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Testimony to the Senate Majority Policy Committee on Strategies to Increase Energy Production and Lower Utility Bills for All Pennsylvanians

On behalf of the
Appalachian Region Independent Power Producers Association
(ARIPPA)

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EXECUTIVE SUMMARY

- ARIPPA represents 10 environmentally beneficial mine land reclamation facilities in Pennsylvania (six in the anthracite region and four in the bituminous region) that utilize circulating fluidized bed (CFB) boiler technology to convert historic coal refuse into highly alkaline beneficial use ash. This process uses coal refuse as a primary fuel to generate electricity sold through the PJM wholesale energy market.
- To date the coal refuse reclamation to energy (RTE) industry has reclaimed over 257 million tons of polluting coal refuse, improved 1,200 miles of impaired streams, and restored 8,000 acres of mining affected land. There are approximately 764 coal refuse banks containing nearly 211 million tons of coal refuse and covering 8,001 acres that remain unreclaimed with 44 of those piles actively burning.
- The coal refuse RTE industry is a decades long public-private partnership with the Commonwealth providing a cost-effective, environmentally beneficial solution for cleaning up Pennsylvania's historic coal mining waste while producing reliable, dispatchable electricity.
- Since the 1980s, state support for the industry has included power purchase agreements (PPA) mandated by the Pennsylvania Public Utility Commission (PUC), tax-exempt Pennsylvania Economic Development and Finance Authority (PEDFA) loans to construct coal refuse RTE facilities, the inclusion of waste coal energy in Tier II of the Alternative Energy Portfolio Standards (AEPS) program, and the Coal Refuse Energy and Reclamation (CRER) Tax Credit.
- The industry partners with local watershed groups, county conservations districts, and environmental organizations like Earth Conservancy, Western Pennsylvania Coalition for Abandoned Mine Reclamation (WPCAMR), and Eastern Pennsylvania Coalition for Abandoned Mine Reclamation (EPCAMR).
- The environmental benefits of the industry are valued at $62 million annually, totaling $1.2 billion over a 20-year period, including reductions in air emissions ($444 million), elimination of water treatment ($452 million), and enhancements of public health and increased property values ($350 million).
- The industry generates annual economic benefits of $697 million, direct expenditures of $389 million, and $15.9 million in state taxes and fees. It supports nearly 2,200 family-sustaining jobs with just over half of those direct positions with average salaries above $81,000 and total earnings of $155 million.
- The "avoided cost" savings to the Commonwealth to maintain the current reclamation by the industry is at least $290 million annually, while eliminating all known refuse piles would cost over $9.3 billion.
- While the combustion of coal refuse does emit the greenhouse gas carbon dioxide (CO_2), doing so avoids the ongoing emissions of the potent greenhouse gas methane that would otherwise have been emitted during its extended lifecycle from abandoned coal refuse in piles. When the full emissions profile of the coal refuse RTE industry is considered, including the reduction of emissions from reclamation of coal refuse piles, the industry produces a net reduction in GHG emissions.
- Energy production is a cost-intensive industry, with a range of skilled personnel and investments required for operations. Relative to most other energy producers, coal refuse plants are labor intensive and have an expensive environmental reclamation fuel cycle with several components. Some plants are victims of their own success as distances to retrieve fuel and related transportation costs have increased as piles adjacent to the plants have already been successfully remediated by the industry.
- Electric generation costs have risen recently because supply is decreasing while demand is growing. A primary reason for this imbalance is baseload power plants that generate reliable electricity are retiring – often due to decarbonization policies or economic pressures – while demand is increasing due to the growth of artificial intelligence, data centers, electrification, and a resurgence in U.S. manufacturing.

- Increased AEPS funding for Tier II resources following passage of Act 114 of 2020 came at a critical time for coal refuse RTE facilities that were struggling to operate at a time of historically low prices in the PJM energy and capacity markets. In fact, four coal refuse RTE facilities closed between 2018-2020. However, since 2020 no additional plants have closed.
- Lower wholesale energy prices and capacity payments in recent years have increased the importance of additional revenue mechanisms, like AEPS and the CRER tax credit, in keeping plant operations viable in a historically low PJM energy market. Since 2020, AEPS Tier II credits have been essential to the continued viability of Pennsylvania coal refuse RTE facilities.
- PJM capacity prices may look extremely high in today's nominal dollars, but they are not actually unprecedented once you adjust for inflation and how much of a generator's installed capacity PJM actually credits as reliable capacity.
- Pennsylvania residential electricity rates have risen sharply since 2018, and the Commonwealth has become an outlier even relative to neighboring PJM states. The primary driver of rising retail electricity costs are distribution charges that are some of the highest in the region. Pennsylvania rates are now meaningfully above the rest of PJM despite having lower wholesale costs throughout the period.
- While total Tier II compliance costs have increased, the impact at the customer level remains limited. Total Tier II compliance — including both waste coal and non-waste coal — accounts for less than 1.3% of a typical residential bill. Waste coal alone accounts for approximately 0.6%.
- Pennsylvania's high retail electric bills are a distribution-cost story, not a Tier II story. Closing the affordability gap with neighboring states requires addressing distribution rates and capacity market design — not the smallest line item on the bill.
- To reduce electricity costs for consumers, the policy focus should instead include utility procurement and cost structures, PJM capacity market design and outcomes, and transmission cost growth and allocation.
- The Governor's Pennsylvania Reliable Energy Sustainability Standard (PRESS) would cut AEPS support for proposed Tier III sources, including coal refuse RTE generators, rendering this new program insufficient to support continued operation of these environmentally beneficial facilities. Instead, the legislature should consider expanding eligible sources and closing the border for AEPS Tier I, as over 50% of Tier I credits currently fund projects outside the Commonwealth thereby limiting in-state economic benefits.
- The closure of the coal refuse RTE industry in Pennsylvania would remove 1,200 MW of reliable, alternative energy from the PJM electric grid. The cost to ratepayers to replace these generation MWs will be significantly greater than the amount of subsidy Pennsylvania currently provides to the coal refuse RTE industry to remediate polluting coal refuse piles. To replace the coal refuse RTE units with 1,200 MW of natural gas generation capacity would cost upward of $3 billion dollars. This does not include the added cost to Pennsylvania taxpayers for replicating the mine land reclamation and the loss of economic benefits from coal refuse RTE plant operations.
- Pennsylvania supplies a disproportionate amount of PJM's electricity and reserve capacity, bears substantial merchant-market risk, and receives relatively little policy support for its generators. On every measure that matters to resource adequacy, Pennsylvania is the single largest supplier in the thirteen-state PJM market. Pennsylvania is PJM's generation backbone with 49.1 GW of installed capacity, about 23.3% of the total in PJM. It produced 244.4 TWh in 2025, about 28% of PJM generation, and exported 92.4 TWh of electricity in 2024, more than any other PJM state.
- The General Assembly should develop policies that protect Pennsylvania's dispatchable generation and prioritize protecting and supporting its own generators to ensure its generators and ratepayers are not effectively subsidizing neighboring states' energy policies.

INTRODUCTION

On behalf of ARIPPA, I thank the Senate Majority Policy Committee for inviting us to discuss ways to increase energy production and lower utility bills for residents and businesses across Pennsylvania (PA). Organized in 1989, ARIPPA is a nonprofit trade association based in Camp Hill, PA, representing independent electric power producers, environmental remediators, and service providers that reclaim polluting waste coal piles often on abandoned mine land (AML) sites to produce alternative energy. ARIPPA represents 10 environmentally beneficial mine land reclamation facilities in Pennsylvania (six in the anthracite region of northeastern PA and four in the western bituminous region) that utilize CFB boiler technology to convert historic coal refuse into highly alkaline beneficial use ash. This process uses coal refuse as a primary fuel to generate electricity, sold through the PJM Interconnection regional transmission organization (RTO) wholesale energy market, injecting private funding into mine land reclamation. Most coal refuse RTE plants were constructed as Qualifying Facilities (QFs) under the Public Utility Regulatory Policies Act of 1978 (PURPA) with a net capacity of 1,197 megawatts (MW).

Since the late 1980s, the coal refuse RTE industry has been a public-private partnership with the Commonwealth providing a cost-effective, environmentally beneficial solution for cleaning up Pennsylvania's historic coal mining waste while producing reliable electricity injecting private funds to support this environmental mission. State support has included PPAs mandated by the PA PUC, tax-exempt PEDFA loans to construct coal refuse RTE facilities, the inclusion of waste coal energy in Tier II of the 2004 AEPS program, the CRER Tax Credit, and the coal refuse set aside in Pennsylvania's proposed Regional Greenhouse Gas Initiative (RGGI) program, ensuring continued environmental benefits.

Given limited state and federal funding for reclamation and remediation of mining-affected lands, and the magnitude of coal mining's legacy in Pennsylvania, ARIPPA facilities utilize coal refuse from historic mining activities that remain in Pennsylvania communities producing acid mine discharges into surface waters and groundwater and causing uncontrolled air pollution from internal combustion, fugitive coal dust, and coal refuse pile fires. By removing coal refuse piles without shifting the full cost to public resources, the industry reduces the burden on Pennsylvania taxpayers. Without this industry, taxpayers would bear the full remediation cost.

In 2020 testimony to the Joint Legislative Air & Water Pollution Control & Conservation Committee, former PADEP Secretary Patrick McDonnell explained that, "waste coal operations and associated generation operations have been one of the most substantial watershed cleanup efforts of the past 30 years, and this

sector continues to play a critical role in terms of pollution prevention, environmental cleanup, and land reclamation in Pennsylvania – that would otherwise remain for future generations."[1]

The use of legacy coal refuse for power generation provides significant environmental and health benefits by reducing reliance on newly extracted coal and natural gas for electricity production and eliminating harmful sources of air and water pollution associated with coal refuse pile fires and acid mine drainage. Unfortunately, lack of understanding that these coal refuse RTE facilities operate to address legacy environmental damage has become confused with the environmental movement to shutter utility-scale coal-fired generating plants that extract new coal from mining for the purpose of generating electricity. Lost in the translation is the unique environmental role, including important net reductions in air pollutants and GHG emissions provided by the coal refuse RTE industry. While the industry continues to help reverse coal refuse pile runoff pollution to water and soil, it is now incumbent to also reevaluate this industry in the context of its net GHG emissions.

