

House Environmental Resources and Energy Committee

Public Hearing on [HB 2104](#) – Bonding and Decommissioning of Solar and Wind Installations

The following testimonies were presented during the hearing on December 15, 2021:

- [Scott Elias](#), Senior Manager of State Affairs, Mid-Atlantic, Solar Energy Industries Association (SEIA)
- [Zander Bischof](#), Senior Policy Analyst, Cypress Creek Renewables (CCR)
- [David Murray](#), Director of Solar Policy, Americans Clean Power Association (ACP)
- [Darrin Youker](#), Director of State Government Affairs, Pennsylvania Farm Bureau (PFB)
- [Chad Forcey](#), Executive Director, Pennsylvania Conservative Energy Forum (PCEF)
- [Department of Environmental Protection \(DEP\)](#)
- [MAREC Action](#)



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

To the

House Environmental Resources and Energy Committee

Public Hearing on HB 2104 and Bonding and Decommissioning of Solar and Wind Installations

Dec 15, 2021

Introductions

Chairmen Metcalfe and Vitali, members of the House ERE Committee, thank you for having me here today and for your interest in responsible solar development in the Commonwealth of Pennsylvania.

The Solar Energy Industries Association (SEIA) is the national trade association for the United States solar industry. 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.

Solar Means Business and Remains an Untapped Economic Opportunity in Pennsylvania

In the last decade alone, solar has experienced an average annual growth rate of 42%. Solar's share of total U.S. electrical generation has gone from just 0.1% in 2010 to nearly 4%, more than 80 times its share a decade ago. In Pennsylvania, the solar industry has invested nearly \$3 billion and employs over 4,000 workers. And today, there are over 400 projects being planned in Pennsylvania in the PJM queue, totaling over 15 gigawatts of power.

Before I dive into HB 2104, I think it's important to note that solar can be an economic driver for communities across the Commonwealth, including rural communities. At a time when many agricultural producers are struggling, solar creates additional revenue streams and helps support farmer incomes. Increasingly, farmers can rely on solar lease payments as a steady revenue stream to help mitigate market volatility, droughts and other threats to their livelihoods. Put simply, the solar industry can help family farms stay in the family and counteract the ongoing trend of farms being lost due to economic hardships.

We also recognize that as an industry we must anticipate risks and challenges and proactively mitigate their impact. That's why SEIA supports smart decommissioning policies and is working to make it easier for the industry to select cost-effective and environmentally responsible end-of-life management solutions.

HB 2104 Incorporates Elements of Reasonable Decommissioning Policy

At the end of the expected performance period of a PV plant, there are several options. Like many other durable products and construction materials, solar equipment can last for 2-3 decades, particularly with proper maintenance. In some cases, PV modules can be reused or refurbished and can have a "second life" generating electricity, thereby maximizing their overall use and potential. However, at some point solar power systems will reach the end of their usable life and be decommissioned. When this occurs, it's important that this happens safely and responsibly and that our industry and not landowners are responsible for decommissioning.

HB 2104 does not have a retroactive application of decommissioning requirements, which is extremely important for preserving existing investments based on the terms of leases executed prior to this bill.

But moving forward, SEIA supports a state-wide, general requirement that decommissioning provisions be included in landowner/developer agreements. It is already an industry best practice that such provisions be included in solar lease agreements to ensure that solar power systems are decommissioned safely and responsibly.

SEIA also supports HB 2104's establishment of appropriate state-wide standardized requirements for decommissioning no later than 18 months after a facility stops producing electricity. These include removing solar equipment and restoring the land to its original condition or adapting it to a new use, based on the preference of the landowner.

SEIA supports the amount of financial assurance being calculated and periodically re-calculated based on decommissioning cost estimates completed by a third-party professional engineer, at the facility owner's expense. As we've stated at other hearings on this topic, including decommissioning costs in the upfront price of solar projects increases overall project costs, which could discourage solar development and thus the ability for landowners to receive a new source of revenue via stable lease payments. As a result, SEIA appreciates that HB 2104 phases in increasing amounts of financial assurance over the duration of the project's operation instead of requiring it all up front.

Smart Decommissioning Policy Provides Flexibility in Posting Financial Assurance

As we've stated at other hearings on this topic in Pennsylvania, smart decommissioning policy provides flexibility in posting financial assurance. It is reasonable to demonstrate proof of financing from a banking institution that a solar developer or facility owner has the responsibility and means to remove a solar facility at the end of its useful life. Some solar developers may prefer

to establish a cash account or trust fund for decommissioning purposes where the developer makes a series of payments during the project's lifecycle until the fund reaches the estimated cost of decommissioning. Other developers prefer financial assurance in the form of bonds to guarantee the availability of funds for system removal. Another mechanism that is used to provide financial assurance is an irrevocable letter of credit. A letter of credit is a document issued by a bank that assures landowners a payment up to a specified amount, given that certain conditions have been met. In the case that the owner of the solar facility fails to remove the system or goes bankrupt, just like in a bond or an escrow account, the landowner can claim the specified amount to cover decommissioning costs. It's the same mechanism offered as an option in the oil and gas bonding program, and we recommend that the bill be amended to include the option for utilizing a letter of credit.

PV Recycling (along with reuse and refurbishment) is the preferred method for equipment disposal over landfilling

Last, I want to speak briefly about landfilling, and HB 2104's requirement that by the 20th year, an updated decommissioning plan show how much material will be salvaged, recycled, refurbished or disposed of in a landfill. I want to be clear: Solar panels are safe. According to the National Renewable Energy Laboratory, finished solar modules undergo rigorous environmental testing to ensure they withstand strong weather conditions and do not pose a danger to surrounding soil or water.¹ While sound science demonstrates that PV modules can be landfilled, it is SEIA's belief that recycling, along with reuse and refurbishment, are preferred methods for equipment disposal over landfilling.

While solar panels are built to last decades and we do not expect significant module retirements in Pennsylvania in the near term, the industry must plan to ensure PV modules are disposed of responsibly. SEIA embarked on this initiative by launching a National PV Recycling Program over five years ago, which led to the development of PV recycling resources across the nation. In 2016, only one PV module recycler was in operation; now, numerous recyclers with multiple locations operate across the country.

Recycling today is more expensive than it will be in 10-15 years, because there are not enough solar panels ready to be disposed. But we are actively working on bringing down the cost to recycle. Solar panels typically consist of glass, aluminum, copper, silver, and semiconductor materials that can be successfully recovered and reused. Other solar energy system components, such as metal racks, steel posts and inverters, can readily be reused or recycled. Fortunately, the solar industry is proactively working on responsible end-of-life management and it's now an emerging business opportunity, with new companies now specializing in services such as resale of used PV modules and parts, decommissioning, and recycling.

