

House Environmental Resources and Energy Committee

Public Hearing : Cryptocurrency and Climate Change

Monday, May 1, 2023

10:00am – 12:00pm

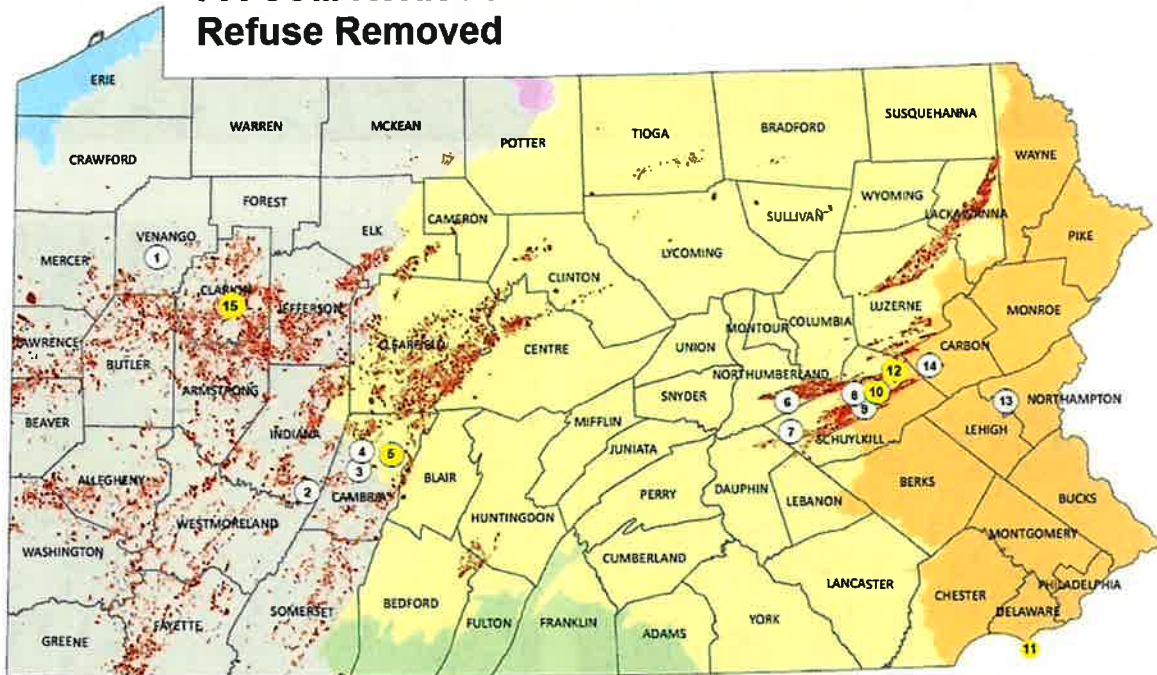
Room 523, Irvis Office Building

Gregory A. Beard
Co-Chairman and CEO, Stronghold Digital Mining

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PA Coal Refuse Plants and Tons of Coal Refuse Removed



1. Scrubgrass Generating - 83 MW; 15,012 tons
2. Seward Generation - 525 MW; 2,106,108 tons
3. Ebensburg Power Company - 50 MW; 360,893 tons
4. Colver Power Project - 110 MW; 428,782 tons
5. Cambria Cogen Company - 87 MW; N/A [2019]
6. Mt. Carmel Cogen - 43 MW; 98,104 tons
7. Rausch Creek Generation - 33 MW; 362,830 tons
8. Schuylkill Energy Resources - 80 MW; 1,357,501 tons

9. Gilberton Power Company - 80 MW; 745,488 tons
10. Wheelabrator Frackville Energy Company - 42 MW; 81,886 tons [2020]
11. Kimberly Clark Chester Plant - 67 MW; N/A [2019]
12. Northeastern Power Company - 52 MW; N/A [2019]
13. Northampton Generating Company - 112 MW; 7,791 tons
14. Panther Creek Energy - 80 MW; 64,329 tons
15. Piney Creek LP - 32 MW; N/A [2013]

*MW = Net capacity; Tons of coal refuse removed in 2020

Watersheds



Pollution Caused by Coal Refuse



Seward Generation – Seanor Site, Westmoreland County



Ebensburg Power Company – Revloc Site, Cambria County



Northampton Generating – Loomis Bank Mine Fire, Luzerne County



Northampton Generating – Loomis Bank Site, Luzerne County



Colver Power Project – Lily Sports Complex, Cambria County



2011



2015



Eastern PA Coalition for Abandoned Mine Reclamation

Michael A. Hewitt, GISP
Program Manager
101 South Main Street
Ashley, PA 18706
Main Line: (570) 371-3522
E-mail: hardcoal@epcamr.org

Re: Waste Coal to Energy Industry is crucial to PA Abandoned Mine Land Reclamation Goals

Honorable Robert P. Casey Jr.
393 Russell Senate Office Building
Washington, D.C. 20510

We looked over the 2009 ECONorthwest report last year when Congressman Cartwright's fellow, Jette Finsden, brought it to our attention. Our first impression was that it was very biased and it's pretty old information from more than ten years ago. We broke it down and submitted our comments to both Congressmen Cartwright and Meuser last year. We also cleared up some of Sierra Club's concerns and wants related to the HR 4735 language and ultimately Cartwright not only co-sponsored it, but co-authored it. The bill has broad support on both sides of the aisle among Pennsylvania delegates.

EPCAMR is familiar with a lot of the reports that the ECONorthwest study references. The overarching problem with the study is the way they created tables and figures to present the information. Figure 1. seems to show an increase in mercury over the years of operation, but this is a cumulative graph. A cumulative graph always looks worse than a regular comparison over time graph. Table 2. makes a distinction between Atmospheric and Pressurized Circulating Fluidized Bed (CFB) but does not explain the difference between the two types of boilers in the text. The information is omitted. The document seems to be set up in a scientific report format but ignores the due diligence aspects.

We are not sure who said it first, but as the saying goes: "Beware there are three types of lies and each one worse than the last. Lies, damn lies and statistics!" We are not ready to fight statistics with statistics regarding the air pollution, but we can attest to the benefits that the co-gen industry has had on land and water that we monitor. There is not one pot of money that will clean up all the \$15 billion worth of AML problems in PA. We need to partner with industry and the public sector to get the most cleaned up that we can before the AML Trust Fund expires. The Waste Coal to Energy Industry is a piece of the puzzle.

We strongly disagree with their "Section III ...Alternatives..." focused on leaving the coal waste on site and simply burying it in a pit (currently this is what PA DEP Bureau of Abandoned Mine Reclamation (BAMR) does with their Surface Mining Control and Reclamation Act (SMCRA) Title 4 program). They are just burying the problem. Out of sight, out of mind, right? Wrong, think of these waste coal piles like "a giant mound of ground coffee". Precipitation percolates through this unconsolidated waste coal material to pick up all kinds of heavy metals and acidity as well as real fine sediment that washes it into nearby streams. This type of mine drainage we refer to as "toe of spoil discharge". While we typically deal with mine drainage from underground mines in the Anthracite Coal Region, these "toe of spoil discharges" are considered surface mine drainage. We see it all the time, the sediment clogs up streams and diverts the water into resident's property while the metals and acidity

cause the stream to be lifeless. Municipalities are responsible for stormwater but do not always have the expertise to know how to dredge the sediments from bridges/culverts, prevent local flooding and keep water flowing. It becomes a burden on the tax base for the continual maintenance to unblock the blocked stormwater conveyances. This is a direct cost overflow to the local residents. In our region they call it the "rain tax". Its not something residents caused and should not be responsible for since this is a legacy mining issue.

When these piles are pushed into unlined strip pits, that same "toe of spoil discharge" now seeps into the underground mines making an already existing underground mine discharges worse. You have essentially put the "ground coffee in a paper filter". The same metals and acidity are leeching out, but now directly into the groundwater. Sometimes the fine sediment will settle in underground mine voids then when we have a huge rain event and the underground mines belch out a black gooey substance and/or a slug of acidity.

There is also a chance for the waste coal piles catch on fire and many do every year. Some spread to the underground mines where they can wreak even more havoc like the infamous Centralia Mine Fire. This started in a waste coal pile buried in a pit, spread to the underground mines in the 1960s, and has been burning ever since. One recently in Carbondale took approximately \$9M to put out, not to mention all the uncontrolled pollutants they put into the air. The unmonitored mine fire emissions have to be worse than any powerplant.

Table 7. seems like all good ideas until you have put them into practice, which many of them we and the state have already tried. Natural revegetation does not work well. Waste coal is not a biologically active soil and it is net acidic. Waste coal stunts the growth of plants and trees which eventually die. Revegetation with experimental species is not recommended because it introduces non-native species to the environment. Do you know that the USDA introduced Crown Vetch and Multiflora Rose as experimental species to control soil erosions, now it is choking out native species? Revegetation with amendments like "biosolids"? We have tried this in many places in cooperation with sewage plants. If you disc the human waste into the waste coal, a nice lush green layer of plants will grow, but local residents complain about the smell. We incorporated almond scented infusers downwind of a biosolids reclamation project in Sullivan Co. to help mask the smell. One incident involved youth playing on a mine reclamation project remediated with "biosolids" in Schuylkill Co. and they developed staph infections. Removal of the waste coal material and disposal in a landfill is the only perfect way to contain the contaminants and collect the leachate, but extremely expensive. Some alternatives have their merits, but still not economically viable or as environmentally beneficial as removal, burn for energy and return the ash to the site.

The beneficial disposal of the CBF ash into strip mines is good for the environment, contrary to popular belief, because it creates a "cement plug" into the strip mine. Coal ash from Co-gen plants acts as its own liner as it is pozzolanic (cementitious) in nature. The water flows off the site and into streams with a little boost in alkalinity, but not to the effect of 9-10 pH as some opponents will imply. There are loads of data that show that monitoring wells downstream of these sites do not show increased metals or drastic increases in pH after a waste coal ash disposal site. This is something that is monitored by DEP and if it did, the operation would be shut down for exceeding NPDES standards. This information can be acquired from the PA DEP District Mining Offices.

Table 8. "Costs associated with Alternative Waste Coal Management Strategies" is based on a conversation with a consultant? We have never heard of Geo-Hydro or Mark Hutson, so we looked them up. Mr. Hutson works at Geo-Hydro, Inc. out of Colorado. He is a professional geologist in Indiana, Kansas, Nebraska, Wisconsin, but not Colorado where he works. Strange? This seems to be

his website <http://www.geo-hydro.com/> which does not look very up-to-date. There is one person's resume on the site and it is not his.