In 2022, the DEP completed a rulemaking to cut CO_2 emissions from fossil fuel-fired electric generating units (EGUs) in Pennsylvania by enabling participation in the Regional Greenhouse Gas Initiative (RGGI). The DEP included a "waste coal set aside" to provide CO_2 allowances for all coal refuse-fired units. DEP recognized that "waste coal-fired units provide an environmental benefit of reducing the amount of waste coal piles in this Commonwealth." The DEP acknowledged in its RGGI regulation that "reducing waste coal piles is a significant environmental issue…because waste coal piles cause air and water pollution, as well as safety concerns. Waste coal-fired units burn waste coal to generate electricity, thereby reducing the size, number and impacts of these piles otherwise abandoned and allowed to mobilize and negatively impact air and water quality in this Commonwealth."[2]

ARIPPA plants work closely with state and federal environmental officials, local watershed groups, and environmental organizations such as Earth Conservancy, WPCAMR, and EPCAMR to reclaim AML sites and convert polluted streams into clean and usable waterways. These facilities represent a public-private partnership with the state to eliminate pollution in the Commonwealth. In addition to state support, operators of coal refuse RTE facilities are currently spending private money to remediate AML sites that, if this industry is unable to continue reclamation on these and other sites, the responsibility and cost would revert to DEP to carry out this remediation work at a significant cost to Pennsylvania taxpayers. Without this industry, DEP would bear significant remediation costs.

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[1] *Prepared Testimony of Patrick McDonnell, Secretary, Pennsylvania Department of Environmental Protection*, Before the Joint Legislative Air and Water Pollution Control and Conservation Committee (February 3, 2020).
[2] *CO_2 Budget Trading Program*, 52 Pa.B. 2471 (April 23, 2022).

The coal refuse RTE industry generates substantial environmental and economic benefits for Pennsylvania that extend far beyond the direct financial returns from electricity generation. It is a market-based, alternative energy solution that if preserved can save the state over $9 billion in environmental remediation costs. Without reclamation by this industry, these piles will persist indefinitely. Understanding this distinction between market revenues and broader societal benefits is crucial for evaluating the industry's role and the rationale for public policy support.

WHAT IS COAL REFUSE?

Coal refuse is a legacy of the pre-1970s coal mining industry that currently scars the land and pollutes waterways across Pennsylvania. It consists of low-quality coal mixed with rock, shale, slate, clay and other material. Also known as waste coal, culm, gob and boney, it was discarded as a “waste” during the original coal extraction process and randomly disposed in piles near the mine sites. These piles pose public health and safety hazards, as they can spontaneously combust or catch fire from lightning strikes, leach acid mine water and other hazardous substances, and are major sources of ground, air, and water pollution.

Due to the costs of remediation and limited public funding, the air and water pollution and human health and safety threats posed by these piles are often ignored until they become an immediate threat to nearby residents. Before CFB technology was developed in the 1980s, there was no productive use for coal refuse and no technology available for the disposal or remediation of these piles. As a result, these hazardous piles have littered the local landscapes and polluted nearby land and water for decades.

Since its inception, the coal refuse RTE industry in Pennsylvania has removed and consumed as fuel more than 257 million tons of coal refuse, improved more than 1,200 miles of impaired streams and reclaimed more than 8,000 acres of previously polluted mining-affected land. At full capacity, it can remove over 10 million tons of coal refuse from the environment and reclaim approximately 200 acres of mining-affected land in Pennsylvania each year. However, due to economic headwinds, deferred plant maintenance issues, and low PJM energy prices, in 2023 and 2024 the industry reclaimed just over 6 million tons per year or 60% of its historic reclamation capacity. That increased to 7.3 million tons in 2025, which is the highest amount since 2022 and an increase of 1.7 million tons over the historic low of 5.6 million tons in 2020. The surrounding communities, lands, and streams have experienced vast environmental and economic improvements due mainly to the decades of hard work and dedication the workers in the coal refuse to energy industry have provided, in addition to the downstream environmental benefit of improved water quality provided to the Delaware, Susquehanna, and Ohio River Watersheds. Despite the efforts of the coal refuse to energy industry, the volume of remaining coal refuse across the Commonwealth is daunting.

According to the most recently available DEP coal refuse pile inventory, in 2023 there were approximately 764 coal refuse banks covering 8,001 acres that remain unreclaimed with 44 of those piles actively burning thereby producing uncontrolled, ground level air emissions. The estimated amount of coal refuse in these banks is nearly 211 million tons of material which may potentially be suitable for reclamation by coal refuse RTE facilities. The DEP acknowledges that this inventory is incomplete, and other studies have projected the amount of coal refuse placed on lands in the anthracite and bituminous coal fields of Pennsylvania approaches 1-2 billion tons.

ENVIRONMENTAL AND PUBLIC BENEFITS OF THE COAL REFUSE RECLAMATION TO ENERGY INDUSTRY

The primary benefits to the Commonwealth from the coal refuse reclamation to energy industry come from the environmental and social impacts of removal and remediation of coal refuse piles. This can be analyzed and quantified by considering both the social benefit from removing coal refuse piles, including better water quality, reduced air emissions, improved public safety, and increased land values, and the avoided public cost if the Commonwealth were to perform remediation at the same volume and level of quality as the industry. These frameworks demonstrate that while market revenues may not fully sustain the industry, the broader benefits justify policies supporting the viability of these plants so that the Commonwealth can capture these environmental and public benefits.

One method to value the impact of the coal refuse RTE industry is to quantify the environmental and social benefits of improvements in air quality, water quality, public health and safety, and land value. These benefits are largely "positive externalities" that accrue to individuals or society at large rather than to the plants themselves. At an annualized average of $62 million, the environmental and social benefits of the industry are valued at more than $1.2 billion over a 20-year period. Reductions in air emissions generate over $444 million in value to society while the elimination of water treatment services saves the Commonwealth nearly $452 million. Enhancements of public health and increases to property values are estimated to create approximately $350 million in added value.

Alternately, industry activity can be valued based on an "avoided cost" for the Commonwealth to directly undertake removal to the same volume of coal refuse and to the same standard of remediation. In lieu of the coal refuse RTE industry's continued operations, the Commonwealth would have to explore other options to address legacy coal refuse piles and their associated environmental liabilities. DEP could commission the removal of piles, disposal of refuse, and remediation of waste coal sites to the same standard as the remediation performed by the industry. The cost associated with these efforts represents the "avoided cost" to the Commonwealth that is currently undertaken by the coal refuse RTE industry.

The reclamation and energy generation cycle is a cost-effective way to address coal refuse sites due to structural advantages:

- The refuse is repurposed as a fuel source, eliminating landfill costs.
- The energy generation process creates revenue to offset costs of operation, unlike state remediation.
- The industry addresses water quality impacts at the source, avoiding costly water treatment.

Project bids from prior AML reclamation projects can provide a basis to estimate the avoided cost from other removal, disposal, and remediation efforts by the Commonwealth that are currently undertaken by the industry. In 2016, the DEP requested bids for removal, disposal, and remediation of a coal refuse pile in Ehrenfeld totaling 2.7 million tons of coal refuse and 62 acres. The contract was awarded to Rosebud Mining Company with a total project cost of $26.2 million, including coal refuse removal and disposal, as well as site rehabilitation costs. This total project cost was based on minimal disposal cost because Rosebud was able to relocate and repurpose the refuse in strip mining pits, and due to its ownership of and proximity to these strip mining pits, transportation and storage costs for the coal refuse were greatly reduced. Upon accepting this proposal, the DEP noted that previous bids they had received in 2013 were cost prohibitive. Rosebud Mining Company was able to submit their competitive bid due to favorable circumstances that are not replicable for most other remediation efforts in the Commonwealth.

The Rosebud proposal is used as an illustrative example of a low-end cost remediation solution, and one that may be accessible to DEP based on limited funding, though it does not remediate waste coal to the same environmental standard as a more permanent remediation solution offered by the coal refuse RTE industry. High-end estimates for removal, disposal, and remediation of the Ehrenfeld site ranging from $59-98 million offer a solution that is more equivalent to the level of remediation offered by the industry, but these estimates are often cost prohibitive. While lower cost estimate proposals are sometimes available based on extenuating circumstances, these scenarios are rare and potentially less environmentally sound than higher end cost estimates.

Based on recent bids adjusted for inflation, the estimated cost of removal and disposal is $43 per ton with rehabilitation costs of $30,000 per acre. To match the industry's 2023 activity of 6.6 million tons of coal refuse consumed and 203 acres of land remediated, the costs to the Commonwealth would be at least $290 million annually. Fully eliminating all currently identified refuse piles would cost upwards of $9.3 billion.

WATER QUALITY IMPROVEMENTS AND BENEFICIAL USE ASH

These plants play a critical role in removing coal refuse piles, remediating mining-affected lands, and reducing or even eliminating surface and groundwater pollution caused by acid mine drainage (AMD) from coal refuse piles. By converting coal refuse into alternative energy, ARIPPA members remove one of the

principal sources of contamination to surface water and groundwater in Pennsylvania. DEP's 2024 biennial Integrated Water Quality Report found that 34% of Pennsylvania's rivers and streams do not meet water quality standards for water supply, aquatic life, recreation, or fish consumption. It lists 28,820 miles of Pennsylvania waters as being harmed by pollution with abandoned mine runoff representing the second largest pollutant at 5,533 miles impacted for aquatic life and 74 miles of polluted potable water supply.

Beneficial use ash from coal refuse RTE plants, a byproduct of this energy generation process, is often used as a soil amendment or fill material to remediate mining sites. A common mistake made by critics of the industry is to confuse the risks associated with coal ash from traditional coal power plants with the beneficial use ash produced by coal refuse RTE plants. Ash from traditional coal-fired power plants may contain toxic components and heavy metals that can potentially leach out to contaminate groundwater, drinking water, and surface water, leading to various health problems and ecological damage. This is not true of CFB ash produced by coal refuse RTE plants.

Due to the limestone injected into the CFB boiler as part of the emissions control process, coal refuse RTE ash is highly alkaline and has pozzolanic (cementitious) characteristics, which cause it to harden and encapsulate the refuse material, as well as any heavy metals and other pollutants that may be present in the ash, when utilized in the mine land reclamation process. Before coal refuse RTE ash can be qualified as beneficial use and placed on a site, it must receive certification from the DEP. The certification process involves running the Synthetic Precipitation Leachate Procedure (SPLP) on samples of fresh ash to determine what constituents in the ash may be mobilized once the ash comes into contact with precipitation water. Additionally, monitoring wells must be installed to evaluate the groundwater and are required for ten years after the date of the last ash placement on a refuse reprocessing site.