¹ See P. Sinha, G. Heath, A. Wade, K. Komoto, 2020, Human health risk assessment methods for PV, Part 3: Module Disposal risks, International Energy Agency (IEA) PVPS Task 12, Report T12-16:2020.

Conclusion

It is SEIA's belief that the ability for the solar industry to become a major source of electricity generation will rely on the way we pro-actively manage our growth and how we address potential barriers before they pose greater risks to our long-term success. As a result, SEIA appreciates the opportunity to work with the committee and prime sponsor to craft a decommissioning and financial assurance program that produces the desired results for an industry eager to develop and invest within Pennsylvania, while assuring that solar facilities will be decommissioned safely and responsibly.

Thank you for your time and attention.

Sincerely,

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

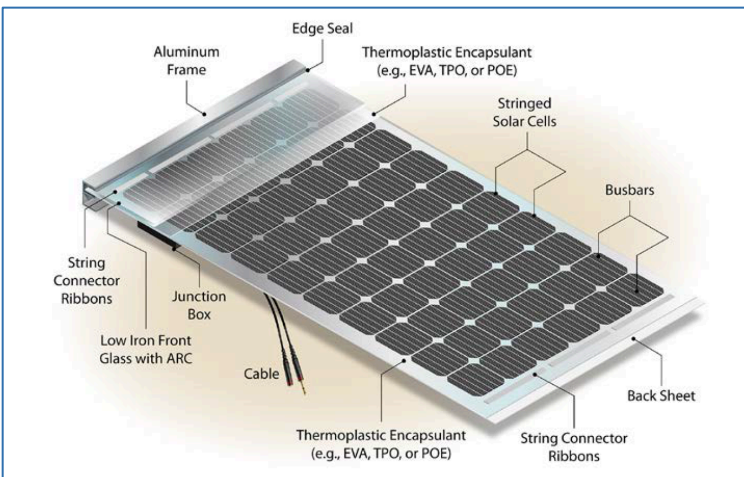
Scott Elias
Senior Manager of State Affairs, Mid-Atlantic
Solar Energy Industries Association

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

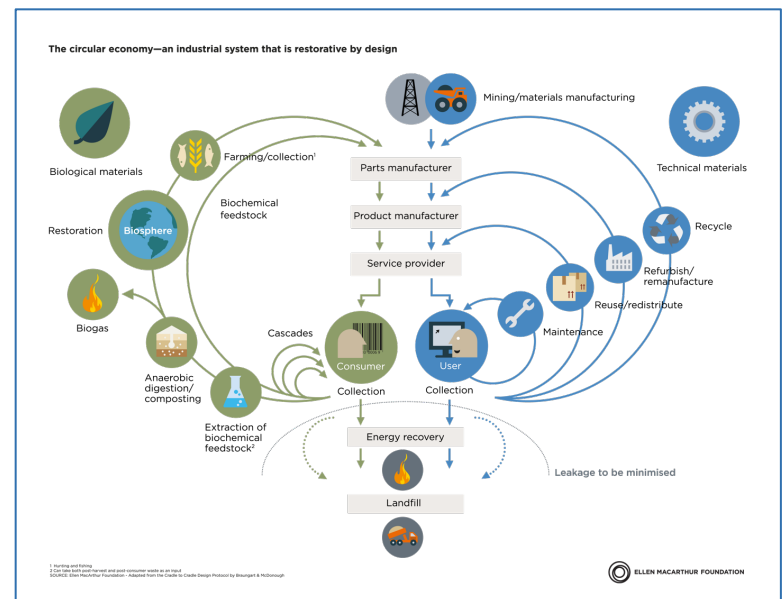
Refurbishment

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.

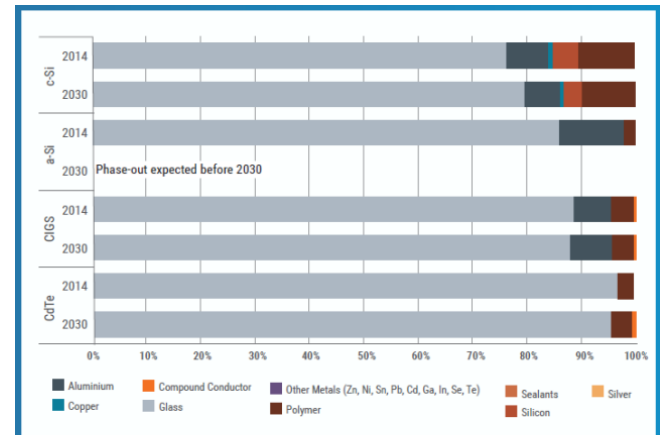


End-of-Life Considerations for Solar Photovoltaics

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.



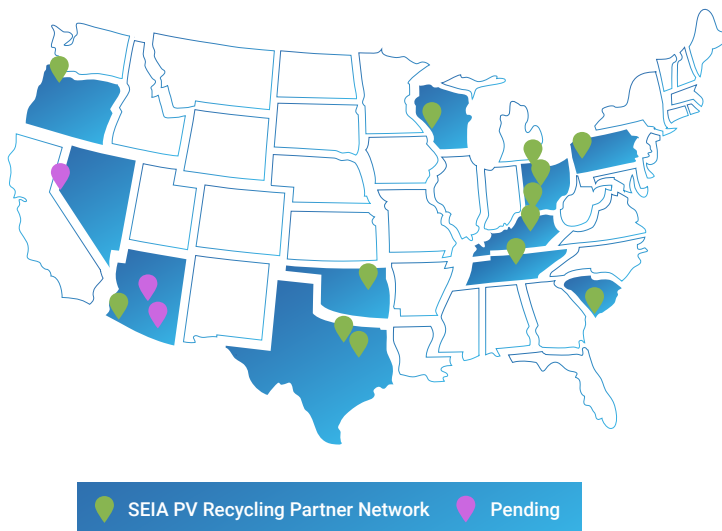
Source: IRENA and IEA-PVPS (2016), "End-of-Life Management: Solar Photovoltaic Panels," International Renewable Energy Agency and International Energy Agency Photovoltaic Power Systems.

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.