The reason we point this out is that the Pennsylvania DEP has been working on reclamation for over 40 years and we have asked for these types of figures from them occasionally. Initially, they would give us these cost per acre ballpark figures about a decade ago but realized due to the complexity of each project, even a range of values is hard to calculate within one state. EPCAMR produces state-wide AML maps / statistics, as well as ones broken down by congressional district, on an annual basis, we used to include the cost per acre figures. They were a 3-year weighted average of all PA DEP BAMR SMCRA Title 4 reclamation projects but over a decade old (2006). This was also prior to when the state took over the emergency projects in 2012. We have worked with DEP over the years to get better cost figures. This information can be obtained from PA DEP BAMR.

We finally got to the end of the report and the last data source is us, EPCAMR. Wrong website, but it is our old fact sheet from 2008. The \$15B figure is something we also still use to represent all AML reclamation costs including environmental hazards. While it is decades old and in need adjustment for inflation, we have been explaining that these costs are "very conservative". PA DEP recently estimated the costs of all Priority 1 and Priority 2 health and safety hazards reclamation at \$5B on the eAMLIS federal AML inventory. This doesn't account for the cost of treating ~ 5,000 AMD discharges and Priority 3 environmental hazards that are inventoried.

Table 2 "Comparison of ...IGCC with other coal-fueled technologies" is intriguing to us, although the source is shady as well. It seems to have been presented at a conference in Pittsburgh by consultants who are proponents of the Integrated Gasification Combined Cycle (IGCC) plants. We have heard of this, so we researched these plants and it looks like experimental technology that came out of the "Clean Coal Movement" a few years ago. In the US there were 3 constructed with funding by the US DOE in Indiana, Florida, and Nevada. The one in Nevada was abandoned because they found that the technology would not work more than 300 feet above sea level. Supposedly the other 2 are still running and we assume that is where the data is from? That or else it comes from other countries that use coal gasification technology. The fuel produced is called syngas, there are many raw sources that this syngas can be produced from other than coal. Please see the attached table of Syngas plants in the US from GSTC (Global Syngas Technologies Council) website at the end of the document. I would have just gave the URL, but you have to be a member to see this information. Notice the 2 coal IGCC electricity plants are on this list. One important distinction to remember that not all coal is the same or produces the same ash and emissions.

It raises the question if they are "comparing apples to apples" regarding coal as the raw source for the syngas in their Table 2 emissions comparison. We don't know because we cannot trace the source any further than the presentation in Pittsburgh. These plants also have issues with hydrogen sulfide (H₂S) emissions. That comes from the bituminous coal and is often an issue for co-gen plants as well. It is one of the main issues as to why Senator Hilary Clinton demanded a full risk disclosure study be done on the IGCC plants and Senator Harry Reid was quoted saying "there is no clean coal technology".

In PA, our power industry portfolio has been trending to our "abundant and cheap" Natural Gas (another fossil fuel). It is cheap because it has very few extraction fees and taxes unlike other natural resources in PA. PA remains the only state in the nation that does not charge a severance tax, another issue we are trying to resolve at the state level as our funding for environmental projects diminishes. But to get back to the tax credit, the natural gas-fired power plants have an unfair advantage over the Waste Coal plants and are out competing them in the market. It can be argued that Natural Gas plants are producing less greenhouse gas emissions, but they are not helping with coal mine reclamation! Also, the groundwater pollution aspects of "fracking" is a very daunting issue as those wells begin to age.

We look forward to talking with you more specifically about the language and support of the Waste Coal Tax Credit in the Senate. Pennsylvania has the most AML of all the states. This is a Pennsylvania-specific issue and we are looking for your support on this issue and other AML issues.

Sincerely,



Michael A. Hewitt, GISP
EPCAMR Program Manager



Robert E. Hughes
EPCAMR Executive Director

Attachment: Syngas plants in the US from GSTC (Global Syngas Technologies Council) Website

Plant Name	Location	Startup Year	Product Classification	Feedstock	Syngas Capacity (MWthOut)
Houston Oxochemicals Plant	Clear Lake	1977	Oxochemicals	Gas	287.1
Baton Rouge Oxochemicals Plant	Baton Rouge	1978	Oxochemicals	Petroleum	77.9
LaPorte Syngas Plant	Deer Park/LaPorte	1979	Methanol	Gas	656.2
Oxochemicals Plant	Bay City	1979	Oxochemicals	Petroleum	68.4
Martinez Flexicoker	Martinez	1983	Flexigas	Petcoke	327
Kingsport Integrated Coal Gasification Facility	Kingsport	1983	Acetic acid	Coal	218.7
Texas City Syngas Plant	Texas City	1983	Oxochemicals	Gas	113.5
Oxochemicals Plant	Unspecified location	1983	Oxochemicals	Gas	54.7
Great Plains Synfuels Plant	Bismarck	1984	SNG	Coal	1900.3
Convent H2 Plant	Convent	1984	H2	Petroleum	257
BFC Gas & Electric Plant	Cedar Rapids	1985	Steam	Biomass/Waste	31
Baytown Flexicoker	Baytown	1990	Flexigas	Petcoke	625
Hudson County Waste Plant	Jersey City	1992	Fuel gas	Biomass/Waste	3
Wabash River IGCC	West Terre Haute	1995	Electricity	Petcoke	590.6
Taft Syngas Plant	Taft	1995	Oxochemicals	Gas	59.1
Polk County IGCC Project	Mulberry	1996	Electricity	Coal	451.1
Texas City Syngas Plant	Texas City	1996	H2	Gas	278
LaPorte Syngas Plant	LaPorte	1996	H2	Gas	252.7
Riceland Foods, Stuttgart	Stuttgart	1996	Electricity	Biomass/Waste	45
Riceland Foods, Jonesboro	Jonesboro	1997	Steam	Biomass/Waste	8
Oxochemicals Plant	Unspecified location	1998	Oxochemicals	Gas	47.8
Baytown Syngas Plant	Baytown	2000	Syngas	Petroleum	347.2
Coffeyville Syngas Plant	Coffeyville	2000	Ammonia	Petcoke	292.7
Delaware Clean Energy Cogeneration Project	Delaware City	2002	Electricity	Petcoke	519.5
Longview Gasification Plant	Longview	2002	Syngas	Gas	213
USC Gasification System	Columbia	2007	Electricity	Biomass/Waste	1.8
InEnTecMidland Gasifier	Midland	2010	HCl	Biomass/Waste	2
Colombia Ridge Facility	Arlington	2011	Syngas	Biomass/Waste	2.1
Edwardsport IGCC	Edwardsport	2013	Electricity	Coal	1150
Indian River bioEnergy Center	Vero Beach	2013	Ethanol	Biomass/Waste	38

The Coal Refuse Reclamation to Energy Industry A Public Benefit in Jeopardy

See the full report at
www.ARIPPA.org



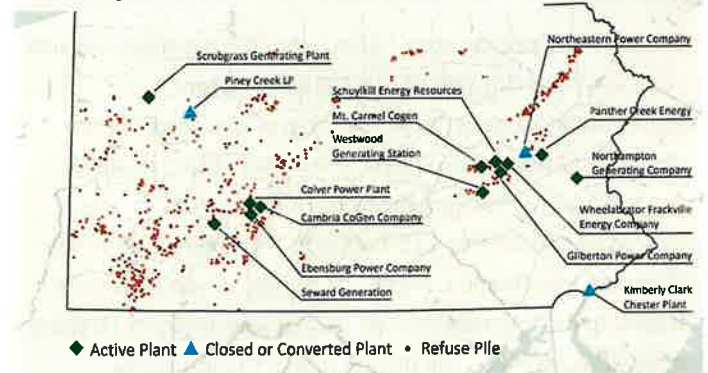
Private Activity, Public Benefit

Pennsylvania's coal mining legacy has left the Commonwealth with significant environmental liabilities, including more than 770 coal refuse piles. For decades, Pennsylvania's coal refuse reclamation to energy industry has addressed these liabilities by **removing coal refuse, using it as fuel to generate energy, and rehabilitating mining-affected lands.**

Focused Upon Environmental Remediation

- > 225 million tons of refuse consumed to date
- > 1,200 miles of polluted streams restored
- > 7,200 acres of land restored

Pennsylvania's Coal Refuse Plants



770 identified coal refuse piles covering 8,300 acres and containing more than 220 million tons remain unaddressed, creating a variety of environmental issues for Pennsylvania's legacy coal communities.

Seanor Reclamation Site



Industry reclamation of the Seanor site restored the area to an unmanaged natural habitat adjacent to the Westmoreland Heritage Trail. The project received a Governor's Excellence Award in 2014, one of numerous environmental awards bestowed on the industry.

A Reclamation Solution in Crisis

Market and regulatory challenges, including low-cost natural gas supply from the Marcellus Shale formation and other regulatory and policy initiatives, have altered the economics of the industry. In recent years, **wholesale energy prices have often been below the "breakeven" point required for coal refuse reclamation to energy plants to simply recover their cost of production.** In addition, capacity payments received by plants for the year commencing June 2019 fell significantly and will remain well below recent levels for a two-year period.

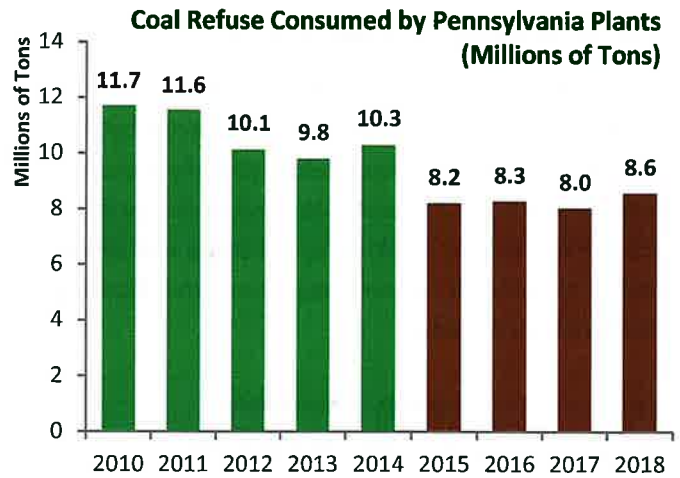
The mismatch between revenue and costs has led to the closure or conversion of 3 of 15 Pennsylvania plants to date, and to seasonal idling for others, resulting in a significant decline in annual benefits to Pennsylvania. **The current economics of the industry are unsustainable, and without some intervention will lead to further plant closures and to a permanent loss of their public benefits.**



The Coal Refuse Reclamation to Energy Industry A Public Benefit in Jeopardy

A Simple Business Model

The industry operates on a simple business model in which revenue from the sale of electricity pays for environmental benefits in the form of the reclamation and restoration of mining-affected sites. This privately funded activity has “positive externalities” for Pennsylvania, delivering benefits to the environment, the Commonwealth and the general public. When plants are forced by pricing realities to operate seasonally or to cease operations, the volume of coal refuse the industry consumes falls, and the public benefits are reduced or lost.