In 2017, the DEP studied the reclamation of coal refuse piles along the Blacklick Creek in Cambria County using ash from coal refuse RTE facilities and concluded that the high-alkaline filler neutralizes the acidity of former waste coal sites in the Blacklick Creek Watershed, providing significant reductions in the acidity of acid mine drainage and reducing pollutant loadings. There was no degradation of the baseline groundwater quality observed after reclamation began. As the refuse piles were reclaimed the pH of Blacklick Creek below the reclaimed sites reached parity with the pH upstream of the piles.[3]

This fuel cycle approach changed the economic structure of coal refuse pile reclamation by generating revenue to offset removal and transportation costs, generating a byproduct for use in remediation, and alleviating the need for the costly disposal of unused coal refuse. Academic research

[3] "Reclamation of Refuse Piles Using Fluidized Bed Combustion Ash on the Blacklick Creek Watershed," Pennsylvania, PADEP Cambria District Mining Office (2017). *Available at* https://www.asrs.us/wp-content/uploads/2021/10/04-14-Martin-Slides.pdf

supports the cost savings of this particular energy reclamation process. In examining the Grant Town Power Plant in West Virginia, Dr. Paul Ziemkiewicz measured the impact of both elements of the reclamation process by estimating the magnitude of acidity reduction for coal refuse removal and beneficial ash replacement.[4] At its current levels and coal removal (6.6 million tons) and beneficial use ash produced (5.1 million tons), it is estimated that the coal refuse RTE industry eliminates over 3,600 metric tons of acid loadings per year. Assuming that industry activity continues at the same level, it will eliminate additional water treatment services with an average annualized cost savings to the Commonwealth of $22.6 million.

AIR BENEFITS AND EMISSIONS REDUCTIONS

Coal refuse piles pose a number of threats to public health and safety, including air quality impacts. It has long been recognized that the enormous inventory of coal refuse piles abandoned by the legacy coal mining industry represents an ongoing ecological threat to the environment. While adverse environmental impacts to soil, stormwater runoff, surface water, and groundwater by these un-remediated, abandoned environmental hazards are well documented, comparatively fewer examinations of the adverse air quality and carbon dioxide equivalent (CO_2e) emissions GHG emissions impacts of un-remediated and abandoned refuse piles have been identified.

As measured in terms of CO_2e, annual GHG emissions due to legacy coal refuse piles can no longer be ignored simply because the companies that deposited this waste as much as a century or more ago are long gone, leaving behind only a lasting legacy of pollution. The inventory of abandoned coal refuse represents a substantial ongoing source of uncontrolled air emissions, including planet warming greenhouse gases and other fugitive air pollutants. Coal dust from piles is swept up in the wind and deposited across nearby communities. Coal refuse piles can ignite spontaneously or through human intervention. Once ignited, fires often continue to burn for decades, since the coal refuse provides a nearly inexhaustible fuel supply. Further, "methods to extinguish or control AML fires…are generally expensive and have a low probability of success" according to a report from the U.S. Bureau of Mines, which terms these fires "a serious health, safety and environmental hazard."

Abandoned coal refuse piles are a significant existing source of CO_2e, hazardous air pollutants (HAPs), and Clean Air Act (CAA) regulated criteria air pollutants simply due to their continued existence. Many of the environmental problems associated with coal refuse occur as a result of pyrite oxidation and the production of acidity. Often overlooked is that this pyrite oxidation is an exothermic, or heat-producing, reaction.

[4] Ziemkiewicz, P., "Acid Load Reduction Resulting from Operation of the American Bituminous Power Partners, L.P. Grant Town Power Plant." April 28, 2016.

It is well documented that abandoned coal refuse piles are subject to a natural oxidation process leading to spontaneous combustion, which releases fine particulate and products of incomplete combustion including CO_2 and methane to the atmosphere. Fugitive air emissions from abandoned coal refuse piles affect air quality locally, as well as GHG emissions globally. The gradual emission of GHGs, particularly methane and CO_2, from the natural process of partial oxidation of existing abandoned coal refuse piles, if unabated, will remain virtually "forever emitters" of GHGs and other air pollutants. The presence of "red dog", a nonvolatile combustion product of the oxidation of coal refuse provides visual evidence of a history of uncontrolled burning of coal refuse in many older coal refuse piles

When considering the unmitigated air emissions of legacy coal refuse piles, it is meaningful to contrast them with the coal refuse RTE industry. Unlike controlled combustion in a CFB boiler where the coal refuse is efficiently burned out to water and CO_2, a smoldering coal refuse pile is only partially converted to CO_2 along with the far more potent greenhouse gas methane. These "pop-up" air emission sources will continue every year for as long as abandoned coal refuse piles are allowed to persist. However, when a ton of coal refuse is forever neutralized via useful energy recovery, it can never again emit air pollutants or greenhouse gases, let alone contribute to acidification of soil and water resources.

One-time and permanent removal of the root cause of CO_2e emissions from abandoned coal refuse by the coal refuse RTE industry is the only known forever remediation process that is both permanent, proven over many years of operation, already in place, and economically sustainable. While some alternatives may have aesthetic and acid run-off merits, they cannot avoid the passive GHG emission legacy of the potent GHG methane. Studies of potential alternatives to prevent emissions from coal refuse piles suggest that every pile would need to be permanently and anaerobically sealed from the air and that methane collection systems or padding with an inert gas such as nitrogen would need to be continuously maintained to preclude the possibility of future spontaneous combustion and surface emissions. A simple field of beach grass growing on top of a coal refuse pile could not materially eliminate the ability of the pile to spontaneously combust or vent products of incomplete combustion to the surface from deep within.

The emissions of methane from abandoned coal refuse piles, based on measurements by the U.S. Environmental Protection Agency (EPA), are many times more potent GHG emissions than the CO_2 emitted from controlled combustion of coal refuse for remediation. Only permanent removal of the coal refuse itself or impermeable capping with methane collection systems is capable of eliminating forever air emissions of gaseous methane resulting from oxidation and incomplete combustion of coal refuse piles. As with municipal waste landfills, once collected the most environmentally responsible solution is to reduce its global warming potential by 25-28 times by simply combusting it to CO_2 in a highly controlled manner. Of course, this is

exactly what the coal refuse RTE industry has already been doing, at significant savings to taxpayers for over thirty years.

The environmental community has focused on phasing out extraction of fossil fuel from its sequestered state within the earth, however abandoned coal refuse has already been extracted and then discarded – it can never be returned to a naturally occurring underground coal seam. Mining, processing, and combustion of that sequestered carbon from newly mined coal indeed re-emits this long dormant CO_2. Abandoned refuse piles, however, have already been mined and are now an abandoned environmental legacy pollutant, free to continue emitting greenhouse gases and other harmful air emissions without any further human intervention over hundreds of years.

The Appalachian region has relied for years on the coal refuse RTE industry to permanently remediate abandoned coal mining waste, which represents a cost-effective and permanent solution to this significant environmental problem. However, to understand the full emissions profile of these facilities, it is necessary to numerically compare air quality and GHG emissions reductions from remediation of coal refuse by the industry to the ongoing, uncontrolled air emissions from allowing existing coal refuse piles to remain in situ.

Until recently, direct study on the comparative environmental impact of using coal refuse for energy instead of leaving refuse coal in situ was largely unavailable. However, recent research provides compelling evidence that the operation of coal refuse RTE facilities results in net improvements in air quality. Two quantitative studies were conducted to study the emissions from coal refuse RTE industry operations at 11 facilities in Pennsylvania and West Virginia (Northern Appalachia) as compared in the projected emissions from an equivalent amount of coal refuse piles combusted in nature to produce a net emissions profile for the full fuel cycle operations of this industry.

The first study, “Net Air Emission Benefits from the Remediation of Abandoned Coal Refuse Piles,” (TRC Study) was performed by Robert G. Fraser, QEP, and Patrick Fennell, PE, of TRC Environmental Inc., a global engineering and consulting company that provides environmental services for regulatory compliance, development and implementation of remediation and reuse strategies, and protection and restoration of natural resources services. The second study titled “Comparison of the Impact on Greenhouse Gas Emissions Between Unabated Coal Refuse Piles and Reclamation-to-Energy Power Plants” (Lehigh Study) was conducted by Dr. Carlos Romero of the Energy Research Center at Lehigh University in Bethlehem, PA. The final reports from these studies are attached to these comments and incorporated herein.

Quantifying emissions of coal refuse piles is difficult due to the mechanisms that participate in the process, including convective transport through vents and other surface openings and diffusion through the pile material and overburden. A prior study verified that the ratio of the surface to the volume of a coal pile, including coal refuse piles, is one of the key factors affecting spontaneous combustion. Unlike stack

emissions, emissions from coal refuse pile spontaneous combustion are often diffused over a large "ill-defined" area and from different sources, such as vents and fissures in the pile. This makes measurement of all coal refuse pile combustion emissions difficult to measure, requiring selection of sampling points and areas to provide an overall representative indication of the emissions across the burning site. There are multiple reports providing site-specific measurement data on a range of coal refuse pile scenarios. These data can be used to create emissions factors for coal refuse pile emissions.

In the TRC Study, the authors found that summing the estimated annual air emissions from doing nothing about these piles suggests that they represent an impediment to achieving net zero GHG emissions in the region, states, U.S. and globally. They relied on existing studies and the state AML inventories of PA and West Virginia (WV) to calculate that 2.5 million tons of coal refuse are actively burning at any given time in Northern Appalachia and applied published emission factors for GHG pollutants, as well as criteria and hazardous air pollutants, to determine that existing coal refuse piles in these states produce over 15 million tons of CO_2e per year due to spontaneous combustion. When the estimated annual air emissions from both weathering and spontaneous combustion are summed to identify the full magnitude of the continuous contribution of air pollutants from these legacy coal refuse piles, the estimated CO_2e emissions total more than 16.4 million tons per year, frustrating the progress being made elsewhere in improvements to air quality and climate change.

TABLE 1: TRC Study

Estimated Air Emissions from Existing Coal Refuse Piles in Northern Appalachia due to Weathering plus Spontaneous Combustion			
Pollutant	Annual Emissions (tons)		
	Coal Refuse Weathering In-situ; tpy	Coal Refuse Smoldering or Burning In-situ; tpy	Total Estimated Air Emissions, Weathering plus Smoldering or burning in-situ; tpy
NO_x		86	86
CO		278,662	278,662
PM_{10}		1,293	1,293
SO_2		95,084	95,084
CO_2	204,168	3,391,053	3,595,221
CH_4	45,504	469,530	515,034
N_20			
H_2S		1,752	1,752
Hg		1.1	1.1
CO_2e	1,341,768	15,129,314	16,471,082

Using industry data from calendar year 2020, coal refuse facilities in PA and WV permanently remediated at least 5.5 million tons of abandoned coal refuse. The TRC Study authors then compared the actual annual emissions from the facilities remediating this amount of the coal refuse with the projected annual and lifecycle emissions that would have been released from the same amount of un-remediated coal refuse if allowed to simply remain in situ. That comparison provides a summary of the net GHG and criteria pollutant impacts of permanent remediation through controlled energy recovery in any single year. The study found that in 2020, the 11 coal refuse RTE facilities in PA and WV produced direct emissions of 7.6 million tons of CO_2e. In situ emissions from that same amount of coal refuse in nature would have produced annual CO_2e emissions of more than 29 million tons per year. Additionally, these in situ emissions would otherwise continue to be released into the environment over the entire coal refuse emission lifecycle (in this case estimated to be at least ten continuous years of CO_2e emissions) producing lifecycle emissions of 292 million tons over a ten-year period.