Testimony of Zander Bischof, Senior Analyst, Policy & Strategy, Cypress Creek Renewables

Provided to

House Environmental Resources and Energy Committee

Public Hearing on HB 2104 and Bonding and Decommissioning of Solar and Wind Installations

December 15, 2021

Introduction

Chairmen Metcalfe, Vitali and members of the House ERE Committee (“the Committee”): thank you for inviting Cypress Creek Renewables, LLC to present here today. My name is Zander Bischof, and I am the Senior Analyst on Cypress Creek’s Policy and Strategy team. Cypress Creek supports the ERE’s effort here to deliberate a decommissioning policy that would prudently standardize responsible decommissioning rules in the Commonwealth through legislation, though we also recommend that this be paired with new energy policy in the Commonwealth that’s been discussed over the past year that cuts red tape and allows solar and storage to compete and bring cost reductions to all ratepayers.

Cypress Creek develops, owns and operates both community and utility scale solar and storage projects across many US states, including Pennsylvania. New development of solar facilities in the Commonwealth will create immense economic benefits in the form of consistent landowner payments, tax revenues and ratepayer savings, among other things, and Cypress Creek is proud to contribute to this. I commend Representative Rapp, her co-sponsors and the Committee for proactively working on policy to ensure that these growing industries are developed responsibly, getting ahead of any abandonment problems such as those that the Commonwealth has experienced with other industries. On behalf of Cypress Creek, I will be presenting today on the eight key components to an effective solar decommissioning policy.

Eight Components of Solar Decommissioning

1. Definition of Decommissioning

In laying out our view on the key components of a successful solar decommissioning policy, I want to start with the definition of “decommissioning”. Decommissioning should be defined as the removal of non-utility owned facilities from the site and the responsible disposal of these facilities in accordance with local, state and federal laws, rules and regulations. Furthermore, it entails the restoration of the lands used for these facilities to a condition in which they can be used towards the same ends as they were prior to the installation of facilities, unless the landowner requests otherwise – for instance, that improvements including roads and structures be left on-site.

2. Solar Facilities Disposal Rules and Regulations

Cypress Creek Renewables, like many in the industry, are mindful of the concern members of the Committee may have regarding what happens to the materials in solar panels during a facility’s life and at the end of a facility’s life.

Let me first say that we share the Committee's concern for public health and safety of residents and landowners around these facilities. The solar panels used by Cypress Creek are safe – they have been rigorously tested via the U.S. EPA's Toxicity Characteristic Leaching Procedure (TCLP), the national hazardous waste standard test used to simulate outside and landfill environments. All the modules that we use have passed this test with no or safe levels of all compounds. This means they pose no danger to residents or wildlife during or after their operation. Let me reiterate, this means panels can safely be placed in landfills with no negative health or environmental impacts. However, panels also have certain valuable component parts that may lead these to be recycled instead of landfilled – either way, residents of the Commonwealth are protected.

3. Standardized Requirement for Decommissioning

The creation of a statewide standard for decommissioning is prudent. Although the likelihood of solar facility abandonment is very low, the small possibility that this happens can be effectively mitigated at modest cost through a well-designed decommissioning policy. By addressing this issue through legislation, this relieves the administrative burden of creating fairly technical decommissioning policy at the local level and avoids a patchwork of divergent ordinances across localities in the state. The establishment of a size threshold, such as the 3 MWac line drawn by House Bill ("HB") 2104, is reasonable and avoids placing undue burden on smaller facilities.

The development of a standard decommissioning form is prudent and will help to ensure effective compliance with and enforcement of this policy. We support HB 2104's creation of an inclusive and transparent process at the Department of Environmental Protection ("DEP") to develop this form and look forward to contributing to this effort.

4. Amount of Financial Assurance

Another critical component to an effective decommissioning policy is the requirement that financial assurance be posted to cover the net costs of decommissioning. This is a means of ensuring that sufficient capital is available at the end of a facility's useful lifetime to cover the costs of decommissioning in the unlikely event that a facility is abandoned.

I would encourage the Committee to look at best practices adopted in calculating net costs in other states that have addressed these issues, such as Texas, West Virginia, Montana and Oklahoma. These states incorporate an element commonly referred to as 'salvage value' which helps to produce an accurate assessment of the value of the materials within a solar facility and ensures that the landowner fully realizes the benefits of the installation. I would welcome the opportunity to continue our dialogue on this critical topic.

5. Calculation of Financial Assurance

The calculation of the component parts of the financial assurance derivation—cost of decommissioning and Salvage Value—submitted with the decommissioning plan should be required from a qualified party – a professional engineer in the Commonwealth. Furthermore, this calculation should be made periodically to ensure that it remains up-to-date.

HB 2104 establishes reasonable requirements and procedures, requiring that qualified professional engineers will be the parties performing the needed studies, and that their analyses be updated every five years. In tandem, these would ensure that the cost of decommissioning remains accurate over time.

6. Deadline for Posting Financial Assurance

Solar facilities have cost structures and business models that differ substantially from that of oil and gas production. In particular, these facilities typically require a large amount of upfront capital expenditure, and cost very little to operate once built. For this reason, these facilities tend to sign long-term “anchor” contracts with creditworthy off-takers for the first fifteen to twenty years of the facilities’ lifetimes—often necessary to secure affordable financing—that guarantee rates to these facilities for the energy generated. This creates a situation of predictably high operating margins for the facilities’ during this window of time, making the risk of facility abandonment negligible during this period. Even if the owner of the facility went bankrupt during this period, the lenders would have claim to the facility and a very strong incentive to continue to operate the facility or sell it to another company that would do so. Therefore, there is no additional benefit in requiring that financial assurance be posted during this period – it would present substantial costs to facility owners without mitigating any abandonment risk.

I am encouraged to see the profiled calculation of financial assurance over the first twenty years of these projects in HB 2104, only reaching the full amount of financial assurance in year twenty. However, I urge the Committee to consider delaying the initial posting of financial assurance to later in facilities’ operating lives when anchor contracts begin to expire, such as was recently done through SB 760 in Texas, which only begins to require financial assurance twenty years after the Commercial Operations Date.

7. Forms of Financial Assurance

Allowing flexibility in the forms of financial assurance that can be posted is important to mitigate related financial “carrying costs”. To this end, financial assurance should include bonds, escrow accounts, and letters of credit, which are all reliable tools for ensuring capital is available at the end of a facility’s useful life.

I urge the Committee to consider expanding the permissible forms of financial assurance to include a letter of credit, as this increased flexibility will reduce the costs to facility owners of posting financial assurance while still providing the same level of certainty to local governments that decommissioning costs will be covered.