Plants that have been closed are typically demolished and sold for scrap, or disassembled and reassembled in another country. As a result, once plants are shuttered, they are unable to return in the future even if the economics of the industry were to change.

Avoided Tasks

At its current reduced capacity, the industry consumes 8 million tons of coal refuse and remediates 240 acres of land per year. Historically, the industry has removed 225 million tons of coal refuse, restored thousands of acres of land, restored 1,200 miles of polluted streams, and had treated billions of gallons of polluted drainage water each year. **Absent the activities of the industry, the responsibilities and costs for the range of environmental and safety hazards associated with coal refuse falls on the Commonwealth.**

Avoided Cost Calculation

State clean-up efforts incur additional costs for disposal not required by the more comprehensive industry efforts. Further, state efforts produce no revenue from energy generation to offset the environmental remediation and reclamation costs. As a result, it is cost prohibitive for the state to remediate sites to the same standard as the industry.

Based on recent project bids, state costs for removal and disposal of coal refuse can run up to \$33 per ton (in addition to land remediation costs). Replicating the annual removal of 8 million tons of refuse and remediation of 240 acres would cost the state \$93 million annually under the most favorable conditions, and **\$267 million annually including typical disposal costs.** Addressing all identified piles across the state would cost \$2.6 - \$7.4 billion at this rate.



\$93 M - \$267 M in annual avoided cost to the Commonwealth



The Coal Refuse Reclamation to Energy Industry A Public Benefit in Jeopardy

Environmental Benefits

The removal of coal refuse piles and the reclamation of mining-affected lands has demonstrated environmental and public benefits, including water quality, public health and safety, and land value.

\$37 M in Annual Enviro / Public Benefits

		
Water Quality	Public Health and Safety	Land Value

South Branch Blacklick Creek



"We've got fish in the water now. People weren't fishing here before. This is a good news story."
- Cambria County Commissioner Tom Cherinsky

Addressing Priority Sites

Through a closely regulated and proven process in cooperation with the Pennsylvania Department of Environmental Protection, **industry activities can address high priority sites for the Commonwealth**, including coal refuse piles polluting key waterways and located in densely populated areas.

In cooperation with the federal government, the Commonwealth, environmental groups, and local landholders, an industry plant is leveraging federal AML pilot funds to remediate a 4 million ton pile in heart of Swoyersville. This project will restore the land for community recreation and economic development uses.

The industry also plays an important role in removing burning piles and other piles threatening air quality with fugitive dust particles. This relieves local communities of unanticipated health and safety costs and potential emergency expenditures.

Swoyersville






Economic Benefits

The industry also represents a major source of economic activity and family-sustaining employment. The industry produces \$615 million in annual economic benefit, supporting 3,000 Full-Time Equivalent (FTE) jobs annually.

These benefits are concentrated in Pennsylvania's coal communities that face existing challenges in generating economic opportunities for residents.

\$615 million in annual economic impact

		
\$363M Direct Expenditures	\$194M Earnings Supported	\$18M State Taxes/Fees

3,000 FTE jobs from economic impact



The Coal Refuse Reclamation to Energy Industry A Public Benefit in Jeopardy

Path to Sustaining the Public Benefits

If Pennsylvania seeks to preserve the benefits and retain this strategic environmental resource, the economic and regulatory framework must recognize the value of the positive externalities that the industry delivers. A demonstrated approach to achieving this goal is through **performance based-tax credits**.

- Raise the statutory cap on the PA Coal Refuse Energy and Reclamation Tax Credit to **\$45 million** so that funding is sufficient and a bridge to a federal solution.
- Replace the state tax credit with a **federal tax credit** as a long-term solution.

Changing the Pricing Dynamics

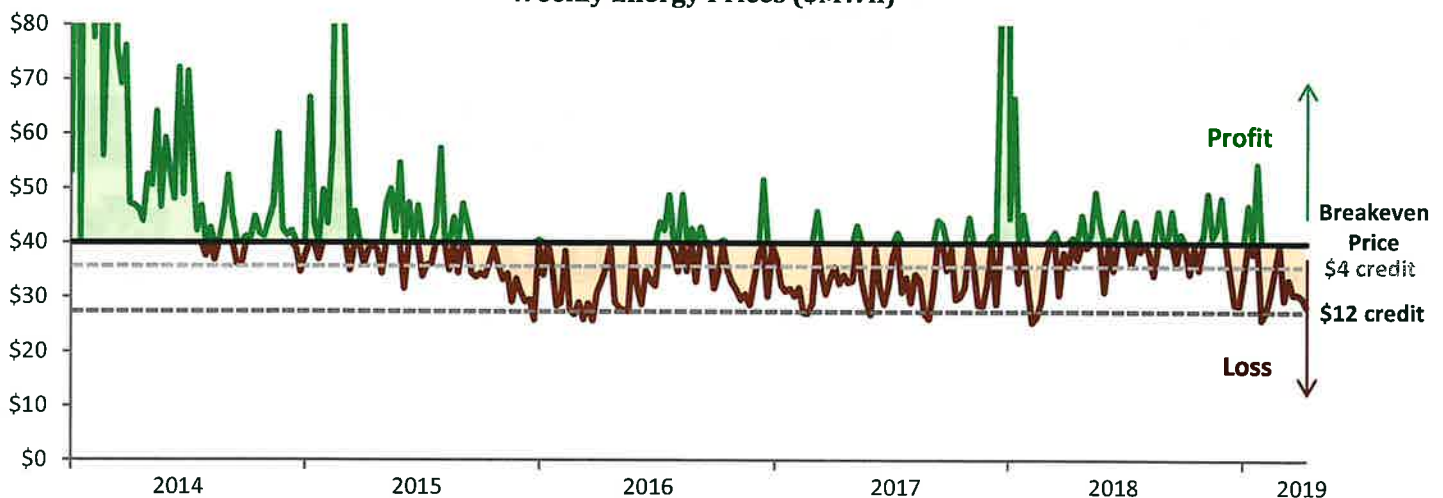
Government can assist the industry either through enhanced performance-based tax credit support, or through a restructuring of the regulatory framework that reflects the environmental externalities of the industry. Either approach would recognize and assign a financial value to the public benefits that are not currently realized within the economics of industry operations.

The Pennsylvania legislature and Governor Wolf acknowledged these benefits in enacting the Coal Refuse Energy and Reclamation Tax Credit in 2016. This program provides a \$4 credit per ton of coal refuse used to generate electricity. However, due to the total program cap of \$10 million, awards are scaled down proportionally, with a realized yield per plant of around \$1.20 per ton. This yield is insufficient to close the gap between industry production costs and revenues, meaning that **the current funding level is insufficient to achieve the program goal**.

At a statewide allocation of \$45 million, as originally envisioned, plants would be able to realize the allowable \$4 per ton credit. This would have the effect of lowering the “breakeven price” needed to cover the cost of generation, increasing the duration of periods in which plants could operate economically.

This mechanism could serve as a bridge to a federal tax credit as a long-term solution. **A federal credit of \$12 per ton would reduce the “breakeven price” to a point where plants could operate continuously, maximizing the environmental benefits that the industry delivers at far less cost than the monetized benefits provided.**

PJM Wholesale Energy Market
Weekly Energy Prices (\$MWh)



S.O.S for the U.S. Electric Grid - WSJ

[The Editorial Board](#) Feb. 26, 2023 at 4:47 pm ET



The PJM report forecasts power supply and demand through 2030 across the 13 eastern states in its territory covering 65 million people. Its top-line conclusion: Fossil-fuel power plants are retiring much faster than renewable sources are getting developed, which could lead to energy “imbalances.” That’s a delicate way of saying that you can expect shortages and blackouts.

PJM typically generates a surplus of power owing to its large fossil-fuel fleet, which it exports to neighboring grids in the Midwest and

Northeast. When wind power plunged in the Midwest and central states late last week, PJM helped fill the gap between supply and demand and kept the lights on.

That's why it's especially worrisome that PJM is predicting a large decline in its power reserves as coal and natural-gas plants retire. The report forecasts that 40,000 megawatts (MW) of power generation—enough to light up 30 million households—are at risk of retiring by 2030, representing about 21% of PJM's current generation capacity.

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Most projected power-plant retirements are “policy-driven,” the report says. For example, the steep costs of complying with Environmental Protection Agency regulations, including a proposed “good neighbor rule” that is expected to be finalized next month, will force about 10,500 MW of fossil-fuel generation to shut down.

At the same time, utility-company ESG (environmental, social and governance) commitments are driving coal plants to close, the report notes. Illinois and New Jersey climate policies could reduce generation by 8,900 MW. Do these states plan to rely on their good neighbors for power?

Many states have established ambitious renewable goals, and the

Inflation Reduction Act lavishes enormous subsidies on wind, solar and batteries. But the report says the “historical rate of completion for renewable projects has been approximately 5%,” in part because of permitting challenges. In an optimistic case, the report estimates 21,000 MW of wind, solar and battery storage capacity will be added to the grid by 2030—about half as much as the expected fossil-fuel retirements.

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There’s another problem: Demand for electric power will increase amid the growth in data centers and the government’s push for the electrification of vehicles, heating and everything else. Loudoun County, Va., boasts “the largest concentration of data centers in the world,” the report notes.

The report doesn’t say this, no doubt owing to political reticence, but the conclusion is clear. The left’s green-energy transition is incompatible with a growing economy and improving living standards. Renewables don’t provide reliable power 24 hours a day, 365 days a year, and the progressive campaign to shut down coal and gas plants that do will invariably result in outages.

During an arctic air blast this past December, PJM ordered some businesses to curtail power usage and urged households to do the same. PJM narrowly avoided rolling blackouts as some generators switched to burning oil. But what will happen when those power plants shut down? A power shortage at PJM has the potential to cascade across much of the U.S.

Government officials have been raising alarms about the risks of cyber

and physical attacks on the grid. But what about the accelerating danger from climate policy?

Journal Editorial Report: Tim Scott gives an impressive speech in Iowa. Vivek Ramaswamy is in. Images: AP/EPA-EFE/Shutterstock Composite: Mark Kelly

'Green Bitcoin Mining': The Big Profits In Clean Crypto

[Christopher Helman](#) 06:30am EDT

This story appears in the August/September 2021 issue of Forbes Magazine. [Subscribe](#)

Bitcoin is infamous for wasting enough electricity to add 40 million tons of carbon dioxide to the atmosphere a year—but now, a growing cadre of U.S. miners are developing green, and lucrative, new strategies worth a fortune all their own.

by [Chris Helman](#)

(IMAGE ABOVE) Bill Spence and Greg Beard on a Russellton, Pennsylvania, coal waste pile left by a mine that powered 20th-century Pittsburgh steelmakers. They're burning this polluting "gob" to mine bitcoin.