As shown in the TRC Study, when the avoided emissions from permanent remediation of existing abandoned coal refuse in Northern Appalachia are compared to annual emissions from the 11 coal refuse RTE facilities in PA and WV in calendar year 2020, the net emissions reduction from operation of this industry is over 20 million tons of CO_2e in a single year with a net ten-year (lifecycle) reduction of over 284 million tons of CO_2e for the same amount of coal refuse that was consumed by the industry in that year. Therefore, the coal refuse RTE industry was found to eliminate 3.9 net tons of CO_2e emissions in one year for every ton of Appalachian coal refuse that it permanently eliminates from the environment and converts to useful energy, or 51 net tons of CO_2e over a 10-year coal refuse emissions lifecycle. This net reduction in GHG emissions would increase as coal refuse RTE facilities operate at a higher capacity.

The TRC Study found that in situ combustion of the same quantity of coal refuse permanently remediated by the coal refuse RTE industry in 2020 (5,546,818 tons) results in a net CO_2e reduction of over a quarter billion net tons of lifecycle CO_2e emissions. Very simply, while the combustion of coal refuse does emit the greenhouse gas CO_2, doing so avoids the ongoing emissions of the potent greenhouse gas methane that would otherwise have been emitted during its extended lifecycle from that same amount of abandoned coal refuse in piles. It is very challenging to think of another economically viable and environmentally beneficial technology of any kind that could come close to providing a net CO_2e benefit of this magnitude, while eliminating the environmental problems created by coal refuse piles, as part of a national strategy to achieve net zero GHG emissions.

TABLE 2: TRC Study

Estimated Net Lifecyle GHG Emission Reductions from Permanent Remediation of 5,546,818 tons of Coal Refuse Annually					
Pollutant	**Unremediated Coal Refuse Estimated Annual Air Emissions (5,546,818 (tons)**	**Unremediated Coal Refuse Estimated Lifecycle Emissions (5,546,818 tons X assumed 10-yrs of continuous air emissions)**	**Coal Reclamation to Energy Industry Emissions to Remediate 5,546,818 tons of coal refuse (tons)**	**Net Lifecycle Emissions from Remediation of 5,546,818 tons of coal refuse (tons)**	**Net Lifecycle Emissions from Remediation of each ton of Coal Refuse by the Reclamation to energy Industry[1] (tons emitted per ton remediated)**
CO_2	6,553,760	65,537,596	7,587,349	(57,950,247)	(10.4)
CH_4	906,655	9,066,551	825	(9,065,726)	(1.6)
N_20					
CO_2e	29,220,138	292,201,380	7,607,978	**(284,593,402)**	**(51)**

The Lehigh Study built upon this by comparing a range of emission factors to determine a high and low range of emissions reductions from the coal refuse RTE industry. For this study, four emissions factors were used in combination with the particular reference case, which is the amount of coal refuse processed by the RTE plants in 2019 (5,627,232 tons). While recognizing the combustion process that takes place in these RTE units is of concern in regard to the CO_2, the author recognized that there are a number of reports that have documented the GHG emissions footprint of coal refuse pile spontaneous combustion, diffused over a large "ill-defined" area and from different vents and fissures in the pile. Calculations were carried out to obtain a comparative assessment on the impact on GHG emissions from unabated coal refuse pile fires vs. the RTE option in the Appalachian region.

In the Lehigh Study, GHG emissions estimations were carried out for equivalent coal refuse volumes processed by the RTE industry in PA and WV in 2019, which if not burned would remain scattered in piles around former coal mine sites representing a risk to vegetative life and negatively impact human health. Depending on the emission factors selected, the expected GHG emissions equivalent, or CO_2e, from unremedied coal refuse piles in the Northern Appalachian region, for a volume of coal refuse adjusted for 2019 for the 11 RTE units, would range from 13,662,919 to 36,239,374 tons. This compares to the corresponding CO_2e emissions reported by the coal refuse RTE plants in the region in 2019 at 7,128,113 tons, or 1.27 tons CO_2e per ton of coal refuse reclaimed by RTE facilities.

TABLE 3: Lehigh Study

Comparative Estimate of GHG Emissions from Coal Pile Refuse and RTE Reclamation

	CO2 Emissions Factor [kg/t coal]	CH4 Emissions Factor [kg/t coal]	Coal Processed by RTE 2019 [t]	CO2 Emissions [t]	CH4 Emissions [t]	CO2,eq Emissions [t]
Reference 20	1,300	180	5,627,232	7,315,402	1,012,902	35,676,651
Reference 21	1,952	17	5,627,232	10,984,357	95,663	13,662,919
Reference 25	2,520	101	5,627,232	14,180,625	566,475	30,041,916
Reference 28	3,500	105	5,627,232	19,695,312	590,859	36,239,374

Each ton of coal refuse consumed in nature is expected to produce GHG emissions between 2.43 and 6.44 tons CO_2e, meaning a net reduction of between 1.16 and 5.17 tons CO_2e per ton of coal refuse reclaimed by the coal refuse RTE industry. The calculations suggest that coal refuse pile GHG emissions are between 1.9 to 5.1 times larger than the corresponding emissions if burned under controlled conditions in the RTE units. Based upon the four emissions factors used in this study, when the full emissions profile of the coal refuse RTE industry is considered, including the reduction of emissions from reclamation of coal refuse piles, the coal refuse RTE industry produces a net reduction in GHG emissions. For a 20-year global warming potential cycle, the total offset amount of CO_2e is of the order of 0.13 to 0.58 billion tons.

Both studies provide empirical evidence that the controlled combustion of coal refuse in properly equipped facilities represents an environmentally superior alternative to the uncontrolled, unregulated emissions that continue from abandoned coal refuse piles throughout the Appalachian region. Econsult Solutions, Inc. (ESI) used this research as a basis to develop a monetized estimate for the net reduction in air emissions achieved through the use of coal refuse for energy. Following from the structure of the 2023 TRC research, they assume that any in situ coal refuse has a realistic risk of combusting. To value this avoided risk, this study compares the emissions produced from using coal refuse for energy to the emissions produced if that coal were to combust in situ.

Using information from the TRC study on the rate of coal refuse burning in situ, it is estimated that combusted waste coal will burn over 20 years, and the surface of the coal piles will generate additional emissions through weathering and oxidation. Applying this framework to the annual amount of coal refuse remediated by the industry in 2023 (6,578,086 tons) results in a net lifetime savings of 26.1 million tons of carbon dioxide equivalent. This result is in line with the results of the Lehigh University study, which estimated net lifetime savings between 13 million and 58 million tons of carbon dioxide equivalent. To

valuate this impact, a conservative CO_2 equivalent value of $23 per ton was used. A 3% discount rate was used to compare the upfront immediate value of coal refuse burned for energy to the impact over time of leaving that coal refuse in situ. This framework results in a net present value of $22.2 million in avoided lifetime CO_2 equivalent emissions resulting from the 6.6 million tons of coal refuse remediated by the industry in 2023. This is expressed as a "one-time" benefit because it captures the lifetime value of emissions savings for each quantity remediated; however, if an equivalent quantity of coal refuse was removed in the subsequent year, this level of value would compound for the emissions savings associated with the removal of this set of piles.

ECONOMIC BENEFITS OF THE COAL REFUSE RECLAMATION TO ENERGY INDUSTRY

The coal refuse RTE industry represents a unique paradigm for mine land reclamation in which environmental and economic objectives overlap. The Commonwealth is typically forced to address the environmental impacts of coal refuse piles on a reactive, rather than proactive basis, due in part to the cost structure of remediation for the state government relative to the coal refuse RTE industry. The industry, on the other hand, has developed a comprehensive fuel cycle approach to the problem.

The coal refuse is removed from these blighted areas and transported to the facilities where it is used to produce energy – offsetting mining and transportation costs – and beneficial use ash is then returned to mining sites for remediation and restoration. The Commonwealth, by contrast, cannot generate energy and attendant revenue with coal refuse, does not have beneficial ash available for reclamation, and most crucially, must pay to safely remove, transport, and dispose of the coal refuse to a new location. As a result, the remediation activities of the industry are far more cost effective than those of the Commonwealth and result in a greater volume of environmental remediation.

The coal refuse RTE industry is a critical driver of economic opportunity throughout rural communities in Pennsylvania. Industry plants are significant employers as well as significant purchasers for other suppliers. The direct expenditures by the plants on their payroll and supply chains create downstream opportunities for related industries including mining, transportation, and environmental remediation that further support jobs and opportunities in rural Pennsylvania.

Not only has the coal refuse RTE industry saved the Commonwealth millions of dollars in environmental clean-up costs, but it is also an economic engine generating annual benefits to Pennsylvania of $697 million, direct expenditures of $389 million, and generating $15.9 million in state taxes and fees. This economic activity supports family-sustaining jobs, which yield average salaries for direct industry employees above $81,000 per year according to a recent ESI study. The study found the industry directly and indirectly

supported nearly 2,200 full-time equivalent jobs, with just over half of those jobs representing direct positions within the plants, and total industry earnings of $155 million.

This data aligns with a report released in January 2022 by the Independent Fiscal Office (IFO) estimating 930 total direct jobs and total wages paid of $80.2 million in 2021, as industry operations and employment have increased in recent years due in large part to increased state support. These high value family and community sustaining jobs relate to every facet of the fuel cycle, ranging from mining, transportation, plant operations and management to environmental remediation. Not to be overlooked is the fact that these benefits are primarily concentrated in financially distressed rural communities of Pennsylvania, which are not only disproportionately burdened by the environmental legacy of past mining, but also struggle to create new economic opportunities.