8. No Retroactive Application of Decommissioning Requirements

HB 2104 correctly only applies requirements on new projects that signed leases after the date of passage. As recognized by the bill drafters, retroactive application can unfairly impose costs on projects that can risk project attrition and the loss of accompanying benefits. Furthermore, businesses thrive where there is certainty, and retroactive imposition of cost on businesses can lead to much higher perceived risk of doing business in the state.

HB 2104 correctly only applies requirements on new projects that signed leases after the date of passage.

Conclusion

HB 2104 is timely and forward-looking legislation that would get ahead on an important issue for responsible energy infrastructure development in the Commonwealth. This legislation is comprehensive, hitting on all of the eight components mentioned above. I thank Representative Rapp and the co-sponsors for introducing it, and the Committee for creating this forum to discuss this important issue. I hope that the Committee will consider my feedback on areas where the legislation can avoid red tape

and thereby be made less costly to comply with in ways that do not detract whatsoever from the degree to which this legislation addresses the issues at hand.

Thank you for your time and consideration. I would be happy to answer any questions.

Sincerely,

Zander Bischof

Senior Analyst, Policy & Strategy

Cypress Creek Renewables



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www.cleanpower.org

**Testimony of David Murray, Director of Solar Policy, American Clean Power Association
to the House Environmental Resources and Energy Committee**

**Public Hearing on HB 2104 and Bonding and Decommissioning of Solar and Wind
Installations**

Dec 15, 2021

POSITION: Oppose Unless Amended

Chairman Metcalfe and Ranking Member Vitali, members of the House Environmental Resources and Energy Committee, thank you for the opportunity to testify on House Bill 2104 and for your support for continuing clean energy development in the Commonwealth of Pennsylvania. I am David Murray, Director of Solar Policy at the American Clean Power Association (ACP).

ACP is uniting the power of America's renewable energy industry to advance our shared goals and to transform the U.S. power grid to an affordable, reliable and clean power system. Our goal is to make clean energy the dominant electricity source in the United States by uniting the power of solar, wind, storage, and transmission companies along with manufacturers and construction companies, developers and owners/operators, utilities, financial firms, and corporate purchasers in the clean energy value chain.

With great appreciation for the policymakers and staff who have worked diligently on this bill, ACP must respectfully oppose the bill as drafted and request specific amendments. While the policy goals behind the bill are laudable, ACP is concerned whenever legislation singles out renewable forms of energy generation for regulatory scrutiny beyond what is required for other types of generation. As written, the bill would impose significant burdens on developers of renewable energy projects in Pennsylvania. Furthermore, these requirements depart significantly from industry best practices and standards established in other similarly positioned states.

We have worked with our members to understand and define best practices and build a framework of policy recommendations that meet the expectations of stakeholders while ensuring a viable economic path to project development.

"20% Landfill" Standard (Page Seven, Line 16)

HB 2104 would require wind and solar generation facilities to submit a decommissioning plan to the Department of Environmental Protection (DEP). This plan requires that “no more than 20% of the total combined mass of an alternative energy facility may enter into a landfill”. While reuse, recycling, sale or redeployment of components of wind and solar projects is a growing opportunity, the 20% maximum landfill standard exceeds what utility scale developers can commit to at this time. First, wind turbines and solar facilities rely on different components; this one-size-fits-all approach not only lacks a clear justification but is uniquely applied to renewable generation. This would place solar and wind energy at a distinct economic disadvantage relative to other forms of energy generation not subject to the requirement. Finally, it is worth underscoring the components of wind and solar projects are typically composed of inert, non-toxic materials, while other forms of generation are free to landfill byproducts or component materials without regard to toxicity, under this legislative construct.

Markets and processes to accommodate material recycling and reuse for typical wind and solar components are still developing, and while project developers may very well be able to meet the 20% landfill standard by the time of decommissioning, project finance partners are unlikely to be able to underwrite such commitments at this time. We urge this Committee to consider amending this provision out of the legislation or reworking it to provide greater flexibility to project developers. ACP welcomes the opportunity to discuss alternatives to achieve legislative priorities without thwarting Pennsylvania’s opportunity to attract wind and solar investments.

Salvage Value

As above, ACP members are concerned about legislation that uniquely targets wind and solar projects with regulatory requirements not broadly applicable across regulated generation technologies. The legislation’s omission of project component salvage value as a legitimate element of decommissioning bond formulas creates a significant and unnecessary burden on renewable project development. Several states, including Texas, Virginia and West Virginia, have reviewed this issue and recently advanced legislation securing decommissioning bond requirements for wind and/or solar projects. Those states have specifically identified salvage value as an important part of the total decommissioning cost calculation. ACP’s siting committee has identified this as a best practice.

The reason is that materials salvage value, as calculated by an independent third party engineer on a periodic basis over the life of the project, represent an important part of the investment model for project developers. Steel and other metals deployed on site – such as racking system for the solar panels - can be a large part of the cost of project development. Those materials are easily reused and recycled, and have real inherent value in robust markets across the region and nationally. In the unlikely event of project abandonment, these materials would significantly reduce the cost for a third party to decommission the project.

To impose a requirement on developers of wind and solar projects that they allocate funds to cover the cost of decommissioning while disregarding this essential revenue stream would mean a disruptive, duplicative and inefficient allocation of project resources. This would needlessly raise the cost of project development in the Commonwealth and slow deployment. Developers would inevitably look to invest project capital in neighboring states without such impediments.

Conclusion

We greatly appreciate this Committee's attention to responsible development of wind and solar projects in the state. We urge the Committee to reconsider these two elements of HB 2104 and develop language that will address stakeholder concerns while not imposing unworkable requirements on proposed renewable projects in the Commonwealth. It is our hope that the Committee will consider ACP as a resource in weighing these issues and let us know of any assistance we can offer in the development of practicable standards.

We deeply appreciate the opportunity to testify before this Committee and would be happy to answer any questions from the Chair or members of the Committee.

December 15, 2021

To:

Rep. Daryl Metcalfe, chair House Environmental Resources & Energy Committee and Rep. Greg Vitali, Democratic Chair, House Environmental Resources & Energy Committee

Dear Chairman Metcalfe and Chairman Vitali:

Thank you for inviting Pennsylvania Farm Bureau to participate in a hearing about the need to offer protection to landowners involved in the leasing of farmland for renewable energy projects.

Our organization's energy policy, broadly speaking, aims to make our nation energy independent, using a diverse energy portfolio that includes renewable sources. We see the potential benefits that solar energy can provide to farmers, whether it's through using solar directly on their farms or leasing land for solar energy development.