Growing up in rural western Pennsylvania in the early 1970s, Bill Spence played with his pals on piles of coal waste, oblivious to the toxic heavy metals right under his feet. After working as an oil industry engineer out west, he returned home in the 1990s and found the piles—known as "gob," for "garbage of bituminous"—still pockmarking the landscape. The present worry is that these unlined pits are leaching deadly carcinogens into the groundwater—or, worse, that they will catch fire and start polluting the air, too. (Of the 772 gob piles in Pennsylvania, 38 are smoldering.)

So Spence, now 63, set out on a mission to whittle down the piles, restore the land—and make money doing it. In 2017, he bought control of the Scrubgrass Generating power plant in Venango County, north of Pittsburgh, which was specially designed to combust gob. But gob isn't a very good fuel, and the plant was barely viable. Later that year, after being diagnosed with pancreatic failure and kidney cancer (which he speculates may have been linked to his early gob exposure), he stepped back from the business. Bored, he started dabbling in cryptocurrencies and soon had a eureka moment: He could make the Scrubgrass numbers work by turning gob into bitcoin.

After surgery and being taken off a feeding tube, Spence is now back at it, converting the detritus of 20th-century heavy industry into 21st-century digital gold. About 80% of Scrubgrass' 85,000-kilowatt output is now used to run powerful, energy-hungry computers that validate bitcoin transactions and compete with computers worldwide to solve computational challenges and earn new bitcoins—a process known as mining. Depending on the price of bitcoin, which has recently been gyrating around \$35,000, Scrubgrass realizes an estimated 20 cents or more per kilowatt hour (kwh) from mining, against just 3 cents selling to the power grid. Plus, because the plant is safely disposing of gob, it collects Pennsylvania renewable-energy tax credits now worth about 2 cents per kwh, the same as those available for hydropower.

Spence is one of an emerging cohort of American bitcoin miners who are turning one of the cryptocurrency's biggest liabilities—its insatiable thirst for energy—into an asset. Whether they're getting rid of waste fuels like gob, helping balance the electric grid in Texas or tapping into the flares at oil-and-gas fields, these cryptopower entrepreneurs are profiting by turning digital lemons into green lemonade. And with

countries such as China, Indonesia and Iran moving either to severely restrict bitcoin mining or ban it altogether, the opportunity for domestic producers has never been greater. From just a 4% share two years ago, the U.S. has grown into the world's second-largest miner, now accounting for 17% of all new bitcoins, according to the University of Cambridge Center for Alternative Finance.

The Belly of the Beast: At Riot Blockchain's bitcoin mining facility in Rockdale, Texas, exhaust from some of the stacks of 120,000 energy-sucking computers pushes the temperature up to 130 degrees.

Courtesy of Riot Blockchain

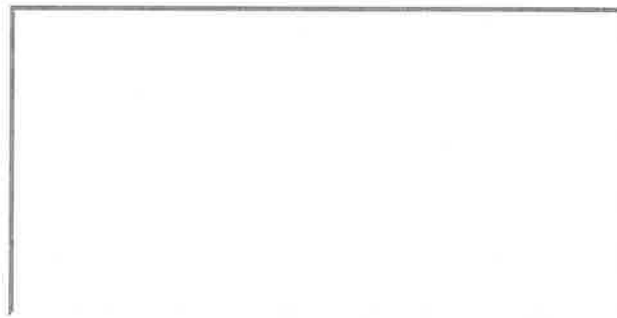
For all bitcoin's purported benefits, it's also clear that the currency is an environmental disaster. Depending on bitcoin's cost (a higher price attracts more miners), its global network sucks up between 8 and 15 gigawatts of continuous power, according to Cambridge. New York City runs on just 6 gigawatts, the nation of Belgium on 10. Exactly how much carbon is released into the atmosphere by bitcoin mining depends entirely on what energy source is used. But the pollution is not negligible. To unlock a single bitcoin, miners must feed their machines about 150,000 kwh, enough juice to power 170 average U.S. homes for a month.

It's especially frustrating that high-energy inputs aren't a bitcoin bug but rather a feature. Sure, some portion of the electricity is used to validate transactions, but much is seemingly wasted solving flat-out useless mathematical problems. This "proof of work" is simply a way to create artificial scarcity, making it far too expensive for any one group to corner or manipulate the market. In a 2010 message board comment, Satoshi Nakamoto, the pseudonymous creator of bitcoin, made no apologies: "It's the same situation as gold and gold mining.

The marginal cost of gold mining tends to stay near the price of gold. Gold mining is a waste, but that waste is far less than the utility of having gold available as a medium of exchange. I think the case will be the same for bitcoin. The utility of the exchanges made possible by bitcoin will far exceed the cost of electricity used."

TERAWATT TERROR

As Bitcoin's price rises, so does the amount of energy consumed by its worldwide network, as more "miners" jump in with their high-powered computers to solve mathematical problems. When Bitcoin peaked at \$64,654 in April, its network was wasting enough energy to keep the lights on in all of Georgia.



Of course, the system could have been designed differently. There are serious cryptocurrencies, including ethereum, cardano, stellar, Ripple's XRP and algorand, which use vastly less energy than bitcoin or are being modified to do so. Ethereum, for instance, is transitioning next year from "proof of work" to a system called "proof of stake," which cuts energy use by 99.95%. There's even a new currency, candela, whose protocol *requires* solar-powered mining.

But bitcoin isn't going anywhere. Its first-mover advantage has translated into a recent market cap of \$700 billion, more than the five

next most valuable cryptocurrencies combined. (Ether, the second most popular, has a market cap of \$250 billion.) And bitcoin mining is unlikely to get much less energy-intensive. Its algorithm forces miners to compete to unlock each new coin, and that competition will continue until the last bitcoin is mined, sometime around 2140. Registering a transaction on the bitcoin blockchain takes a million times more energy than processing one on Visa's bank network. (Backers say a new Lightning transaction network designed to operate atop bitcoin could make it even more efficient than Visa.)

"If you think it's fake money, then any amount of energy use will be too much," observes Ted Rogers, vice chairman of Greenidge Generation Holdings, which operates a power plant and bitcoin mining facility on Lake Seneca in upstate New York. "But bitcoin is not going away, and it is going to be the global reserve currency and the center of the future financial world."

"If you think bitcoin is fake money, then any amount of energy use will be too much."

Ted Rogers, Vice Chairman of Greenidge Generation Holdings

To see how green bitcoin can be, look no further than the Lone Star State, whose independent power grid famously failed during last winter's deep freeze. Dozens of power plants were knocked offline, causing billions of dollars in property damage, and some retail

customers were presented with monthly bills as high as \$17,000. While the directors of the comically named Electric Reliability Council of Texas (ERCOT) have since resigned, the state's politicians—beyond mandating that plants prepare better for winter weather—haven't done much to reform the system.

Fortunately, the free market seems to be coming to the rescue, with 16 gigawatts of new wind and solar projects set for construction in West Texas over just the next year. During normal conditions this will be far more electricity than is needed to fill the Texas demand gap. But it will also ensure that there's enough power for extreme events like ice storms and summer heat waves. Bitcoin miners are acting as a kind of shock absorber for this new green power. They buy up excess energy when it's not needed, then shut down their mining rigs when demand surges, releasing power back onto the grid.

"West Texas is going to dominate; it will all come here," predicts Jesse Peltan, 24, CTO of Dallas-based Autonomous (and a member of the 2021 Forbes 30 Under 30). Last year Peltan helped launch a 150-megawatt crypto mining data center near Midland called HODL Ranch, named for crypto hoarders who buy and then (typo intended) "hodl on for dear life." It's the first large-scale operation to be powered by the region's massive solar and wind farms. Some nights the gusts are so ferocious that grid operators give away power just to keep the system from overloading.

Here's the key: These miners have entered into so-called demand response contracts with the Texas grid, whereby they agree, in exchange for rebates, to shut down their computers at a moment's notice during times of peak power demand. This brings average power costs at HODL Ranch down below 2 cents per kwh, for a mining cost

close to \$2,000 per bitcoin.

In Texas, bitcoin miners act as a shock absorber for new green power, buying energy when it's not needed and shutting their rigs when demand surges.

The largest bitcoin mining operation in America is also in Texas, operated by publicly traded Riot Blockchain (\$3 billion market cap) in Rockdale, northeast of Austin, near a giant interconnection that moves 5,000 MW of grid power through a maze of transformers and high-voltage lines. Riot taps directly into this interconnection to draw 300 MW of that juice, which powers 120,000 high-speed mining computers stacked in racks 30 feet high in three narrow buildings, each longer than two football fields. Construction is under way to expand to 750 MW, with 130,000 more machines to be installed by the end of 2022.

Riot has a ten-year contract to buy all the power it needs in Rockdale at a bargain 2.5 cents per kwh, counting a 0.5-cent-per-kwh discount it gets for participating in demand response. It also has the option to resell all its power to the grid. During the Texas freeze, the Rockdale facility voluntarily shut down all mining for two days. Assuming it earned the peak price of \$9 per kwh, that's a \$90 million windfall. "At this scale of energy procurement, we are not just mining bitcoin," says CEO Jason Les. Instead, Riot is acting as a "virtual power plant."

Les, 35, studied computer science at UC Irvine but first learned about bitcoin while playing professional poker in the mid-2010s—and seeing

other players use it to hold and move their winnings without banks. He's not bothered by bitcoin's volatility, because he's all in: "When massive price swings come, they don't affect me whatsoever. In poker, if you're good, you're still losing 45% of the time. I'm very comfortable with losing."

An even bigger technological green gamble is being taken by Crusoe Energy Systems, which has raised \$250 million, mostly to mine bitcoin in the middle of remote oil-and-gas fields in six states, including New Mexico, Texas and North Dakota. Investors include Bain Capital, Valor Equity Partners, Tesla cofounder J.B. Straubel and the twin-brother crypto billionaires Cameron and Tyler Winklevoss. Crusoe has deployed 45 shipping containers stuffed with bitcoin mining computers, which are powered using natural gas that otherwise would have been burned off or flared. (When drillers complete new oil wells but don't yet have pipelines hooked up to gather the natural gas, they set it on fire, since allowing it to simply waft into the atmosphere would be even worse for global warming.)

"We underestimated the operational complexities in the business," admits Crusoe cofounder Chase Lochmiller, a 35-year-old veteran of crypto investment firm Polychain Capital. The startup has found it a challenge to maintain containers spread out across the vast landscape, particularly during the heat of the summer. While Crusoe is unlikely ever to scale up to Riot's size and profitability, it is already diverting 10 million cubic feet per day of gas that would otherwise be flared. "We think the best way to improve the carbon economics of an oilfield is to add a few bitcoin rigs," Lochmiller says.

Reclaiming history: Spence and Beard of Stronghold walk the Russellton site, which produced metallurgical coal for Pittsburgh steelworks a century ago.

What really counts as green energy? Wind and solar power, for sure. Other sources can be a tougher call.