COAL REFUSE ENERGY AND RECLAMATION TAX CREDIT

The CRER Tax Credit was created by Act 84 of 2016 and is available to facilities that utilize coal refuse and beneficially use ash to restore lands degraded by legacy coal refuse piles and abandoned mines. While the credit was originally equal to $4 per ton of coal refuse used to generate electricity by an eligible facility, due to a tax credit cap that was originally $7.5 million, subsequently raised to $10 million for FY 2017-18 and to $20 million for FY 2019-20 through FY 2023-24, in most years eligible facilities received less than the full tax credit amount. In 2024, the Pennsylvania legislature and Governor Josh Shapiro agreed to increase the CRER Tax credit to $8 per ton of coal refuse with a program cap of $55 million to further support the industry amidst rising operating costs and decreasing energy revenue.

The 2022 IFO report assessed whether the tax credit has achieved its goals and purpose. For this review, the IFO analyzed the program's goals to enhance revenue stability and predictability for electric generation facilities that use fluidized bed combustion and emission control equipment to burn coal refuse, incentivize the use of coal refuse in the generation of electric power, and incentivize the use of treated ash byproduct in the reclamation of mining-affected sites. The analysis established the program purpose as reducing or eliminating the environmental impact and various negative externalities imposed on communities by coal refuse piles and AML sites. The IFO report concluded that "the CRER Tax Credit has achieved its intended goals and purpose."

ALTERNATIVE ENERGY PORTFOLIO STANDARDS

The coal refuse RTE industry is the only AEPS energy source that provides a tangible, quantifiable environmental benefit to the Commonwealth in terms of air, water, and land remediation. The AEPS program was implemented over a period of years culminating in 2021 with a requirement of 8% of energy from Tier I

sources, including a 0.5% carveout from solar, and 10% from Tier II sources including waste coal, municipal solid waste, blast furnace gas, hydro power, energy efficiency, and distributed generation. In 2017, legislation was passed requiring alternative energy credits (AECs) meeting the solar carveout come from resources located in Pennsylvania, and again in 2020 the same requirement was added for Tier II AECs with the goal of increasing credit pricing while ensuring that the program supported in-state electric generation facilities and jobs.

Historically, Tier II AECs offered minimal financial support to eligible facilities with an average weighted price per credit of only $0.25 from 2008 through 2019. However, since Act 114 of 2020 restricted eligibility to Tier II generation sources located in Pennsylvania, effectively closing the program to out of state generators, the value of Tier II credits has increased significantly. According to the PUC AEPS Historical Pricing, Tier II credit pricing reached an average weighted price of $26.92 in 2025. This increased funding for Tier II resources came at a critical time for coal refuse RTE facilities that were struggling to operate at a time of historically low prices in the PJM energy and capacity markets. In fact, four coal refuse RTE facilities closed between 2018-2020. However, since the passage of Act 114 of 2020, there have been no additional facility closures.

Since 2020, AEPS Tier II credits have been essential to the continued viability of Pennsylvania coal refuse RTE facilities. Prior to Act 114 of 2020, absent significant improvement in electricity pricing, Pennsylvania coal refuse generators were expected to continue to retire and eventually depart the market altogether. The state would therefore lose all environmental avoided cost benefits, along with the associated economic benefits, while Tier II AEC prices would rise to support out of state resources.

According to a 2020 study by Thorndike Landing,[5] by closing the borders on Tier II, AEC prices were initially expected to rise up to $16, while preserving the economic and environmental benefits of the coal refuse resources and focusing Tier II spending on in-state resources, rather than resources in other parts of PJM. While these initial estimates were accurate, Tier II AECs have since reached prices as high as $36 per credit as noted in the 2024-2025 AEPS Annual Report issued by the PUC. This increase can be attributed to market forces produced by inflationary costs and persistently low PJM wholesale energy and capacity revenues, along with price competition from other states such as New Jersey Renewable Portfolio Standards Class 2 where some Pennsylvania AEPS Tier II sources remain eligible. In the past year, spot market prices for AEPS Tier II credits have dropped significantly ranging from $19-25 per AEC.

[5] *See* Comments – ARIPPA to the Pennsylvania Public Utility Commission, Docket Number M-2020-3023323 *Implementation of Act 114 of 2020*, submitted on March 2, 2021, *available at* https://www.puc.pa.gov/docket/M-2020-3023323.

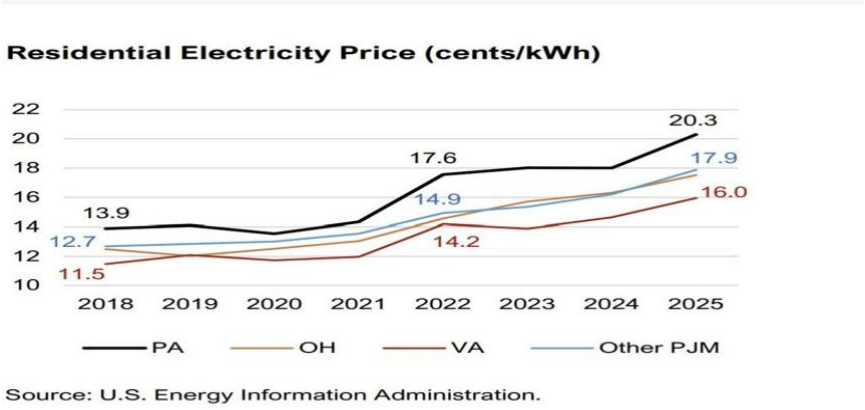
Following the 2020 AEPS Tier II border closure, the amount of in-state Tier II AEC retirements has steadily climbed with 100% of retired Tier II credits coming from Pennsylvania sources in the 2024-25 compliance year. In the 2024-25 AEPS compliance report, the PUC reported that the total compliance costs for all AEPS tiers was approximately $702 million, of which $367 million was for Tier II compliance. Waste coal accounted for 50.5% of the credits retired for Tier II compliance, or 6,895,000 credits. At a weighted average credit price of $26.92, waste coal generators would receive an estimated $185 million in revenue support for credits retired for Tier II compliance in the 2024-25 compliance year. While 100% of the Tier II credits were produced by Pennsylvania generation, 51% of the credits retired for Tier I compliance were produced by facilities outside of Pennsylvania. Thus, while the AEPS program injected $367 million into supporting all Tier II electric generation sources located in Pennsylvania, only $152 million of the $312 million paid by Pennsylvania ratepayers for Tier I compliance likely supported electric generation located in the state.

While the weighted average price of AEPS Tier II credits has increased by $21.16 since the 2020-21 compliance year, the first year following the Tier II border closure, the AEPS Tier I credit price has experienced a similar increase ($18.67) from $10.62 in the 2020-21 compliance year to $29.29 in the 2024-25 compliance year. The increase in renewable energy credit (REC) prices is not restricted to Pennsylvania, as PJM Tier 1 REC prices rose significantly starting in 2021. The PJM Tier 1 average price for the 10 years leading up to 2021 was $8.74/MWh, but began a steady upward trend in 2021 and reached $30/MWh by the end of 2023 similar to the AEPS prices. This increase in price is due to increasing demand for RECs driven by changes to various state Renewable Portfolio Standards programs, a tighter supply of RECs due to various factors, and higher demand for electricity generally.

While total Tier II compliance costs have increased, the impact at the customer level remains limited. Total Tier II compliance — including both waste coal and non-waste coal — accounts for less than 1.3% of a typical residential bill. Waste coal alone accounts for approximately 0.6%. The primary drivers of rising electricity costs are distribution charges that are some of the highest in the region.

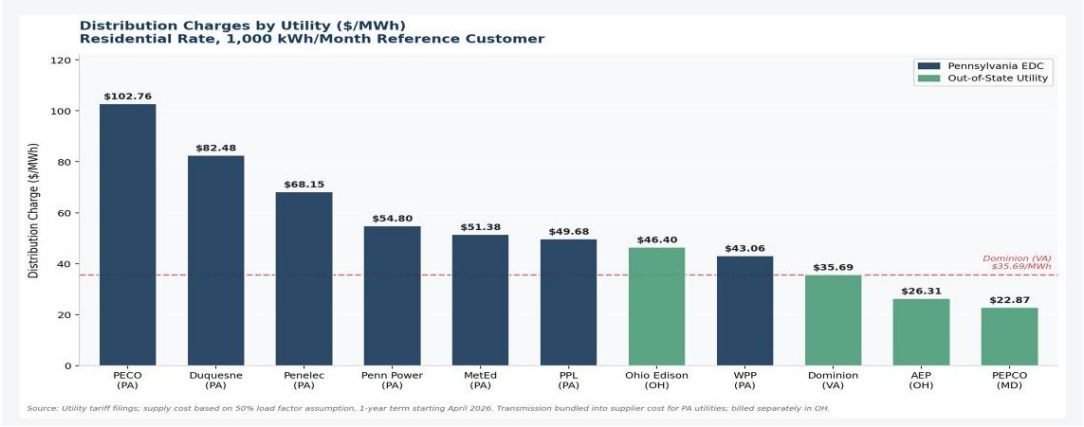
Pennsylvania residential electricity rates have risen sharply since 2018, and the Commonwealth has become an outlier even relative to neighboring PJM states. The data point to where the cost growth is actually coming from — and Tier II is not it. Pennsylvania's high retail electric bills are a distribution-cost story, not a Tier II story. Closing the affordability gap with neighboring states requires addressing distribution rates and capacity market design — not the smallest line item on the bill.

Pennsylvania residential rates rose 46% between 2018 and 2025 — from 13.9¢/kWh to 20.3¢/kWh. Virginia rose 39% (11.5¢ to 16.0¢) and Ohio tracked similarly. Pennsylvania is now meaningfully above the rest of PJM despite having lower wholesale costs throughout the period.



Residential electricity prices, 2018–2025. PA: 20.3¢/kWh | VA: 16.0¢ | OH: 17.9¢. Source: U.S. Energy Information Administration.

The gap is structural and lives on the distribution side of the bill. Comparing distribution charges utility-by-utility makes the source clear. Every Pennsylvania electric utility charges more for distribution than Dominion (VA), AEP (OH), or PEPCO (MD). PECO sits at $102.76/MWh — nearly 3 times Dominion. Even the lowest-cost PA utility (West Penn Power at $43.06) is above Dominion. This is a structural cost story driven by declining load spread across fixed distribution infrastructure, not by generation or compliance costs.



Distribution charges by utility, $/MWh. Pennsylvania EDCs in navy; out-of-state utilities in green. Source: Utility tariff filings.

When you deconstruct the average utility bill, it becomes clear that Tier II is a small share of the total. The full cost-stack comparison (per MWh) shows Tier II compliance — the entire AEPS Tier II program — accounts for $2.60 of a $202.66 PECO bill, or approximately 1.3%. Waste coal alone accounts for $1.25, or approximately 0.6%.