Utility-scale solar has the potential to impact a significant portion of Pennsylvania farmland, especially considering the state's current power-purchase agreement with Lightsource bp. Our hope is that Pennsylvania can strike the appropriate balance between protecting our most valuable farmland from any form of development, while also preserving the ability of farmers to diversify their income through leasing agreements.

In order to strike that balance, there will need to be statewide legislation that protects landowners who lease their land for development and ensures that farmland can one day be returned to productivity. That means the state will need to develop legislation that requires responsible decommissioning of renewable energy sites, such as what is called for in House Bill 2104.

Over the past three years, our organization has received significant outreach from solar energy developers. Each developer highlighted the potential for continued agriculture compatibility underneath solar panels—such as through sheep grazing—and the ability to return farmland to productive use after the solar energy

system has outlived its useful life. The one benefit to solar, as opposed to other forms of land use development, is the ability to return farmland to its previous condition and allow farmers to grow traditional commodities again on that ground. Again, this speaks to the need for a robust decommissioning plan that not only covers the cost of removing equipment, but also covers land reclamation.

Along with serving as my organization's Harrisburg lobbyist, I also have the privilege of serving on the board of directors for the Center for Rural Pennsylvania. Earlier this year, the board took a tour of an existing utility scale solar facility in Franklin County. I was struck by two things. First, is the scale of development that results in a fundamental transformation of that farm property. Thankfully, this solar facility is allowing sheep to graze underneath the panels. The second point is the sheer complexity of the project, from underground conduit, steel girders driven into the ground, energy converters and gravel driveways housed on what was once a corn field.

I think it is critical that lawmakers fully appreciate the size and scope of these projects as we discuss the need for proper decommissioning. The last thing we want to see is landowners forced to pay for the disposal of solar panels and restoration of their land. First, most landowners lack the needed expertise to remove this equipment if they have to do it on their own. Second, they would face significant cost trying to restore their land to productive use.

As we look at renewable energy decommissioning, I think we need to work from a "worst case scenario approach." That worst case scenario is that a company who executed a 30-year lease for a solar energy facility on a farm and at the end of that lease, is no longer in business. It is far too difficult for us to predict today what solar energy production will look like 30 years in the future, so the equipment installed on land in 2021 could very well be obsolete in 2051. A properly funded decommissioning plan will address that worst-case scenario.

We appreciate that House Bill 2104 calls for a decommissioning plan that requires a developer to secure financial assurance from a financial institution that covers the full cost of land restoration. Equally important is the provision that requires that a plan be updated every five years from a licensed third-party engineer. We can also support the concept of "stepping up" the amount of financial assurance over a 20-

year period, as called for in HB 2104. What we want to avoid is seeing decommissioning plans that rely heavily on the salvage value of the renewable energy equipment. While much of the material clearly has a current value in terms of recycling, decommissioning plans based only on salvage value likely don't also cover land restoration costs.

Lastly, I do want to acknowledge that the solar industry has been willing partners on finding an agreement on legislation addressing decommissioning. Farm Bureau and the industry had extensive discussions earlier this year on legislation that we both could agree upon. The product of those discussions is largely covered in House Bill 2104.

It is our hope that the General Assembly swiftly adopts legislation to require decommissioning plans for solar facilities. Given the expected growth in commercial solar in Pennsylvania in the near future, time is of the essence to have legislation in place to protect landowners. Thank you for your consideration and I look forward to answering your questions.

Regards,



Darrin Youker
Director, State Government Affairs



**Testimony before the Environmental Resources and Energy Committee of the
Pennsylvania House of Representatives**

December 15, 2021

Chad A. Forcey, Executive Director

Pennsylvania Conservative Energy Forum · www.penncef.org

Good Morning Chairman Metcalfe, Chairman Vitali, and members of the House Environmental Resources and Energy Committee. My name is Chad Forcey, and I am the Executive Director of the Pennsylvania Conservative Energy Forum.

The Pennsylvania Conservative Energy Forum (PennCEF) is a 501(c)(3) nonprofit educational foundation committed to clean and renewable energy and energy diversity in the Commonwealth. Led by a Board and Leadership Council of prominent Pennsylvania conservative leaders from government, industry and education, PennCEF believes that renewables like solar, wind and biomass should be included in our proud Pennsylvania “all of the above” energy sector. For PennCEF, “all of the above” means that renewables deserve full access to markets, in addition to other significant sources like natural gas, nuclear and coal.

The Commonwealth leads the nation in domestically-produced energy exports. Next-generation solar technologies bring the promise of even greater economic expansion to our strong and diverse energy portfolio. Clean and renewable energy jobs now account for the greatest portion of job growth in this sector, as illustrated by the [2020 E2 Clean Jobs Pennsylvania report](#). The report found that Pennsylvania’s clean energy jobs now stand at more than 93,000 and are growing at an annual rate of 6%—a growth rate five times the overall job growth in Pennsylvania. Of all the industries documented in this report, the solar industry accounts for the greatest percentage of job growth.

As we emerge from the ravages of the pandemic, the need for economic recovery is paramount. In the field of solar, legislation that establishes a level playing field for investors, developers and installers in the solar space can spur greater investments to aid in our economic recovery, while protecting farmers and landowners who want to go solar. That’s why we support HB 2104, and we thank Rep. Kathy Rapp for her work to bring the solar industry, agriculture and landowners together to create a successful bill.

[HB 2104 – An Introduction](#)

As conservatives, we support a Pennsylvania solar industry that encourages competition while protecting consumers and the land itself. It is our view that HB 2104 strikes this balance.

I must begin with the fact that solar energy resources are safe, and their development is to the ultimate benefit of landowners. Undue red tape that can slow or even halt the process of economic development is to the benefit of neither the solar professional nor the landowner, so working to create a bill that balances out these concerns is of paramount interest.

Passage of HB 2104 would create a statewide standard governing the decommissioning process, which we support. This would help to avoid the regulatory confusion of numerous and divergent local standards. The creation, in HB 2104, of a minimum size for regulation of 3MW helps to ensure that the regulatory burden is not placed on homeowners seeking rooftop systems or the developers that service them. We believe that this is an appropriate line to draw.

Concerns about what happens to solar equipment following the lifespan of a given system is what has brought us all here today. The solar industry uses the term “decommissioning” in reference to having a completed system deconstructed, removed, and the land made ready for redevelopment or returned to the original use. (In this definition, we are referring to non-utility owned projects, as any proposed development in this area by utilities would fall under the purview of existing de-regulation statutes and code.)

