory, Solar Power International 2019, Sept. 26, 2019.

The solar industry is committed to working with the prime sponsor, committee, and all stakeholders to conduct a fact-based and thorough examination of issues regarding energy bonding and decommissioning so that the collaboration produces the desired results for both an industry eager to develop and invest within Pennsylvania and the citizens of the Commonwealth.

The issue of bonding is usually brought up to address a most unlikely scenario - an abandoned solar project. Solar projects have long term revenue contracts that tie their success to their optimal energy production and operational conditions. It is counterintuitive that an asset making money while in service would be abandoned. However, SEIA understands that this is still a concern that the industry must address, and solar developers are comfortable posting financial assurance in an amount sufficient to ensure decommissioning of the solar facility and removal of the improvements from the site, consistent with standard industry practices.

While SEIA shares the committee's goal of solving for the unlikely scenario of landowners being stuck with an abandoned solar project, we believe that there are better ways to address this rather than charging the Environmental Quality Board with establishing state-wide regulations that require project developers to post unclear financial assurances, particularly in the form of a bond.

Typically, plans to properly decommission solar facilities at the end of their useful life are regulated at the local government level. Items such as permitting, construction schedule, financial securities, environmental requirements, and provisions for waste management and recycling already dictate a project's success. Such plans are normally laid out in detailed agreements that solar developers execute with private property owners when they lease the land and before ground is even broken. For this reason, SEIA is comfortable with a state-wide, general requirement consistent with industry best practice that decommissioning requirements are included in landowner/development agreements.

In our experience, it is an industry best practice that decommissioning plans and their corresponding financial assurances are posted to the county of jurisdiction, who can draw on the financial assurance in the extremely rare event that the owner/operator of a project does not decommission the project at the end of its life.

However, SEIA strongly believes that there should be flexibility in financial assurance beyond just a bond. Acceptable forms of financial assurance should include a parent company guaranty with a minimum investment grade credit rating issued by a major domestic credit rating agency, a letter of credit, cash, **or** a bond. A local county of jurisdiction could also identify other forms they deem acceptable to hold.

SEIA believes the financial assurance should be no greater than the total estimated cost of decommissioning, less the equipment salvage or resale value, which is determined by a licensed/professional engineer. Indeed, it is common industry practice to retain a qualified third-party professional engineer to articulate the details and projected costs of decommissioning. These costs include removing project equipment from the property and restoring the land, as reasonably possible, to the condition it was prior to the lease, unless the landowner and project developer mutually agree on an alternative condition for land restoration.

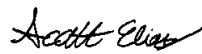
Under any bonding law, it is critical that projects that have already commenced operations, received siting permits or have entered into local decommissioning agreements before the effective date of any new law, are exempt from posting bonds. Both operating and permitted projects will have secured financing based

on current or previous law such that upsetting those private contracts could discourage future investment.

Finally, SEIA and its members would encourage the state's legislators to develop recommendations to form and support a stakeholder group to study, evaluate, and make future recommendations on PV Module End-of-Life policy that would benefit Pennsylvania, its growing solar market and its constituents, who like many across the U.S., value and believe in investing in solar.

Should you have any questions regarding these matters, you can reach me at the contact information below. Thank you for your consideration of this matter.

Sincerely,

A handwritten signature in black ink that reads "Scott Elias". The signature is written in a cursive style with a prominent initial "S".

Scott Elias
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Summary of North Carolina HB 329 (2019)