Cost Component ($/MWh)	PECO (PA)	Dominion (VA)
Energy	$56.44	$70.41
Losses	$3.44	$4.29
Capacity	$24.90	$32.29
Transmission	$22.00	$19.51
ARR	-$2.11	($4.46)
REC (Total AEPS Compliance)	$4.68	$6.91
Tier 1 Renewables (8% obligation)	*$2.08*	—
Tier 2 Non-Waste Coal (5.2% of obligation)	*$1.35*	—
Tier 2 Waste Coal (4.8% of obligation)	*$1.25*	—
Ancillary Services	$3.48	$3.47
Total Supplier Cost	**$112.83**	**$132.42**
Distribution Charge	**$78.99**	**$35.69**
Other Charges	**$10.84**	**$2.90**
TOTAL BILL (per MWh)	**$202.66**	**$168.59**

Two observations stand out:

- PECO's total bill ($202.66/MWh) is roughly 20% higher than Dominion's ($168.59/MWh), but the gap is driven almost entirely by distribution charges ($78.99 vs. $35.69) — not by Tier II compliance.
- Waste coal's contribution to the PECO bill ($1.25/MWh) is smaller than the Arrears credit (ARR), smaller than ancillary services, and an order of magnitude smaller than the distribution-side cost gap between the two utilities.

If the goal is to reduce electricity costs for consumers, the policy focus should include utility procurement and cost structures, PJM capacity market design and outcomes, and transmission cost growth and allocation. In summary, while Tier II credit prices have risen over time as intended and expected with the passage of Act

114 of 2020, the program delivers more electricity, lower cost per MWh, greater in-state retention, reliable baseload power, and environmental cleanup for comparable ratepayer investment compared to Tier I. Coal refuse RTE plants, which comprise the majority of Tier II generation, actively clean up legacy environmental issues by combusting abandoned waste coal, reclaiming thousands of acres of land, restoring miles of streams, and treating acid mine drainage. This dual role - generating energy while remediating pollution - delivers public benefits far beyond electricity production, addressing long-standing challenges in Pennsylvania's coal regions.

The AEPS program is currently meeting the needs of Pennsylvania Tier II energy sources, such as waste coal, municipal solid waste, blast furnace gas, and hydro power. Why should we change the Tier II program, which from all accounts is accomplishing its goal of supporting continued operation of these sources?

PENNSYLVANIA RELIABLE ENERGY SUSTAINBILITY STANDARD

As proposed, the PRESS legislation would add several new resource types, create a third tier, and increase the amount of energy required to come from the three tiers to 50%, as well as create a new Zero Emissions Credit (ZEC) program for nuclear generation. Most importantly for ARIPPA's members, PRESS would create a new Tier III consisting of waste coal, municipal solid waste, and integrated combined coal gasification technology (all currently AEPS Tier II resources), generation of electricity utilizing byproducts of the pulping process and wood manufacturing process (an AEPS Tier I resource), and adds natural gas or coal using clean hydrogen (20%) co-fired blend or equivalent carbon intensity reduction. While ARIPPA and our members appreciate that waste coal is retained in the new PRESS program, the structure of this new Tier III – like AEPS Tier II before the 2020 border closure – would be support in name only. As proposed, PRESS would significantly cut support for Tier III sources, including waste coal, rendering this new tier insufficient to adequately support continued operation of these environmentally beneficial facilities.

First, PRESS would reduce the Alternative Compliance Payment (ACP) to $15 for the new Tier III from the current $45 ACP for AEPS Tier I and II resources. The ACP serves as a de facto price cap on the AEC market. Thus, a cut by two-thirds in the ACP will result in an equivalent or greater reduction in the value of AECs that currently support AEPS Tier II resources. A reduction in the ACP would be a disincentive for sources in this tier, particularly those sources already in the AEPS program, to construct new facilities or continue operating existing facilities in the state. These resources will be less competitive with surrounding states and less viable to continue their operations, particularly in a PJM energy market with historically low prices.

Additionally, the proposed legislation calls for 3.8% of Pennsylvania's energy to come from PRESS Tier III resources in 2026 rising to 5% in 2032. However, since at least 2020, the proposed PRESS Tier III

resources that are currently producing AECs in Pennsylvania (waste coal, municipal waste, wood pulping byproducts) have annually generated in excess of 5% of Pennsylvania's energy usage. Therefore, even with no new resources or increases in generation, PRESS Tier III would have an initial 40% credit oversupply. Taken in conjunction with the two-thirds reduction in the ACP to $15, this oversupply will produce PRESS Tier III credit prices similar to historic Tier II AEPS credit prices of less than $1 and far below the amount needed to support continued operation of these facilities.

Historic Amounts of Proposed PRESS Tier III Credits Created						
PRESS Tier III Sources	2020	2021	2022	2023	2024	2025
Wood pulping by-products	323,481	379,802	391,932	304,669	203,313	269,152
Municipal Solid Waste	1,732,914	1,610,136	1,554,757	1,626,412	1,609,843	1,558,728
Waste Coal	5,199,621	5,242,271	5,676,664	5,541,020	5,878,306	5,308,483
Total	7,256,016	7,232,209	7,623,353	7,472,101	7,691,462	7,136,363
PA Total MWh Consumed	136,458,735	136,669,240	139,111,166	135,967,418	134,242,935	136,554,600
% Proposed Tier III Credits	5.32%	5.29%	5.48%	5.50%	5.73%	5.23%
3.8% Tier III Requirement	5,185,432	5,193,431	5,286,224	5,166,762	5,101,232	5,189,075
Excess Credits @ 3.8%	2,070,584	2,038,778	2,337,129	2,305,339	2,590,230	1,947,288
% of Excess Tier III Credits	39.9%	39.3%	44.2%	44.6%	50.8%	37.5%

*Source: PJM Generation Attribute Tracking System (GATS) and PAPUC AEPS Compliance Reports 2020-2025

A cut in state support for these environmentally beneficial energy resources of the magnitude proposed in PRESS would force many of the facilities to idle or permanently close thereby forgoing their economic and environmental benefits. Should that happen, what you will end up with is a useless PRESS Tier III that fails to support any of these environmentally beneficial energy sources and leaves the state with no realistic means to clean up more than 200 million tons of polluting waste coal. If you are going to revise the AEPS and create the new PRESS, shouldn't it be structured in a way that will actually work and provide the support these facilities critically need?

PRESS's revisions to AEPS Tier II energy sources risk reducing incentives for critical electricity providers, including coal refuse RTE plants, steel manufacturers that repurpose coke oven gas for on-site electricity generation, and facilities that divert municipal solid waste from landfills to create renewable energy. These facilities are critical to Pennsylvania's economy, supporting thousands of jobs and contributing to grid reliability. In addition to their environmental benefits, Tier II resources are some the most resilient and reliable electricity sources in the AEPS program, particularly during peak winter demand when intermittent resources are generally unavailable. Reducing support for these facilities' incentives could jeopardize some of the most reliable and environmentally beneficial energy sources in the state.

Instead of altering Tier II and reducing incentives provided therein, the legislature should consider expanding the eligible sources and closing the border for AEPS Tier I, as over 50% of Tier I credits purchased

by Pennsylvania's electric distribution companies fund projects outside the Commonwealth thereby limiting in-state economic benefits. Pennsylvania ratepayers deserve to see their investments support local jobs and infrastructure. If a new Tier III is created, this would be the more reasonable place to include promising new technologies like advanced nuclear (e.g., small modular reactors), fusion and grid-scale storage. This approach preserves existing jobs and environmental benefits while promoting investment and reliability in Pennsylvania's energy generation.

ECONOMIC CHALLENGES FACING THE COAL REFUSE RECLAMATION TO ENERGY INDUSTRY

These plants face unique challenges that jeopardize their financial viability as employers, taxpayers, and environmental remediators. The problem simply is that a variety of economic forces have recently conspired to undermine the economic fundamentals of the industry. As the industry struggles, the amount of environmental remediation that can be accomplished declines. Between 2018 and 2020, four Pennsylvania coal refuse RTE plants permanently closed, taking with them hundreds of jobs and millions of tons of potential coal refuse reclamation.

Many coal refuse facilities are today a victim of their own success. Distances to retrieve fuel, and related transportation costs, have increased as piles adjacent to the plants have already been successfully removed and remediated by the industry. Thus, they must travel farther and farther afield, away from the energy facilities to site and permit coal refuse piles for reclamation. Similarly, the rising cost to ship the beneficial ash back to remediate mining sites has increased operating costs. These are reflected in the fuel cycle reclamation costs which represent, on average, about 70% of the operating costs of these facilities.

The viability of the coal refuse RTE industry has also been adversely affected by a bevy of burdensome environmental regulations at both the federal and state level. Furthermore, the traditional fossil fuel regulatory scheme undervalues coal refuse electricity generation because it fails to recognize its positive externalities, the inherent environmental value of remediating abandoned refuse sites, and the manifest environmental benefits attendant to this industry. Federal and state environmental regulatory requirements, reclamation bonding expenses, and the corresponding capital, operating and maintenance costs represent an escalating expense threatening the facilities' survival.

Energy production is a cost-intensive industry, with a range of skilled personnel and investments required for operations. Fixed costs that do not directly vary with the level of energy production such as personnel, equipment, and administration represent the largest investments, supporting an average salary in excess of $81,000. Variable costs associated with each unit of energy production have rapidly increased with transportation being a major component of the cost structure for the coal refuse RTE industry directly impacted by the price of diesel being higher in Pennsylvania relative to neighboring states as plants have

remediated the sites closest to their location and now must go further afield to find new sources of coal refuse. Capital costs to maintain and enhance the functionality of the plant and equipment have been increasing due to inflation, supply chain constraints, and deferred maintenance. Finally, taxes paid by the plants are vital to local communities. Based on aggregated data from a member survey, the ten member plants in Pennsylvania were estimated to have total costs of $434 million in 2023.

Relative to most other energy producers, coal refuse plants are labor intensive and have an expensive environmental reclamation fuel cycle with several components. Both coal refuse and limestone must be transported to plants, and the resulting beneficial use ash is then transported back to the mining sites for use in environmental remediation. This series of steps and the attendant cost structure relative to decreasing energy and capacity prices in the PJM market have created major marketplace challenges for the industry.

Pennsylvania coal refuse plants participate in the PJM RTO that runs the wholesale electricity market for most of Pennsylvania and all or part of 12 other states and the District of Columbia. Participation in competitive energy markets, for which these facilities were not designed, has in recent years been challenging due to persistently low energy and capacity market pricing. While remediation of coal refuse piles produces a broad range of environmental and social benefits, individual RTE plants are private businesses that operate as merchant power generators responsive to the financial conditions in the PJM marketplace.