Solar panels can either be disposed of in landfills, or they can be recycled, due to the high value of various components used in their construction. In either case, citizens do not need to worry, as they neither contaminate landfills, nor cause harm to workers at recycling facilities.

It is to the cost of such work that this bill speaks. HB 2104 directs the DEP to oversee the creation of the decommissioning form, with transparency and accountability. We support this role for the Department. Financial assurance is required under this legislation, and should be determined by a Professional Engineer. HB 2104 adopts this standard, which we support as it will ensure that the costs are accurate, and remain accurate in 5-year increments.

The Formula for Bond Costs

As proposed in the legislation, 30-days before construction commences, developers must show the county recorder a proof of bond equal to 20% of the calculated decommissioning costs. Every five years another calculation is made by a third-party engineer to identify updated decommissioning costs. The bond amount carried by developers is also adjusted.

The schedule is as follows:

- 40% of decommissioning costs at year 5
- 60% of decommissioning costs at year 10
- 80% of decommissioning costs at year 15
- 100% of decommissioning costs at year 20

This solutions in this bill, presented by Rep. Rapp, will allow renewable development to proceed in a well-regulated way. This bill offers consumer protections and ensures local communities that projects will be managed properly through the entire life cycle. The graduated bonding requirements keep upfront costs low while creating accountability for developers.

Suggestions for Possible Changes

Other states allow for a calculation of salvage value for materials being decommissioned. This salvage value can then be deducted from the overall decommissioning cost to lower the necessary bonding requirements. This addition could strengthen the bill to encourage investment by smaller developers who have less access to initial capital.

Small developers may also be impacted more by the initial 20% bond requirement in year 1 because they would have to purchase a larger bond prior to system activation and revenue generation. One option may be to alter the year 1 bond requirement to 10% thus allowing for a smaller barrier to construction. There would be no issue keeping the later year requirements in place as project revenues could then cover the costs.

Conclusion

I will close with a quote from former [U.S. Navy Secretary John Lehman](#), who is widely credited for winning the cold war at sea under President Reagan. Lehman owns a farm in Bucks County, and he is a member of our Leadership Council:

“In 2018, a group of fellow Pennsylvania leaders and I launched the Pennsylvania Conservative Energy Forum, a group devoted to ‘all of the above’ energy generation that includes new technologies. Our organization recognizes that renewable energy must be a part of building for the future. On my farm, solar panels generate most of the electricity needed for our agricultural operations.”

Coming out of the devastation that Pennsylvania farmers have suffered due to the many economic disruptions of the pandemic, it is of greatest importance that we support their efforts to diversify income and preserve land use. Solar is a key component of that process for our farmers. It is critical that we craft the regulatory stability that allows them to harvest the sun for energy, as they do for their crops. Help for farmers and other rural Pennsylvanians who want to diversify their income with a level playing field in the solar space is of key importance to PennCEF. We are grateful that Rep. Rapp and other members of the House agree, as evidenced in this bill and in this hearing.

We thank the Committee for the opportunity to submit testimony on this important bill. I am happy to respond to any questions, and I can also be reached by email at chad.forcey@penncef.org.



pennsylvania
DEPARTMENT OF ENVIRONMENTAL
PROTECTION

Submitted Testimony
Pennsylvania Department of Environmental Protection

House Environmental Resources and Energy Committee
Hearing on HB 2104 and Bonding and Decommissioning of Solar and Wind
Installations

December 15, 2021

Thank you for the opportunity to provide comment on House Bill 2104 and the bonding and decommissioning of solar and wind installations.

House Bill 2104 provides for the decommissioning of utility-scale solar and wind facilities on leased property. It requires the Department of Environmental Protection (DEP) to develop regulations for decommissioning plans and financial assurance requirements, such as bonding.

Solar in Pennsylvania

To place this in context, here is a summary of the current scope and scale of grid-scale solar development in Pennsylvania.¹

- There are currently approximately 100 megawatts (MW) of installed capacity from seven operating projects.
- There are approximately 12,100 MW of capacity in development from roughly 370 projects that are currently seeking approval from the transmission operator, PJM, to connect to the grid.
- These 370 projects in development represent over \$12 billion² in investment potential (to build and operate) and an estimated 40,000 jobs over 10 years.³

Impact of Solar and Wind Projects

Clean, renewable solar energy is vital to economic growth, environmental protection, and electrical grid resiliency in Pennsylvania, and DEP has established an objective of increasing to 10% the amount of in-state electricity sales that come from in-state solar energy generation. That said, DEP recognizes that even though renewable energy projects such as solar and wind are termed “zero emission”, that does not mean zero emission projects have zero environmental impact. You would be hard-pressed to identify any project or human activity whatsoever that has no impact on land and resources.

Recognizing and incentivizing proper reclamation and decommissioning of any project or site to restore it and recycle, reclaim, or refurbish the equipment and materials used is an effort we should apply across the board. In addition, we should be designing facilities with the environment in mind, using products that take less energy to make and are designed to be able to be reused or easily recycled.

¹ Please note that “Grid-Scale Solar” does not include residences or businesses in the Commonwealth that generate alternative energy for onsite consumption as these systems are not subject to the bonding requirements contemplated by HB 2104.

² NREL: \$1.13 per Wdc for 50 MW Fixed-tilt (Non-Union Labor, US Weighted Average, 2016) Source: U.S. Solar Photovoltaic System Cost Benchmark Q1 2018, Figure 28 <https://data.nrel.gov/submissions/103>

³ Solar Foundation: 3.3 Installation and Project Development Jobs per MW Installed (Utility-scale) Source: 2018 Solar Census, Table 9, Page 30 <https://www.thesolarfoundation.org/wp-content/uploads/2020/02/Solar-Jobs-Census-2018-1-1.pdf>

Operating a project and then being able to use the land in a manner equal to pre-project conditions is actually a key element of what makes renewable energy projects, particularly solar, superior to other types of development that sometimes forever irrevocably change the nature or use of the land. Unlike most large, grid-scale energy projects, solar installations can be removed entirely, and the land can be used for the same purpose as prior to the project.

In the case of solar, there are a number of mechanisms to achieve assurance that projects are decommissioned, the land is restored, and retired solar panels are handled properly. Bonding is already part of the current best practices for ensuring proper decommissioning and land restoration at the end of a solar project. Bonding and details regarding end-of-life restoration are considerations in the land lease between the property owner and developer such that the conditions, payments, and timeframes be suitable to both. This requirement can also be further strengthened at the local government level by including provisions in ordinances where oversight of a local project is customary. These bonding requirements bound by ordinance can and are included in the land lease before a construction permit is issued.

