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 billion[2] 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.

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[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 Fixe-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 market[4]. Additionally, CdTe was the subject of research from Brookhaven National Laboratory[5] 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.