On the banks of New York's Lake Seneca, the Greenidge Generation plant produces 80 MW of power, using about half to mine crypto. Private equity firm Atlas Holdings, based in Greenwich, Connecticut, bought the mothballed plant in 2014 and invested tens of millions to upgrade it to run on natural gas. That means it emits just a quarter of the carbon dioxide it did during the previous six decades, when it ran on coal, and none of the sulfur compounds or particulate matter.

So far, so green. Yet, as it did when it was powered by coal, the plant sucks in up to 100 million gallons of water daily for cooling, returning it to Lake Seneca about seven degrees warmer. Local environmentalists call it a "giant fish blender" and blame the heated water for lowering oxygen levels and contributing to algae blooms. A bill that would have banned crypto mining in New York for three years died in a state assembly committee in June. Greenidge has been further "green-washing" its bitcoin by acquiring CO2 allowances and forestry offsets. CEO Jeff Kirt notes the plant's discharge water is well within regulatory limits and says it has been adding more screening systems to protect Seneca's trout. The company plans to go public later this year.

Back in Pennsylvania, environmentalists aren't entirely thrilled that Spence's Scrubgrass plant gets the same subsidy as hydropower. But the state has decided it's better to have carbon dioxide emitted by a gob-burning power plant than to leave the stuff in polluting pits.

"The problem is real," Spence insists. "The only way to fix it is these plants." The technology at Scrubgrass wasn't widely used until the

1990s and is expensive. A special reactor burns the gob, rocks and all, producing a high-pH ash that is applied to the remaining piles to neutralize their acidity. The economics make sense only with the addition of bitcoin mining. Spence has a new, well-connected partner in Greg Beard, who until 2019 headed natural-resources investing at private equity giant Apollo Global Management. The two cofounded Stronghold Digital Mining, which now owns Scrubgrass. With Beard, 49, as CEO, Stronghold raised \$105 million in June from private investors—enough to buy more bitcoin mining equipment and acquire a second and possibly third gob-burning plant—and has filed preliminary papers to go public. Beard says he never saw anything like this during his two decades in private equity. “This is the most important growth play in a generation.”

Burning for Bitcoin | Pittsburgh Post-Gazette

Anya Litvakalitvak@post-gazette.com July 29, 2021 : 15-18 minutes

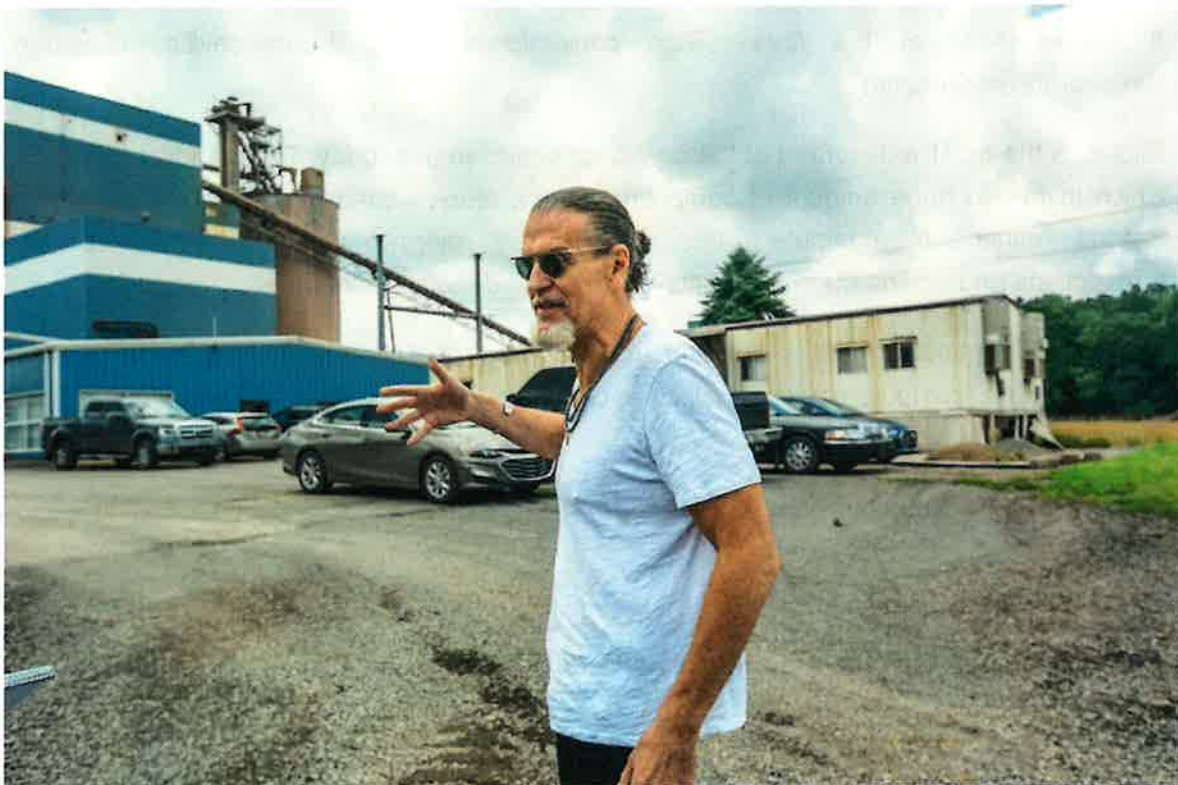
Trucks deposit ash from the Scrubgrass Power plant at the Russellton coal waste pile in West Deer. (Andrew Rush/Post-Gazette)

A waste coal-burning, crypto-mining pirate ship sets sail

In March 2017, Bill Spence got suddenly, catastrophically sick. A part of his pancreas died. His gall bladder failed. When he got to the emergency room, the doctors found kidney cancer. “Let’s see if you can make it 48 hours,” his doctor told him.

Just a few weeks earlier, Mr. Spence, a cheerful tower of a man whose signature ponytail had been updated to a gray man bun, had walked into the Scrubgrass waste coal plant that he had just bought and hung a black pirate flag in the office. The coal plant was a pirate ship, he announced. “We sink or profit together.”

The power plant and the mountains of waste coal that it burns were now in the hands of this group, not the large corporations and hedge funds that had owned it until then. Then, all of a sudden, the captain of the ship was on death’s door.



Bill Spence, co-chairman of Stronghold Digital Mining, gives a tour of the Scrubgrass power plant, which also houses thousands of Bitcoin mining machines. (Andrew Rush/Post-Gazette)

When Scrubgrass' general manager, R.J. Shaffer, learned the news, he printed out a photo of the Venango County power plant and delivered it to Mr. Spence's hospital bedside. The picture had two pirate flags, the signatures of the crew, and was captioned: "The 'Power' of Healing."

"I knew it would be an inspiration for him to get better," Mr. Shaffer said.

And Mr. Spence did. The recovery left him homebound for several years, but it also left him with plenty of time to do what he does: come up with business ideas.

The plant he had bought was in trouble. It was competing with cheap natural gas on the power grid and losing — endangering the 35 jobs at Scrubgrass Generating Station along with the effort to clean up millions of tons of leaching coal waste left behind by mining companies over the course of decades.

The plant couldn't just rely on the grid for revenue anymore, because the grid simply didn't need its power all that often. Mr. Spence started to look for other customers.

As Mr. Spence convalesced, Mr. Shaffer and the plant's engineering manager, Jeff Campbell, would visit with him in his Fox Chapel home to brainstorm ideas.

"Do you know what a Bitcoin is?" Mr. Spence asked them one day in late 2017.

A Bitcoin ATM at the Quick Stop convenience store, Lawrenceville. (Stephanie Strasburg/Post-Gazette)

Bitcoin is the most widespread of the cryptocurrencies in use today. These digital currencies, which involve a huge amount of computing power, aren't issued by a central bank but are instead "mined" by computers that perform the energy-intensive work of validating transactions and adding them to a digital ledger, called the blockchain.

Just as mining coal or gold is a matter of who gets to the commodity first, so too is digital mining, where computers race against each other to be the first to validate a block of transactions and win their reward.

With each new computer vying for the prize, the algorithm adjusts to make getting it more difficult.

Rather like a coal company hiring more coal miners, crypto miners buy more and faster computers, creating a kind of arms race that's driving a huge demand for power.



Bill Spence, co-chairman of Stronghold Digital Mining, and R.J. Shaffer, general manager of the Scrubgrass power plant, talk in the lot behind the facility in Venango County. (Andrew Rush/Post-Gazette)

Already, some power generators — finding they can make more money supplying electricity to Bitcoin-mining operations than selling it to the grid — are shifting focus.

Energy Harbor, which owns the Beaver Valley Nuclear Plant in Beaver County, announced earlier this month that it will supply nuclear power to a Bitcoin-mining data center in Ohio.

Talen Energy, owner of the Susquehanna Steam Electric Station in Luzerne County, is doing the same. The company said last month that it will develop a data center to mine digital currency that could use up to 300 megawatts, or 12% of the nuclear plant's capacity.

Bitcoin miners, in turn, are hyper cognizant of power prices and availability.

Some are taking mobile units into the oil fields, hooking up their machines to run on natural gas, a byproduct of oil product that would otherwise be flared. Others, worried about the substantial and growing carbon footprint of all this digital mining — Bitcoin's highest profile booster Elon Musk recently called the industry to account for its contribution to climate change — are trying to find renewable sources of energy to power their machines.

A truck drives to pick up a load at the Russellton waste coal pile in West Deer. The pile is being trucked to be used as fuel at the Scrubgrass power plant in Venango County and later returned in the form of ash. (Andrew Rush/Post-Gazette)

Today, Scrubgrass, an 85-megawatt blue box with a black smokestack in the hills of Scrubgrass Township, looks much like it did when it first opened in 1993 — except for the trailers filled with Bitcoin miners in the back.

The operation originally came online along with a wave of such plants that were supposed to tackle Pennsylvania’s legacy of abandoned coal piles.

The plants took advantage of a new technology in the 1990s — a circulating fluidized bed that made it possible to burn such low-grade material and control emissions of sulfur and nitrous oxides. Limestone is injected into the process, and the resulting ash, now alkaline, is often spread on the land where the waste coal came from to neutralize the acid.



The Scrubgrass plant, with Bitcoin mining trailers in back. (Andrew Rush/Post-Gazette)

Last year, the Pennsylvania Department of Environmental Protection estimated there are about 9,000 acres filled with waste coal piles in the state remaining, after some 3,700 acres have been reclaimed over the past three decades, mostly by the piles being burned in waste coal power plants. Some piles are hundreds of feet deep.

“There is clearly more work to be done,” DEP Secretary Patrick McDonnell told a state legislative committee last year during a hearing on the greenhouse gas impacts of such power plants. They emit more carbon dioxide than regular coal plants per unit of energy because the quality of their fuel is much lower than pure coal.

That has always been the trade-off — cleaning up the waste coal piles cleans up the water around them and remediates unsightly and dangerous land. But the CO₂ goes in the air.