For example, a model ordinance being used today by many local governments includes decommissioning and restoration provisions, and it even includes wording on bonding requirements to assure those plans are implemented at project closure or abandonment. Often due to the nature of the lease term, the number of term extensions and the potential over time for refurbishment of panels or costs for recycling or disposal, the bonding amount and agreements may have to be reviewed and updated.

With this in mind, HB 2104 would add potentially duplicative and highly onerous new bonding requirements for items that were not normally part of the standard practice lease agreement bond. Moreover, this would involve the Commonwealth becoming a party to the bonding process of hundreds of projects, all with differing timeframes and potential for periodic updates. This would very likely increase the cost of these projects being developed, making Pennsylvania less attractive for investment, with questionable benefit.

Considering that the Commonwealth is not engaged in permitting these facilities outside of environmental permits related to construction, using earth disturbance and storm water controls, this bonding requirement would then engage the DEP in the project throughout its entire life and through completion of the decommissioning plan. This is not typically something that is done for other construction projects by DEP and would represent an expansion of DEP's traditional role.

Finally, we should highlight that DEP's sibling agency, the Department of Conservation and Natural Resources (DCNR), is in the process of drafting siting principles that promote sustainability and resource protection, reinforce the benefits of forest canopy through carbon sequestration, and encourage co-location opportunities that preserve working lands, enhance wildlife connectivity, and protect core habitat. Through this process, they are also reviewing best practices for decommissioning. DCNR's service foresters offer assistance to landowners with respect to sustainable management strategies, and this effort will help achieve the

Commonwealth's climate mitigation goals through expansion of renewable capacity while working to expand and protect our existing forest capacity.

Recycling

House Bill 2104 also emphasizes recycling and refurbishment. It is DEP's hope that refurbishment or recycling is the primary consideration prior to disposal. The Pennsylvania Recycling Markets Development Center has previously said that dismantling solar panels for recycling will likely require proper management of both hazardous and non-hazardous materials, not unlike flat screen televisions and other consumer electronics, which in both electronics recycling and other forms of materials management is very common across the United States and around the world.

Furthermore, solar panels that may contain some hazardous chemicals are not any different than other power electronics that are present throughout our society. In fact, solar panels are solid state and sealed from the elements – they are explicitly designed to be impervious so that rainwater, wind, etc. do not interact with the inner chemistry of the system.

There is more than a single type of solar panel/photovoltaic (PV) technology, and differing types have different chemistry. In previous hearings, some legislators have highlighted thin film PV technologies that contain Cadmium Telluride (CdTe), which is a compound that is typically hazardous, but it is rarely in use in Pennsylvania and makes up less than five percent of the world market⁴. Additionally, CdTe was the subject of research from Brookhaven National Laboratory⁵ concluding that “CdTe PV modules do not present any risks to health and the environment during their use, and recycling the modules at the end of their useful life completely resolves any environmental issues.” Silicon (monocrystalline and polycrystalline) solar cells – which do not contain CdTe – make up over 90 percent of the solar cells made and almost all solar cells in deployment in Pennsylvania. These silicon modules do not fail a hazardous waste determination upon their disposal, meaning they are not hazardous waste. Additionally, by weight, approximately 80 percent of a solar panel is glass and aluminum – two commodities that are recycled in significant volumes today.

As this bill contemplates bonding for reclamation of facilities at the end of life, a new PV facility today could have a lifespan of 25 years or more. These solar panels in this forward-looking timeframe could likely be refurbished or the materials contained in them have such value that deconstructing these panels may result in zero waste. Development of supply chain incentives – including design for recyclability and focusing on reuse of reclaimed materials – may make the purpose of a bond to ensure reclamation or remediation moot.

Other Bonding Requirements

There are bonding requirements in certain areas of DEP's jurisdiction, including waste management, oil and gas development, and mining. While there are some full-cost bonding

⁴ [Cadmium Telluride | Department of Energy](#)

⁵ [Could CdTe PV Modules Pollute the Environment \(bnl.gov\)](#)

requirements for mining and waste management, oil and gas bonds are well below actual costs. In fact, the Environmental Quality Board (EQB) recently accepted petitions to review Pennsylvania's oil and gas well bonding requirements and to develop full-cost bonding. The petitioners argued that oil and gas well bonding requirements are so low, they may create an incentive for operators to go out of business rather than clean up their environmental damage, leaving the cost to Pennsylvania taxpayers. Generally speaking, DEP does not require bonding for the construction, decommissioning, or reclamation of power generation units or facilities. DEP does not require any bonds or other financial assurances whatsoever for the decommissioning of most construction activities, such as for warehouses and office buildings, which often have far more environmental impact than a solar or wind installation.

Conventional Oil and Gas Wells

Wells drilled prior to 1985 do not require any bond. For conventional wells drilled after 1985, the bond is \$2,500 per well with a maximum bond of \$25,000, well under the actual cost to plug a well. A \$25,000 bond could cover dozens or hundreds of wells that a company owns. It costs on average \$33,000 for DEP to plug a conventional well, which is only the actual well plugging itself and potentially site stabilization if necessary, but it does not include restoration or reclamation of the site.

Unconventional Oil and Gas Wells

Bonding requirements depend on the bore length and the number of wells owned by the operator. Bonds begin at \$4,000 per well and go up to \$10,000 per well, and bonding limits vary from \$35,000 for operators with fewer than 50 wells to a maximum of \$600,000 for operators with over 150 wells. Again, this is far below the actual cost of plugging a well.

Waste Management

Generally speaking, individual permits for waste processing or disposal facilities require bonding. In addition, many general permits also require bonding. The general permits where bonding is applied are typically for situations where there is processing of large quantities for beneficial use, complicating processing techniques, or other instances where there exists a substantive threat to public health or the environment. Such bonds would cover the cost to clean up and dispose of all the waste materials authorized to be stored, processed, or disposed on site.

Mining

While DEP is not involved in the bonding of coal-fired power plants, the bonding program for mining operations is based on the full cost of reclamation of a site. DEP is able to recalculate bonding amounts annually, which are developed based on actual costs for, among other sources, reclamation of abandoned mine lands and forfeited mine sites. Reclamation plans include information on approved future land use after the reclamation. Such bonds would cover the cost of reclaiming the site and may include additional bonding requirements to cover the cost of, for instance, long-term operation and maintenance of treatment of discharges to nearby waterways.