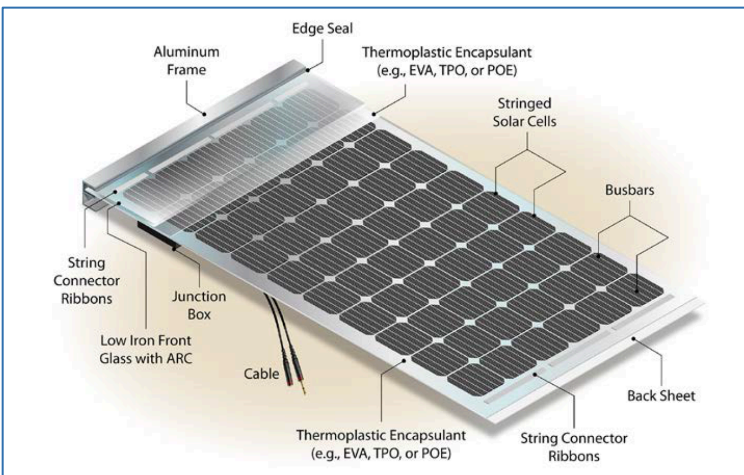
| Item | NC HB 329 (2019) |
|---------------------|---|
| Timeline | 3 yrs to study and develop regulations based on study |
| Applicability | All rooftop and ground-mounted modules (plus energy storage and wind turbines) |
| Hazardous Materials | Dept study extent to which present, develop regulations based on results |
| Program | Adopt rules to establish a regulatory program to govern end-of-life for modules and decommissioning |
| End of life | Study preferred methods of end of life management, including reuse, refurbishment, recycling, safe landfill disposal |
| Include in study | Economic and environmental costs and benefits associated with each method above |
| Include in study | The data-based expected economically productive life cycle of various types of photovoltaic modules |
| Include in study | The volume currently in use in the State, and projections, based upon life cycle data, on impacts to the State's landfill capacity if landfill disposal is permitted for such equipment at end-of-life |
| Include in study | A survey of federal and other states' and countries' requirements regarding end of life management, decommissioning, and financial assurance |
| Include in study | Whether or not adequate financial assurance requirements are necessary to ensure proper decommissioning of utility-scale solar projects |
| Include in study | What Infrastructure may be needed to develop a practical, effective, and cost-efficient means to collect and transport end-of-life photovoltaic modules, etc. for reuse, refurbishment, recycling, or disposal |
| Include in study | Whether or not stewardship programs for the recycling of end-of-life photovoltaic modules and energy storage system batteries are necessary for applications other than utility-scale solar project installations, and if so, fees that should be established and the overall market effect on the cost externality |

Engaging the circular economy approach

Photovoltaic equipment and options for first end-of-life stages

The falling cost of solar has made renewable energy accessible to more people than ever before and has resulted in an exponential increase in solar adoption. With more than 400 gigawatts (GWdc) of photovoltaic (PV) modules installed globally (including 62 GWdc in the U.S. through 2018), end-of-life management is important for all PV technologies to ensure clean energy solutions are a sustainable component of the energy economy for future generations.

Like many other durable products and construction materials, solar equipment can last for decades, particularly with proper maintenance. In some cases, PV modules can be reused or refurbished to have a 'second life' of generating electricity. The other components of solar systems can also be handled responsibly. Inverters can be recycled as e-Waste and racking equipment can be re-utilized with newer technology or recycled like other metals.



Source: NREL, *Crystalline Silicon Photovoltaic Module Manufacturing Costs and Sustainable Pricing*, 2019

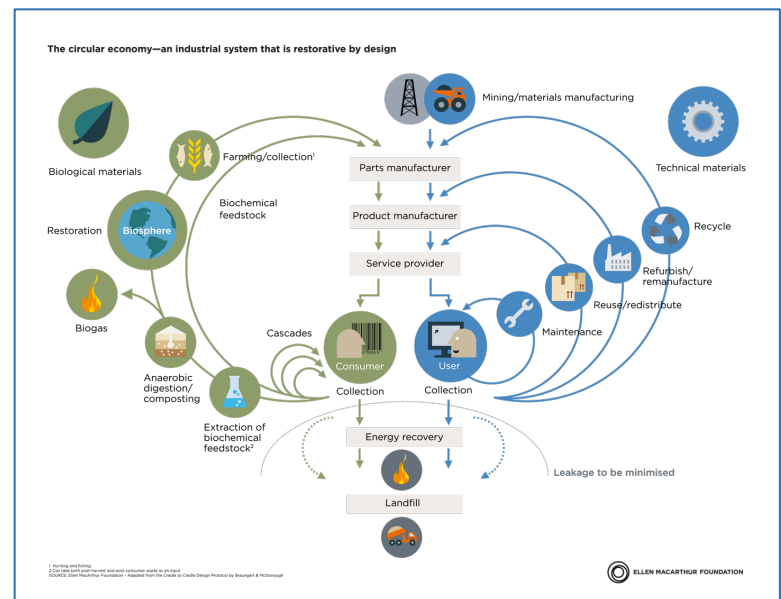
Refurbishment

PV modules can be damaged during transit, installation or moving. Some of these modules can be repaired for minor issues and there are several new organizations pursuing this option. If the product is still under warranty, the installer or manufacturer should be contacted to determine if repair is an option. Many modules that are repaired today are often reused in off-grid or non-grid connected applications. While this channel is not as developed as other end-of-life options, SEIA is actively exploring the related options with our members and other stakeholder

Reuse

PV systems may be decommissioned for several reasons. Repowering a solar system with newer technology that is more efficient or has a higher nameplate capacity can provide even more electricity from the same amount of space.