In 2019, the last year with available federal data, Scrubgrass emitted the equivalent of 371,000 tons of CO₂ — the greenhouse gas footprint of 80,000 cars driving for a year. In 2012, when the plant was running at full force, it emitted close to a million tons.

The waste coal piles themselves also emit pollutants.

“Of the piles that remain,” Mr. McDonnell said last year, “approximately 40 have ignited and continually burn, significantly impacting local air quality and releasing significant amounts of carbon dioxide and other pollutants.” Other estimates put the number of burning piles at more than 90.

That’s why the DEP essentially excused waste coal plants from buying carbon credits as part of its plan to join the Regional Greenhouse Gas Initiative, a multistate carbon cap-and-trade program.

The Russellton waste coal pile in West Deer is dark against the regular soil of the area. (Andrew Rush/Post-Gazette)

It was another man’s illness, his father’s, that brought Mr. Spence into the waste coal business in the first place. A mining engineer from the Mon Valley, he was living in Texas in the early 1990s when his father got sick and Mr. Spence began to take extended trips to Pittsburgh to care for him.

Suddenly, the waste coal piles that he was used to seeing as a kid looked different — they looked like an opportunity.

In 1994, Mr. Spence bought a 5 million-ton gob — that is, garbage of bituminous — pile in West Deer and secured a contract with a brand new plant in Venango County to burn the waste coal.

It took a decade to truck all of that material 60 miles north to Scrubgrass. After it was burned, the resulting ash was trucked back to West Deer and spread on the land. There it sat compacting for another decade.

Earlier this month, Mr. Spence stood on that flattened ground in northern Allegheny County, now home to a pair of soccer fields and an indoor sports complex, and talked about what’s possible when waste coal is cleaned up.

Then he drove a quarter mile down the road, where a mountain range of abandoned coal waste showed how much is left to be done.

The other West Deer pile that now sends 50 trucks to Scrubgrass every day represents the remnants of a coal mine that once supplied steel to build U.S. skyscrapers and produce weapons during World War II. The mine opened in 1904 and shuttered eight decades later, leaving heaps of waste coal on the ground.

Every time it rains, the remnants leach an acidic brew of heavy metals into the earth, turning streams orange.

But it's not the environmental good-doing that hooked investors during two funding rounds that yielded more than \$100 million over the past several months.

The appeal was the Bitcoin operation, said Greg Beard, CEO and president of Stronghold Digital Mining, a company that he founded with Mr. Spence to turn Scrubgrass and several other waste coal plants into a crypto hub.

On Tuesday, Stronghold filed documents with the Securities & Exchange Commission to become a public company.

Chris Radwanski, data center supervisor, checks on Bitcoin mining machines in a shipping container behind the Scrubgrass power plant. (Andrew Rush/Post-Gazette)

Jeff Campbell, the plant engineer, started researching Bitcoin as soon as he got home from Mr. Spence's house in 2017. He watched a 40-minute YouTube video and said the idea clicked into place: "This is currency that's underpinned by power."

On Amazon, he bought a \$50 USB stick that promised to mine Bitcoin. He switched his computer to an isolated network and plugged it in.

At that time, Bitcoin was still "fringe," Mr. Campbell said, and he worried about getting a computer virus or even ending up on an FBI watchlist because of cryptocurrency's reputation in moving funds for terrorism.



Jeff Campbell, Scrubgrass power plant's engineering manager, realized how quickly Bitcoin mining could generate revenue. (Andrew Rush/Post-Gazette)

The USB stick worked as advertised, and after a few weeks, Mr. Campbell invested \$1,000 and bought a mining machine, a computer whose sole purpose is to run computations. It ran for a week and generated the equivalent of \$6.65 in Bitcoin.

Nervously, Mr. Campbell linked the machine's digital wallet to Scrubgrass' PNC account to transfer the spoils, then he went into the office to check if it really showed up there.

"Oh, my God. I can't believe this is really going to work," he said

"All we need to do is put 15,000 of these in," he told Mr. Spence.

According to Mr. Campbell's calculations, at that price, mining for Bitcoin with 15,000 machines would add about 50% to the plant's operating revenue.

The earnings from the first machine funded the purchase of the second, then those two funded the third and so on.

Today, there are about 3,000 cryptocurrency miners packed into retrofitted shipping containers behind the power plant, most of them owned by Stronghold and some that belong to other mining companies that buy power from the plant. Another 5,000 machines are scheduled to arrive next month. According to documents filed with the SEC, Stronghold is planning to operate 57,000 miners by the end of next year.



A bank of Bitcoin mining machines at the Scrubgrass waste coal power plant. (Andrew Rush/Post-Gazette)

In 2020, when the power plant seldom ran, Stronghold made more money from its Bitcoin operations than by selling Scrubgrass's energy to the grid. During the first three months of this

year, the trend reversed. It received almost \$2 million from power sales and more than \$1 million from its crypto datacenter.

Mr. Spence talks to his kids about blockchain, the cryptography involved in storing and verifying huge swaths of data, the way people in the 1960s talked about plastics, a la the movie “The Graduate.”

“I feel that blockchain is gonna change the world,” he said.

For Mr. Campbell it feels like the beginning of the internet did: He knows it’s going to be revolutionary and ubiquitous, but the vision is still fuzzy. “Facial recognition? Three-dimensional rendering? Autonomous driving? Artificial intelligence?” he spitballs.

Mr. Spence’s business partner, Mr. Beard, who used to manage energy investing at Apollo Global Management Inc., isn’t as exuberant.

“I’m not sure that you need to be a believer,” he said.

He plugged the numbers into an Excel spreadsheet and saw that it makes economic sense to mine. That was enough for him.

Stronghold is buying another waste coal plant, Panther Creek Energy Facility in Carbon County, with plans to replicate its cryptomining data center there, and is eyeing a third.

A bulldozer is parked at the Russellton waste coal pile in West Deer. (Andrew Rush/Post-Gazette)

While Bitcoin is the shiny veneer of the operation, it’s actually a means to an end — giving Scrubgrass a reason to run more than the electric grid needs so it can continue to burn waste coal.

For the first 20 years, the plant ran nearly constantly. It had a power purchase agreement with the local utility, which meant there was a guaranteed demand and a guaranteed price for its output.

When that ended, in 2013, Scrubgrass struggled to navigate the competitive power market, where the price of power was falling in part because the Marcellus Shale was making natural gas a cheaper fuel for electricity than coal, let alone waste coal.

Plants — especially smaller ones like Scrubgrass that find themselves on the margin — often run only at peak times when the demand on the grid raises prices enough to make it worth their while.

Having a constant demand, like the attached data center, means Scrubgrass doesn’t need to shut down when prices for power fall. It also means that when the grid needs it, Scrubgrass can act like a battery — instantly switching its power to the grid.

(Andrew Rush/Post-Gazette)

“I think 10 years from now, people are going to say, ‘Bitcoin is the thing that power plants do to regulate the grid,’” Mr. Campbell said.

He’s already thinking of ways to route the heat produced by the miners back into the power plant. (Last winter, Mr. Campbell heated his home with Bitcoin machines).

Meanwhile, the plant, although no spring chicken, feels like it’s still trying to figure out what it is — a place where people tinker and experiment. Mr. Shaffer, who spent most of his career at the plant, proudly proclaims that his colleagues aren’t “typical power plant people.” A former restaurant manager runs the data center.

Mr. Spence, not a typical anything except an entrepreneur whose ventures over the years ranged from natural gas services to a health magazine, hung the framed photo of Scrubgrass just inside the front door of his home.

“They should be building more plants like this, not less,” he said recently. “It’s not perfect. I acknowledge that to you. But it’s damn good.”

Anya Litvak: alitvak@post-gazette.com

Correction: In an earlier version of this story, the Post-Gazette incorrectly estimated potential revenue from bitcoin mining at the plant.

**THE COAL REFUSE
RECLAMATION TO ENERGY
INDUSTRY AND CARBON
TRADING MARKETS**

June 2020



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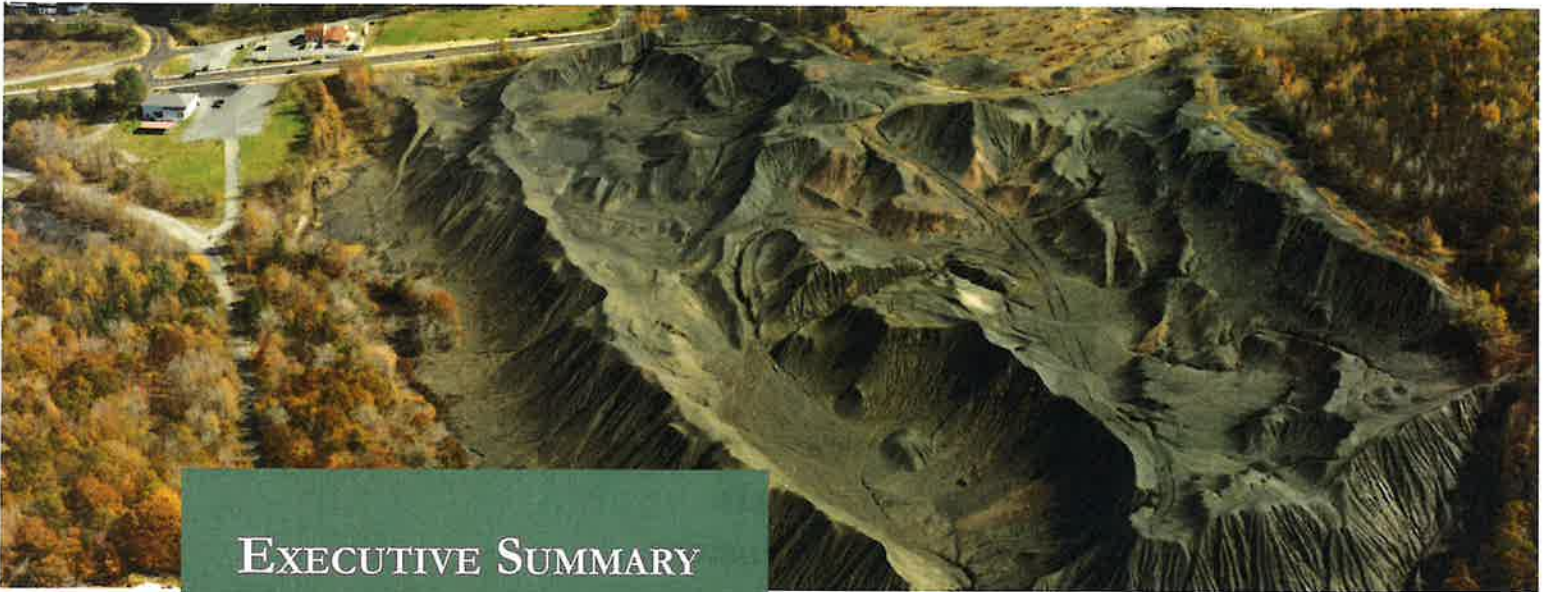
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EXECUTIVE SUMMARY

This report addresses the environmental and economic benefits of the coal refuse reclamation to energy industry alongside climate and pollution policies.