Conclusion

In closing, the alternative energy sector and associated support businesses is large and quickly growing. These bonding requirements are potentially duplicative and highly onerous and there

are serious questions about what benefits they would provide over existing requirements. Renewable and alternative energy projects in development represent economic opportunities for the Commonwealth, and solar deployment in particular could result in over \$12 billion of investment potential in Pennsylvania in the near future. Beyond the environmental benefits, these facilities will provide local economic opportunities and tax revenues as well as many jobs to build, maintain, and eventually decommission these projects.

While we are encouraging this kind of smart, low-impact development, the effects of this bill could create a financial disincentive and lead to a substantial loss of investment potential in the alternative energy and manufacturing sectors, particularly as neighboring states are actively seeking to incentivize investment in solar and wind within their borders. Again, in the case of solar, the best practice in play is to reduce, refurbish, and recycle. It is possible that HB 2104 will be a deterrent to solar and wind investment that will be necessary to Pennsylvania remaining a leader in the energy sector as market forces increasingly shift toward renewables. In terms of priorities, the General Assembly would achieve a much greater return on investment by first focusing on other sources of energy with much greater environmental impact that have little or no bonding requirements.

Thank you again for the invitation to provide testimony. We appreciate your consideration and look forward to working with you and all interested stakeholders on this topic as we seek to both conserve and improve our environment.



MAREC ACTION

December 15, 2021

MAREC Action Testimony House Environmental Resources and Energy Committee Hearing on House Bill 2104

Chairs Metcalfe and Vitali and other distinguished members of the House Environmental Resources and Energy Committee, thank you for the opportunity to provide written testimony on the matter of HB 2104, a bill providing for the decommissioning of alternative energy facilities.

I am testifying on behalf of MAREC Action, a non-profit organization representing over 35 businesses that develop and manufacture utility-scale solar and wind energy projects. With stable, pro-growth, responsible policies in place, our industry sees a major opportunity to continue investing in Pennsylvania. Many of our members already do business in Pennsylvania and employ Pennsylvania residents. According to the American Clean Power Association, Pennsylvania's solar, wind and storage industries represents approximately \$4 billion in private investment to-date.¹

The renewable energy industry is committed to responsible decommissioning of our projects. Unlike utilities, independent developers of solar projects cannot employ eminent domain to develop a project. MAREC Action members rely on the support of landowners and broader community social license to operate—meaning the need for continual approval through various stages of development. Renewable energy companies that disregard their host communities face increasing opposition to their projects and significant challenges to new business in the long run.

That's one of the reasons, along with reduction to regulatory risk for project financing, that the renewable energy industry supports reasonable decommissioning regulations—including requirements for financial assurance that decommissioning will be completed without imposing costs on landowners or local government.

¹ https://cleanpower.org/wp-content/uploads/2021/10/Pennsylvania_clean_energy_factsheet.pdf

However, MAREC Action is currently **not** able to support HB 2104. There are several aspects of the bill that raise serious concern.

The bill needs to strike a fair balance with other energy generators in PA by allowing salvage value.

Renewable energy developers are looking to compete with other energy generators on a level playing field. HB 2104 as currently constructed will make it difficult for our projects to pencil out or essentially make the numbers work if we are asked to take steps not required of other generators. For instance, the decommissioning bonding requirements for the natural gas industry amounts to less than 20 percent bonding; whereas HB 2104 requires bonding to start at 20 percent at construction and then over time gets raised to a 100 percent bonding requirement. This provision can significantly raise the cost of a solar or wind project and makes it more difficult to compete.

Other states that require bonding for the decommissioning of solar and wind farms, like Texas and West Virginia, explicitly allow for the value of salvaged materials (glass, steel, the solar panels themselves, and other materials) at the time of decommissioning to count toward assurance that the project owner will have the financial ability to decommission a project as required. This significantly reduces the upfront cost for developers to acquire financial assurance, while not decreasing the overall collateral in place to ensure decommissioning. The same third-party engineer that HB 2104 directs to be chosen to determine the cost of decommissioning would also determine the value of the salvaged materials at the end of a projects' life. The salvage value would be an offset to the overall cost of decommissioning. As the cost of decommissioning would be reevaluated every five years under this bill, the salvage value could also be reevaluated at the same time to ensure that value of the salvaged materials corresponds with the changes in decommissioning costs.

Allowing salvage value as an offset would reduce the level of financial assurance required for decommissioning and would place renewable energy decommissioning more on par with other generation industries' cost of decommissioning. While this is not a direct correlation to the percentage that other industries provide for financial assurance, this is in line with other states deemed reasonable for financial assurance for wind and solar projects.

A 20 percent landfilling cap on solar and wind energy facilities is unprecedented.

The other serious concern that we face from the bill is an unprecedented requirement that "[n]o more than 20% of the total combined mass of an alternative energy facility may enter into a landfill as part of the grantee's decommissioning plan." [§ 4304 (b) (2)]. While this will have different cost implications

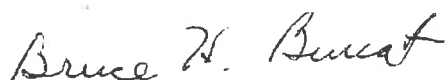
depending on the type of technology, wind or solar, we are not aware that any other state in the region, or any other energy technology in Pennsylvania that has a cap on the materials that can be landfilled. Both the wind and solar industries are striving to reduce their already comparatively low environmental impacts, but mandates to avoid landfilling, which is a legitimate and safe waste disposal option for their materials, would be expensive. This provision would also place these two industries on an unlevel playing field.

MAREC Action members are reviewing this legislation to better understand the impact the landfilling mandate would have on the financial viability of industry growth in PA. The costs and methods to decommission a utility scale solar facility versus that of a utility scale wind facility are very different. Since this is not a requirement in any other PJM marketplace state, MAREC Action members are gathering additional information on this issue and look forward to future discussion. Initial indications are that costs of the landfilling cap requirement would indeed increase the cost of solar and wind energy projects, but wind energy would likely be significantly more impacted due to the cost of recycling blades.

MAREC Action wants to emphasize that while we cannot support the bill as introduced, we want to work with the bill's sponsors and this Committee to amend the bill to ensure that the wind and solar industries are treated similarly with other energy technologies in Pennsylvania. We would hope that we could work together to incorporate salvage value when determining decommissioning costs and to not impose a strict limitation on the level of landfilling that can be done on decommissioned projects, when this requirement is not imposed on other energy technologies in the Commonwealth.

We appreciate the opportunity to provide this testimony.

Respectfully Submitted,



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