Like all power generating companies, they rely on two primary market-based revenue sources: wholesale energy sales to energy suppliers who deliver power to consumers and capacity payments received in exchange for a guarantee to supply adequate quantities during periods of peak consumer demand. Unfortunately, recent conditions in the PJM market serving Pennsylvania do not provide sufficient revenue to cover operating costs for coal refuse plants. Weekly wholesale energy prices averaged around $30/MWh in 2023 and 2024. Meanwhile, estimated “breakeven prices” to recover costs of production for plants grew from $39/MWh in 2019 to $62/MWh in 2023 and continue to rise at an alarming rate due to increases in cost inputs.

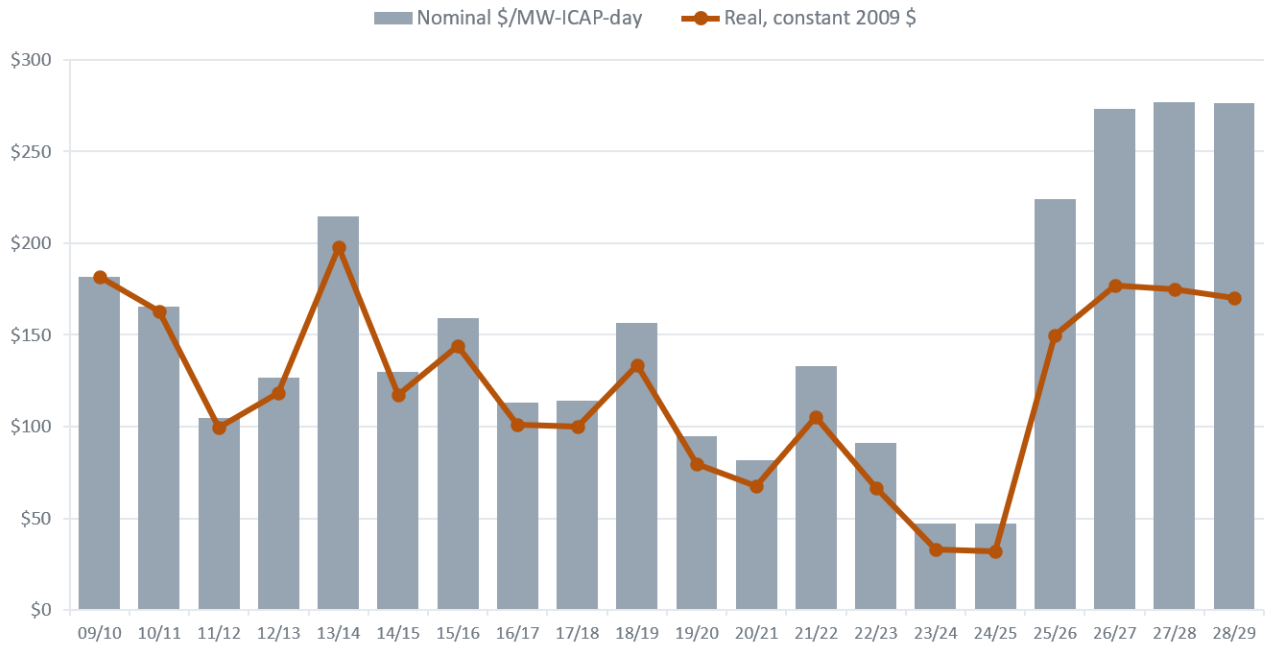
Capacity payments have also been below typical levels in recent years with the price per MW-day from 2023 to 2025 of $50 representing the lowest price in the past 10 years. Pricing increased to $270 in 2026, representing a 28% increase in real terms above the pre-COVID high, and will notably stay above the recent depressed price levels over the next three auction periods due to a capacity payment “collar” negotiated by Governor Shapiro with a floor of $175/MW-day and a cap of $325/MW-day. When wholesale prices fail to meet production costs, continued operation relies more heavily on capacity payments and governmental interventions, such as tax credits and other subsidies.

Historical Base Residual Auction (BRA) Clearing Prices (RTO Average)

- 2022/2023: $50.00/MW-day
- 2023/2024: $34.13/MW-day
- 2024/2025: $28.92/MW-day
- 2025/2026: $269.92/MW-day (with localized spikes higher in zones like BGE and Dominion)
- 2026/2027: $329.17/MW-day (hitting the FERC-approved market price cap)
- 2027/2028: $333.44/MW-day (record high prior to temporary state mitigation caps)
- 2028/2029: $325.00/MW-day (cleared at the established regulatory price cap collar)

PJM capacity prices may look extremely high in today's nominal dollars, but they are not actually unprecedented once you adjust for inflation and how much of a generator's installed capacity PJM actually credits as reliable capacity.

What a MAAC-located coal unit at a 5% forced outage rate actually clears, per MW of installed capacity per day



MAAC Resource Clearing Price x (1 - EFORd) through 2024/25, x ELCC coal class rating from 2025/26. Deflated by CPI-U annual average, 2009 = 1.000; 2025 excludes the unpublished October reading, 2027 and 2028 assume 2.5% inflation.
Sources: PJM Base Residual Auction reports, PJM ELCC Class Ratings, BLS.

Beginning with the 2025/2026 Delivery Year, PJM applied the Effective Load Carrying Capability (ELCC) modeling method to measure the actual capacity value a power source provides during high-risk, peak-demand hours. Adopted via a marginal ELCC approach, it determines how much reliable contribution generation and storage resources receive in PJM capacity auctions. Under the ELCC system, coal refuse has a class rating of 83%. That means a 100-MW coal refuse plant would conceptually be treated as: 100 MW ×

83% = 83 MW of accredited capacity. So even if the auction price is high, you cannot simply multiply that price by the plant's physical 100 MW and compare it with an older auction. Therefore, these recent “record” auction prices should not be confused with record economic support for existing generation.

Inflation is the second adjustment. Comparing $214.84 in 2013 with $276.25 in 2028 makes today's price appear higher, but $276 in 2028 does not have the same purchasing power as $215 in 2013 when you convert the historical capacity prices into constant 2009 dollars. After adjusting for inflation and accreditation, the real values based on 2009 dollars become:

- 2025/26: $149.50/MW-day
- 2026/27: $177.08/MW-day
- 2027/28: $174.99/MW-day
- 2028/29: $170.40/MW-day

While the recent price spike restores much of the economic value that generators previously lost, it still does not exceed the real value achieved in 2013/14 in the MAAC zone.

After making those adjustments, the 2013/14 capacity market price was actually more valuable to a coal refuse generator in that market than the current 2028/29 market, despite today's prices being much higher. While recent PJM capacity prices may seem high in nominal terms, after adjusting for inflation and the changing way PJM accredits generating capacity, the 2028/29 value is about 14% below the 2013/14 peak. Even when PJM's capacity market produces very high nominal prices, that doesn't necessarily mean existing generators are receiving historically exceptional compensation. That distinction could be particularly important for coal refuse and other dispatchable generators because the economics of keeping those plants operating depend on whether capacity revenues are sufficient to offset their costs and risks.

A recent study by ESI found that pricing variability and lower price levels for both wholesale energy and capacity payments in recent years have increased the importance of additional revenue mechanisms, like AEPS and the CRER tax credit, in keeping plants viable. Reviewing a comparison of industry costs and revenues provides context for the role of the AEPS program and CRER tax credits in the economic viability of the coal refuse RTE plants. With market revenue reduced, Tier II AECs accounted for more than half of plant revenue in 2023. Industry operations would not have been viable without this revenue source.

Based on aggregated data, the ten plants in Pennsylvania barely broke even with estimated revenue of $446 million and total costs of $434 million in 2023. This shows that the industry’s environmental reclamation and energy operations would not have been viable without the vital state support from the AEPS and CRER tax credit programs. Comparing revenues and costs, the revenue generated per unit of energy of $64 marginally cleared the total cost of $62.26 per energy unit in 2023. This represents a profit margin of just under 3%, or an aggregated profit of $12 million across all ten plants.

Since 2023, operating costs have continued to increase at rates exceeding inflation, while market revenues remained low by historic measure with a 2024 average Locational Marginal Price (LMP) in PJM, weighted by load, of $33.74/MWh. In 2025, the PJM system-wide real-time load-weighted average LMP rose to $50.73 per MWh, exhibiting a 50.4% spike from the 2024 average. Key drivers of 2025 increase were escalating fuel costs and extreme weather leading to historic summer and winter peak demand. However, these prices remain extremely volatile with a warm winter likely driving prices to drop below $30/Mwh thereby placing greater risk on dispatchable generation like coal refuse.

PJM GRID IMPACT

The closure of the coal refuse RTE industry in Pennsylvania would remove 1,200 MW of reliable, alternative energy from the PJM electric grid. The cost to ratepayers to replace these MW will be significantly greater than the amount of subsidy Pennsylvania currently provides to the coal refuse RTE industry to remediate polluting coal refuse piles. To replace the coal refuse RTE units with 1,200 MW of natural gas generation capacity would cost upward of $3 billion dollars. The capacity price needed to support such development would be in excess of $500 per MW-day. This does not include the added cost to Pennsylvania taxpayers for replicating the mine land reclamation and the loss of economic benefits from coal refuse RTE plant operations.

Pennsylvania has historically been a net electricity exporting state. In 2023, the generators in state produced 235,924,937 MWh while consumers used 138,710,993 MWh producing a net surplus of 97,213,944 Mwh that was exported to surrounding states. However, PJM is currently facing growing resource adequacy concerns due to factors like load growth, generator retirements, and delays in new generation projects. Since early 2023, PJM has been warning of the potential for an imbalance in electricity supply and demand that will affect future grid reliability. PJM has stated that “a capacity shortage may affect the PJM system as early as the 2026/2027 Delivery Year, when the 2025 Long-Term Load Forecast is taken into account.”

Electric costs have risen recently because supply is decreasing while demand is growing. A primary reason for this imbalance is power plants that generate electricity are retiring – often due to decarbonization policies or economic pressures – while demand is increasing due to the growth of artificial intelligence, data centers, electrification, and a resurgence in U.S. manufacturing. When generation resources are shuttered and more are needed, prices naturally rise to encourage construction of new generation. This dynamic is national, but some states like Pennsylvania where older resources are being retired without enough new supply coming online are feeling the effects more acutely.