The coal refuse reclamation to energy industry is unique in the energy sector. These plants are able to use coal refuse that was discarded decades ago to generate power using circulating fluidized bed technology (CFB), which means they can source their fuel from the hundreds of legacy waste coal piles across the Commonwealth.

While these plants do burn coal waste and release the pollutants and carbon dioxide associated with fossil fuels, the process also helps rid the Commonwealth of waste coal piles which contribute to particulate pollution, acid mine drainage and other environmental and health hazards.

The alternative to this successful public-private partnership would be for Pennsylvania public agencies to take on these remediation projects directly using federal and state funds. However, this would come at a higher cost to the taxpayer and these sites tend to be a lower priority for federal funds.

In 2020, the Joint Legislative Conservation Committee held hearings and informational sessions to understand how the Commonwealth intended to strike a balance between the remediative services the coal refuse to energy industry provides and the current initiative to reduce greenhouse gas emissions (GHGs) and pollutants.

The events brought together experts and stakeholders to provide Committee members with a complete understanding of the picture of the industry, the role that Pennsylvania's agencies play and the impact of regulatory factors such as state and federal tax credits and carbon markets.

EXECUTIVE SUMMARY

ENVIRONMENTAL AND HEALTH IMPACTS

Coal refuse exists in piles around the Commonwealth, frequently containing over tens of millions of tons of waste coal each. The DEP's inventory has catalogued 772 existing coal piles, but the full number remains unknown.

The combined area of the piles is over 8 thousand acres. They are often incapable of supporting vegetation, making them unstable and unsightly. They are also a source of dangerous pollutants like aluminum, manganese, iron and volatile particulate matter that can be dislodged by rain or wind.

Runoff from coal refuse is acidic and can kill or drive off aquatic wildlife and vegetation. Besides decimating waterway ecosystems, this water is unusable and dangerous to humans as well.¹

Lightning strikes, arson and accidents can ignite a pile, filling the air with smoke and uncontrolled carbon dioxide (CO²) emissions. All of these factors combined can make a community unlivable - causing long-term health problems and lowering property values.

1 - Pennsylvania. House. Joint Legislative Conservation Committee. *Hearing on the Status of the Coal Refuse Reclamation to Energy Industry, Feb. 2, 2020. (Statement of Patrick McDonnell, Secretary, Department of Environmental Protection).*

GOVERNMENT-LED REMEDATION

One way to address coal refuse is to have public agencies and organizations use state and federal funding to remove the piles. This was the case in the Barnes-Watkins site in Cambria County. The project took 4 years and removed 1.3 million tons of refuse.¹

The refuse that was usable as fuel was taken to the newly opened FBC facility, Seward Generation Station, owned by Reliant Energy. The unusable refuse was moved to a nearby disposal site where it was stabilized and vegetated using ash from the generation facility.

The project funding was broken down as:

- **\$4,284,157.86 from a DEP Abandoned Mine Lands grant, which distributed federal funds from the federal fee on underground and surface coal mining;**
- **\$90,000 from Pennsylvania's Growing Greener funds;**
- **and \$202,575.82 from the Cambria County Conservation and Recreation Authority, who was paid \$0.25 per ton of fuel refuse by Robindale Energy Services.²**

While the process was lengthy, the final re-

sult improved the water quality of the West Branch of the Susquehanna so dramatically that it met the Pennsylvania Fish and Boat Commission's (PFBC) Naturally Reproducing Wild Trout Water criteria - a designation that only 3 percent of Pennsylvania's waterways receive.²

INDUSTRY-LED REMEDATION

The main benefit of an industry-led solution is funding. As private companies, coal refuse reclamation to energy facilities generate their own funds by selling their electricity, removing most of the burden to taxpayers.

They do claim the Coal Refuse Energy and Reclamation Tax Credit, which has an annual cap of \$20 million, as well as credits as a Tier II Alternative Energy producer, which has a weighted average price of approximately \$0.25 per credit.³

In addition to being more economically viable, the plants also generate coal ash which the industry returns to the pile site for reclamation purposes. To date, the industry has removed and burned over 200 million tons of coal and restored over 7,000 acres. It also employs 3,000 Pennsylvanians, pays \$18 million in taxes and stimulates the economy with over \$350 million in direct expenditures.³

1 - Pennsylvania. House. Joint Legislative Conservation Committee. *Hearing on the Status of the Coal Refuse Reclamation to Energy Industry. Feb. 2, 2020. (Statement of Heather Smiles, Chief, PFBC Division of Environmental Services).*

2 - Pennsylvania Department of Environmental Protection BAMR. (2010, April 15). *Barnes-Watkins Refuse Pile Reclamation Project.* <http://files.dep.state.pa.us/Mining/Abandoned%20Mine%20Reclamation/Abandoned-MinePortalFiles/2010Nomination.pdf>.

3 - Pennsylvania. House. Joint Legislative Conservation Committee. *Hearing on the Status of the Coal Refuse Reclamation to Energy Industry. Feb. 2, 2020. (Statement of Jaret Gibbons, Executive Director, Appalachian Region Independent Power Producers Association).*

THE INDUSTRY'S FINANCIAL CRISIS

The abundance of low-price natural gas and the growth of the renewable energy sector has lowered prices below the break-even cost for these plants. However, the positive externalities caused by the mining and disposal of coal refuse goes uncompensated.

While this is the case for other industries' positive externalities, the coal refuse reclamation to energy industry argues that they are the best, lowest-cost solution for remediating legacy waste coal.

In the Econsult report, *The Coal Refuse to Energy Industry: A Public Benefit in Jeopardy*, they estimate that state funded remediation and disposal - if done without the industry - would cost \$267 million annually.¹

In contrast, the Pennsylvania Coal Refuse to Energy and Reclamation Tax Credit costs taxpayers just \$20 million per year. Between this and the Alternative Energy Portfolio Standards, the industry argues that they are still not meeting break-even prices which they require to continue operating and providing their services. Only ten coal refuse to energy plants remain because of this trend.²

In December of 2019, Governor Wolf directed the DEP to draft a greenhouse gas

cap-and-trade program that aligns with the Regional Greenhouse Gas Initiative (RGGI). For most fossil fuel burning electricity generators, the plan would have them purchase offsets for their emissions. These can then be traded to reduce compliance costs.

Currently, the proposed RGGI rulemaking has a set-aside for the coal refuse reclamation to energy industry, which will exempt these plants from buying emission credits as long as plant emissions do not increase past a set limit.

On May 7, 2020, the proposed rule announced a 9.3 million tons of CO² set-aside for the industry.³ This amount was derived from the highest industry emissions in the past five years, and plant operators voiced concerns that this is not representative of the industry's capacity. Instead of running full time, the facilities have been cycling to save costs when electricity is cheap and the set-aside might not be adequate if their capacity rebounds.⁴

RECOMMENDATIONS

The industry and the state agencies are in agreement about the benefit of using coal refuse as fuel. However, as these plants have similar pollution and CO² outputs to a standard coal-fired power plant, sustaining these plants seems to be at odds with the administration's proposed climate goals.

1 - Econsult Solutions Group Inc. (2019, June). *The Coal Refuse Reclamation to Energy Industry: A Public Benefit in Jeopardy*. <https://arippa.org/wp-content/uploads/2019/07/ARIPPA-Report-FINAL-June-2019.pdf>

2 - *Statement of Gibbons*.

3 - Pennsylvania Department of Environmental Protection. (2020, May 7). *Draft Proposed Rulemaking: Chapter 145. Interstate Pollution Transport Reduction*. <https://files.dep.state.pa.us/>.

4 - Pennsylvania. House. Joint Legislative Conservation Committee. *Hearing on the Status of the Coal Refuse Reclamation to Energy Industry*. Mar. 5, 2020. (*Statement of Gary Merritt, Regulatory Affairs Manager, Northern Star Generation*).

However, many coal refuse piles have ignited and continuously burn, representing an uncontrolled release of CO² and toxic compounds, severely impacting local air quality. Currently there are 40 documented fires but more could occur in the future.

Additionally, the coal refuse reclamation to energy industry represents a small part of the fossil fuels burned in Pennsylvania. In total, their capacity is less than 1,200 megawatts. Creating an exception for this small subset in exchange for remediating legacy coal piles at significantly lower cost to the taxpayer could be a sensible move.

The Joint Legislative Conservation Committee offers these recommendations:



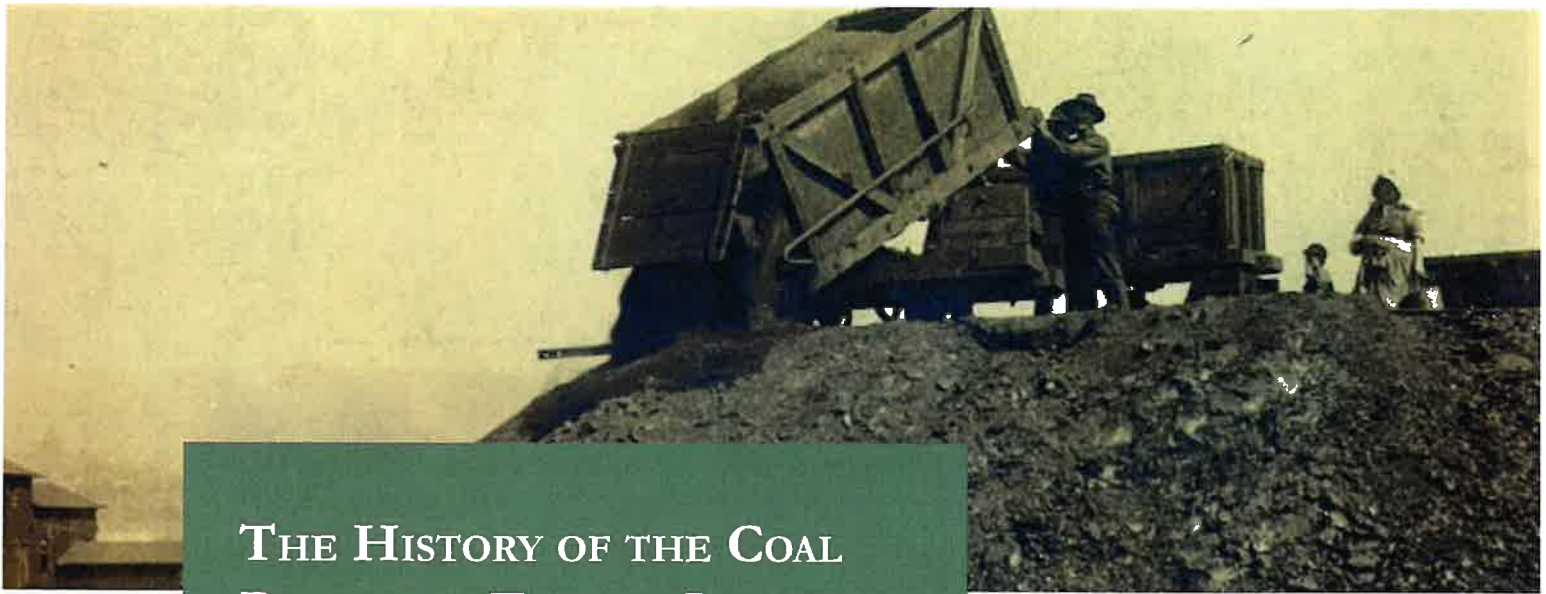
- Increase the Coal Refuse to Energy and Remediation annual cap to \$40 million from the current \$20 million, while also removing caps to allow the full amount to be accessed by the industry.
- Advocate for a long-term, industry-sustaining federal credit of at least \$12 per ton of refuse burned to eventually replace Pennsylvania's current credit.
- Create a Power Purchase Agreement with local utilities or state and federal agencies to ensure the plants continue to operate regardless of fluctuations in the energy market.
- The coal refuse to energy industry set-aside in the DEP's Draft CO² rule is vital, however, consider increasing the set-aside amount to 12.5 million tons of coal equivalent to account for decreased production in recent years.
- Limit participation in Tier II of the Alternative Energy Portfolio Standards program to in-state resources to increase credit value.