The replaced PV modules can be reused in other projects as they may still have plenty of useful life left. Often these modules can find new opportunities in charitable, off-grid or even grid-connected projects, provided they continue to meet the appropriate building codes and safety standards.

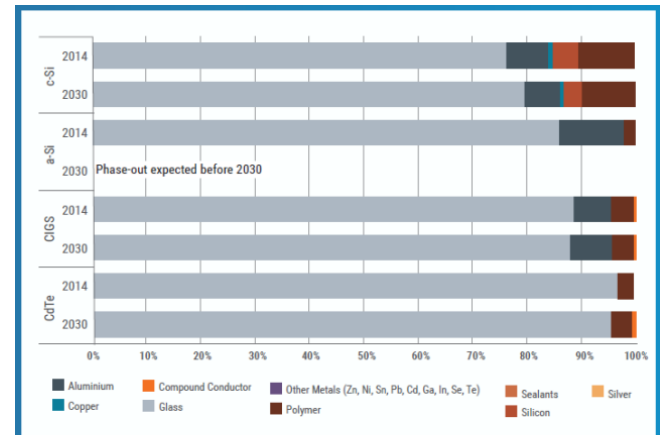


End-of-Life Considerations for Solar Photovoltaics

Recycling

Although most PV panels produced today will have a useful life for decades, there is inevitable waste created when panels are damaged during shipment or installation, determined to be defective, become obsolete or reach their end-of-life. High-value recycling can help minimize life-cycle impacts and recover valuable and energy-intensive materials, thereby increasing sustainability within the PV industry.

Recycling of solar equipment is increasingly possible as more recyclers accept modules. PV panels typically consist of glass, aluminum, copper, silver and semiconductor materials that can be successfully recovered and reused. By weight, more than 80 percent of a typical PV panel is glass and aluminum – both common and easy-to-recycle materials.



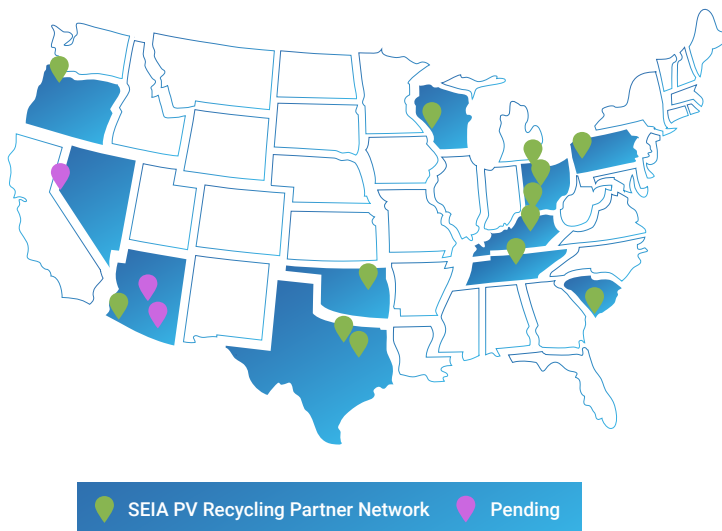
Source: IRENA and IEA-PVPS (2016), "End-of-Life Management: Solar Photovoltaic Panels," International Renewable Energy Agency and International Energy Agency Photovoltaic Power Systems.

Cooperation throughout the value chain



Research and development of PV-specific recycling equipment can optimize the recoverability and purity of reclaimed materials. The start-up and support of new organizations will help the industry extend the useful life of existing products while maintaining the quality and safety of the equipment. Working together with stakeholders from all these areas will help inform and develop policy appropriately so that end-of-life management solutions complement the deployment of solar.

SEIA PV Recycling Partner Network



SEIA's PV Recycling Working Group actively seeks and develops recycling partners across the U.S. While the majority of PV modules installed today will stay in service for more than 20+ years, some waste is generated from weather events, manufacturing scrap and warranty-related claims. The recyclers provide their services to installers, project and system owners, developers, distributors and other parties.