On every measure that matters to resource adequacy, Pennsylvania is the single largest supplier in the thirteen-state PJM market. Pennsylvania is PJM’s generation backbone with 49.1 GW of installed capacity,

about 23.3% of the total in PJM. It produced 244.4 TWh in 2025, about 28% of PJM generation, and exported 92.4 TWh of electricity in 2024, more than any other PJM state. Pennsylvania has roughly 9.6 GW of capacity above its own 2028/29 obligation. Pennsylvania's generation has relatively strong capacity accreditation. Applying PJM's ELCC ratings to Pennsylvania's fleet produces an estimated accreditation that is better than the PJM average.

Pennsylvania carries a disproportionate share of PJM's electricity-generation and reliability burden while receiving relatively little policy or revenue support for its generation fleet. Pennsylvania generators are unusually exposed to wholesale market price with only 6.8% of Pennsylvania generation classified as receiving rate recovery, REC, or ZEC support. Pennsylvania has 227.7 TWh of price-exposed generation, about 48.6% of all price-exposed generation in PJM. This contrasts with neighboring states that provide substantially more support for their own generation. Additionally, ownership is concentrated, as Constellation and Talen together account for roughly 40% of Pennsylvania's generation capacity. About 29% of Pennsylvania capacity is held by owners with limited geographic alternatives for their assets. This means some generators are particularly exposed to Pennsylvania-specific regulatory and market conditions.

Pennsylvania is providing the generation, siting, emissions exposure, and merchant-market risk while neighboring states benefit from the resulting reliability. Other PJM states depend heavily on Pennsylvania with 9 of 13 PJM jurisdictions consuming more electricity than they generate. Pennsylvania accounts for approximately 85% of the energy surplus among the jurisdictions whose load and generation are entirely within PJM. Pennsylvania's 92.4 TWh surplus covers nearly all of the 106.5 TWh deficit run by the six buyer jurisdictions. Each of them lowers its own bill by suppressing the price Pennsylvania generators earn.

The PJM capacity market reinforces this imbalance, as Pennsylvania represents 25.8% of cleared 2028/29 PJM capacity. Pennsylvania has 9,562 MW of accredited capacity beyond its own obligation, while five deficit jurisdictions collectively face a 21.6 GW shortfall. Pennsylvania's surplus capacity effectively supports states that have insufficient generation of their own. The $325/MW-day capacity price cap reduces Pennsylvania generators' potential revenue, as PJM's last two auctions cleared at the administrative cap. PJM's own simulations show what the market would have paid without it: $529.80 (2027/28) and $554.72/MW-day (2028/29) vs. capped clears of $333.44 and $325.00. Pennsylvania's generators lose about $0.8 billion annually because of the cap, while several buyer states receive lower capacity charges. The cap cost Pennsylvania's 10 coal refuse generators $154.3 million in capacity revenue over two years, while New Jersey, Ohio, Virginia, Maryland, and Washington DC avoided $1.81 billion of capacity charges.

Another concern is the availability of dispatchable generation in the PJM Market is shrinking. Since 2010, the PJM region has retired approximately 55 GW of dispatchable capacity, while adding only 39.7 GW. Since 2020 alone, another 19.2 GW of dispatchable capacity has retired. At the same time, additions of new

dispatchable capacity have slowed dramatically. Pennsylvania has historically built more than other states. Pennsylvania added 11.5 GW of dispatchable capacity since 2010, more than any other PJM state. This contrasts that with Maryland, Virginia and New Jersey, which together added only 28 MW since 2020 while retiring 7.6 GW. Pennsylvania itself has now also begun shrinking, with a 956 MW net decline since 2020.

Pennsylvania supplies a disproportionate amount of PJM's electricity and reserve capacity, bears substantial merchant-market risk, and receives relatively little policy support for its generators. Meanwhile, many neighboring states increasingly depend on Pennsylvania's fleet to compensate for their own generation deficits. Pennsylvania should develop policies that protect its dispatchable generation and ensure its generators and ratepayers are not effectively underwriting other states' energy policy choices.

CONCLUSION

The coal refuse RTE industry is a unique private-public partnership that allows these facilities to generate electricity and at the same time restore the environment of the Commonwealth. As public funding for AML remediation continues to be insufficient, ARIPPA and our members hope to continue partnering with the Commonwealth to promote the value of AML reclamation and find ways to secure funding that will sustain and increase the current level of AML reclamation activities. The industry is historically the most effective and prolific actor in the remediation of coal refuse piles across the Commonwealth. No one but the coal refuse RTE industry can remove abandoned coal refuse piles and address the attendant environmental and safety hazards in a holistic, efficient, and permanent manner while providing dispatchable baseload electric generation.

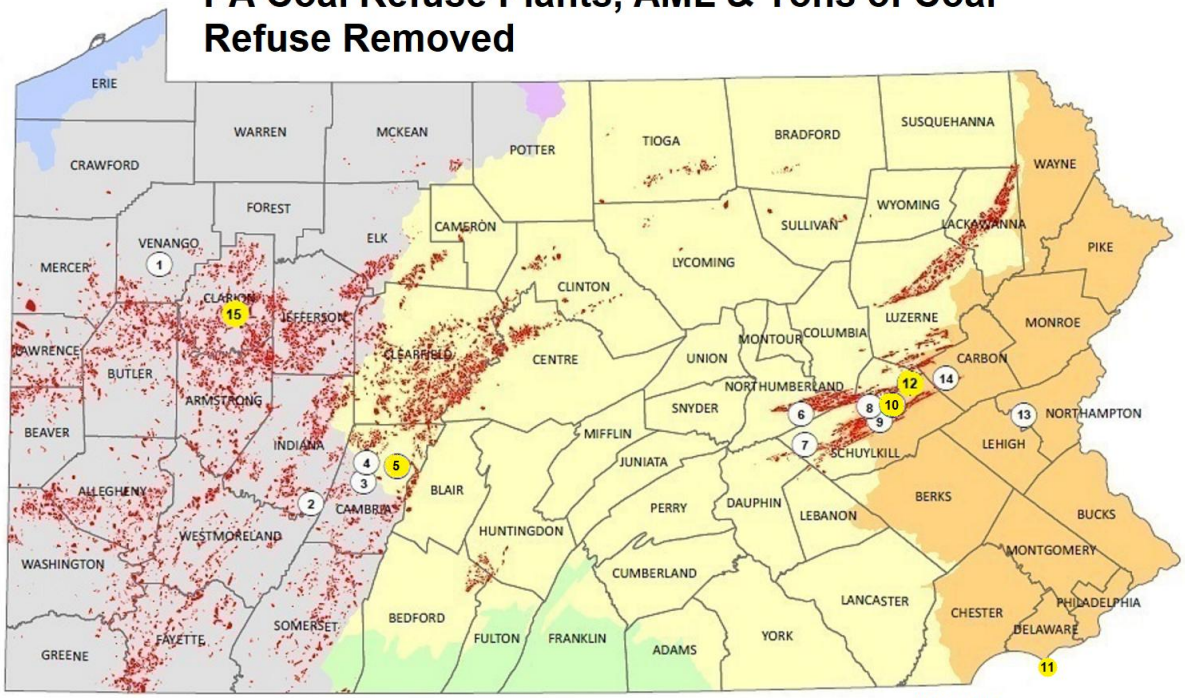
The industry is appreciative of the Commonwealth's continued support as plants continue to struggle in the face of costly environmental regulations and volatile energy prices. By partnering with private industry, the Commonwealth receives environmental remediation of these polluted sites at a reduced cost from were it to be performed by a state agency or subcontractor. If the state does not continue to partner in the environmentally beneficial efforts of these facilities and ensure that they remain open, not only will family sustaining jobs be lost, but the massive environmental problem of abandoned coal refuse piles and pits will continue to scar our land and pollute our air and waterways for generations to come.

We urge the Senate Majority Policy Committee to recognize the vital role these facilities play in restoring and reclaiming AML sites and the environmental and economic benefits of this work as the General Assembly evaluates how to ensure reliable, affordable electric generation and considers legislation, such as the PRESS bill, that could impact the coal refuse RTE industry. Pennsylvania should prioritize protecting and supporting its own generators rather than effectively subsidizing neighboring states' energy policies.

ARIPPA Plants by County

County	Plant	Net Operating Capacity (MW)	Fuel Type
Cambria	Colver Power Project	111	Bituminous
Cambria	Ebensburg Power Company	50	Bituminous
Schuylkill	Gilberton Power Company	80	Anthracite
Northumberland	Mt. Carmel Cogen	43	Anthracite
Northampton	Northampton Generating Company	112	Anthracite
Carbon	Panther Creek Power Operating	80	Anthracite
Schuylkill	Westwood Generation	33	Anthracite
Schuylkill	Schuylkill Energy Resources	80	Anthracite
Venango	Scrubgrass Generating	83	Bituminous
Indiana	Seward Generation	525	Bituminous
	Total	**1197**	

PA Coal Refuse Plants, AML & Tons of Coal Refuse Removed



1. Scrubgrass Reclamation Company – 83 MW; 311,383 tons
2. Seward Generation – 525 MW; 1,667,644 tons
3. Ebensburg Power Company – 50 MW; 299,279 tons
4. Colver Green Energy – 110 MW; 540,325 tons
5. Cambria Cogen Company – 87 MW; N/A [2019]
6. Mt. Carmel Cogen – 43 MW; 265,566 tons
7. Rausch Creek Generation – 33 MW; 352,125 tons
8. Schuylkill Energy Resources – 80 MW; 1,355,140 tons
9. Gilberton Power Company – 80 MW; 739,368 tons
10. Wheelabrator Frackville Energy Company – 42 MW; N/A [2020]
11. Kimberly Clark Chester Plant – 67 MW; N/A [2019]
12. Northeastern Power Company – 52 MW; N/A [2018]
13. Northampton Generating Company – 112 MW; 481,815 tons
14. Panther Creek Power Operating – 80 MW; 560,954 tons
15. Piney Creek LP – 32 MW; N/A [2013]

*MW = Net capacity; Tons of coal refuse removed in 2023

Watersheds

- Ohio
- Genesee
- Delaware
- Potomac
- Erie
- Susquehanna
- Abandoned Mine Land Problem Areas
- Closed
- Announced Closure

Pollution Caused by Coal Refuse Piles

Examples of Reclamation by the Coal Refuse RTE Industry

Northampton Generating – Loomis Bank Mine Fire, Luzerne County

Northampton Generating – Loomis Bank Site, Luzerne County

Barnes Watkins

Cambria County, Pennsylvania

Coalpit Run

Cambria County, Pennsylvania

Cooney #3

Cambria County, Pennsylvania

Soberdash

Westmoreland County, Pennsylvania

South Branch Blacklick Creek

Cambria County, Pennsylvania

Spangler

Cambria County, Pennsylvania

Stineman
Cambria County, Pennsylvania

Vintondale
Cambria County, Pennsylvania