The Coal Refuse Reclamation to Energy Industry and Carbon Trading Markets

Prepared by Research Analyst
Coleen Engvall

Pictured: Colver Power Project



THE HISTORY OF THE COAL REFUSE TO ENERGY INDUSTRY

With the advent of CFB boilers, Pennsylvania recognized an opportunity to address the legacy waste coal problem across the coal regions of the Commonwealth.

Coal refuse piles plagued communities for decades, but several attempts to regulate the sites ended in failure. The most tragic of which was the Buffalo Creek Disaster. The Buffalo Creek Dam in West Virginia, owned by the Buffalo Mining Company, was an attempt to contain a coal mining waste site. However, the dam failed in 1972, killing 125 people and leaving 4,000 homeless. The aftermath caused Pennsylvania to reassess their own coal refuse regulations.

Then in 1978, to lessen the impacts of the fuel crisis, the U.S. government passed laws and distributed funds to support and create alternative fuel generators.

The Public Utility Regulatory Policies Act (PURPA) was passed to this end, encouraging innovation in the market by requiring utilities to purchase this alternative energy. These two factors coincided to set the stage for the coal refuse reclamation to energy industry.

Waste coal, or coal refuse, has created environmental and safety hazards since the 1700s, and until the advent of CFB boilers there was no practical way to use or dispose of it.

Pennsylvania's Energy Development Authority issued two bonds to build new plants to capitalize on PURPA's purchase agreement, to reduce the amount of waste coal in the environment and to create jobs in distressed coal communities.

However, the coal refuse reclamation to energy industry, the energy market and the regulatory landscape have changed since the 70s and waste coal burning plants have struggled to remain open. In fact, only ten remain in Pennsylvania and they are facing existential threats.

The industry acknowledges its disadvantages in the current market, especially with the low prices seen during the natural gas boom. However, they argue that they are the most cost-effective way to remove coal refuse and remediate abandoned mining lands. The burden of which would fall to the government in the absence of the industry.



LEGACY COAL REFUSE'S IMPACTS TO COMMUNITIES AND THE ENVIRONMENT

Coal has been mined in Pennsylvania since the country's founding, with peak extraction in the 1910s. At this time, there were virtually no considerations given to the human and environmental impacts of mining activities.

Unproductive mines were left open and abandoned, producing acid mine drainage and safety hazards across the coal region. Coal that was of substandard quality to be used as fuel was discarded in massive piles. Those piles still remain and many of them contain tens of millions of tons of coal and rock. Together they cover over 8,000 acres in Pennsylvania according to the DEP, though some piles are currently undocumented.

AIR POLLUTANTS

Dry piles also release dangerous particulate matter into the wind. Black coal dust has been known to blanket whole towns. Worse yet, piles can catch fire from lightning strikes, arson, spontaneous combustion or other causes. These fires are very difficult to contain and trying to douse them can cost millions of dollars. Even then, many fires reignite after containment efforts cease.

Once lit, the piles emit toxic chemicals such as carbon monoxide, hydrogen sulfide, sulfur dioxide, ammonia, sulfur trioxide and many others. Nearby residents often attribute coughs and breathing difficulties to the dust and smoke from piles.¹ There are known health impacts to each of these chemicals, depending on the concentration and exposure duration.

In addition to the health concerns, these fires represent uncontrolled GHGs. The CO² given off by the 45 piles around the Commonwealth is unmeasured and unregulated. Without intervention, these fires could continue until the coal refuse is consumed.

1 - *Barnes-Watkins Refuse Pile Reclamation Project*. 2010.

POLLUTION RUNOFF

Refuse piles are exposed to the elements, and the toxic compounds contained in them leach into the surrounding surface and ground water each time it rains. The water picks up harmful contaminants and acidifies the water. Streams near these piles have been shown to have pH levels as low as 4.5, which is comparable to the acidity of soda or tomato juice.

Water effluent from piles contain levels of several elements above the constituent criteria maximum concentration for freshwater organisms. Silver, arsenic, barium, cadmium, chlorine, chromium, lead, nickel, antimony, selenium, vanadium and more have all been documented in coal refuse effluent.¹

According to the PA Fish and Boat Commission, silt from piles is also a concern for many species of fish:

“When coal mine refuse is washed into streams, the subsequent siltation can cover and suffocate the eggs, leading to poor hatching rates.”²

Aquatic plants, animals and microscopic organisms often die or vacate waterways near piles. This can lead to a negative feedback loop, as healthy aquatic ecosystems are vital for filtering and purifying polluted water.

COMMUNITY AND SAFETY CONCERNS

Piles can attract illegal recreational activities such as kids riding dirtbikes or ATVs attempting to drive up the steep ridges. However, the slopes of piles are made of loose coal chunks and do not support plants that can anchor surfaces. This makes their slopes very unstable - able to shift or collapse with even small disturbances. Many piles have reported injuries related to recreational activities. Some of these accidents have even ended in fatalities.³

However, members of the communities who don't engage in dangerous activities are also affected. Ugly, dangerous coal piles and the pollution that results from them depresses property values in the coal region which is already suffering from economic downturn. The chemicals and particulate matter given off by piles can lead to chronic health problems as well.

1 - Cravotta, C.A., Brady, K.B.C. (2015). Priority Pollutants and Associated Constituents in Untreated and Treated Discharges from Coal Mining or Processing Facilities in Pennsylvania, USA. *Applied Geochemistry*. <https://doi.org/10.1016/j.apgeochem.2015.03.001>.

2 - *Statement of Smiles*.

3 - Pennsylvania Department of Environmental Protection. (n.d.) *The Sugar Creek Coal Refuse Pile and Mine Drainage Discharge Reclamation Project*. <https://files.dep.state.pa.us/mining/>.

OPTIONS FOR ENVIRONMENTAL REMEDiation

GOVERNMENT-LED REMEDiation

Governmental programs and agencies have engaged in public-private-partnerships to address coal refuse piles and the resulting problems. The DEP's Bureau of Abandoned Mine Reclamation (BAMR) has taken on large remediative projects in the past with successful results, though the coal refuse reclamation to energy industry has been a key player in these projects.

The majority of DEP-BAMR's funds for remediating refuse piles are sourced from the Abandoned Mine Lands (AML) funds, a federal program managed by the Office of Surface Mine Reclamation and Enforcement (OSMRE). However, unless a pile is actively burning, coal refuse piles are a low priority for this funding.¹ To complete a project, BAMR will often partner with coal refuse to energy facilities or other private organizations.

1 - Econsult Solutions Group Inc. (2019, June).

BARNES-WATKINS SITE

The 18 acre refuse pile near Watkins, Pennsylvania, had combusted and was continuously burning. It was the source of significant iron and aluminum contamination in local waterways and many local residents filed complaints with the DEP.

The pile had been tested for its value as a fuel source in the past, but the energy content and contaminants were inconsistent through the pile, therefore unattractive to prospectors.

In 2004, BAMR received AML funds to begin the project after partnering with local electric generators and the Cambria County Conservation and Recreation Authority (CCCRA).

Funding was broken down as:

- **\$4,284,157.86 from an Abandoned Mine Lands grant, which DEP allocated to the project;**
- **\$90,000 from Pennsylvania's Growing Greener funds;**
- **and \$202,575.82 from the CCCRA, who was paid \$0.25 per ton of fuel refuse by Robindale Energy Services.***

Robindale Energy Services mined, transported and amended the coal refuse to be able to be burned at the Seward CFB facility.¹

SWOYERSVILLE CULM PILE

In 2018 the effort to remove the 4 million ton Swoyersville refuse pile began. The general contractor for this project is Olympus Power, LLC, a member of ARIPPA. They not only carried out the work of reclaiming the site, but also provided the majority of the funding. They were unable to take on this project alone due to low energy prices.

The partners included the DEP, Eastern PA Coalition for Abandoned Mine Reclamation, the U.S. Surface Mining Control and Reclamation office, Pagnotti Enterprises and the Foundation for PA Watersheds.

- **\$8 million was provided by the Keystone Reclamation Fuel Management, LLC, a subsidiary of Olympus Power.**
- **\$4 million grant from the Abandoned Mine Land program and the Surface Mining Control and Reclamation Act.**

The current project only addresses 500 thousand tons of the pile, with the rest to be reclaimed in the future.

The project aims to improve water quality in the Abrahams Creek which is currently impacted by the pile, and reclaim the land for development.²

1 - *Barnes-Watkins Refuse Pile Reclamation Project*, 2010.

2 - Eastern Pennsylvania Coalition for Abandoned Mine Reclamation. (n.d.) *Swoyersville Culm Pile Removal AML Pilot Project*. <http://epcamr.org/home/current-initiatives/funding-project-management/swoyersville-culm-pile-removal-aml-pilot-project/>.

OPTIONS FOR ENVIRONMENTAL REMEDATION

COAL REFUSE RECLAMATION TO ENERGY INDUSTRY

To date, the industry has removed more than 225 million tons of refuse coal and at historic operating levels, 10-12 million tons were taken from the Pennsylvania landscape annually. Now, with just ten plants remaining, the industry still manages to remove and burn 8 million tons of coal per year.

Over the course of their operation, coal refuse burning plants have removed and remediated over 7,200 acres of land.¹

The main benefit to the industry-led remediation is funding. In order to remediate a pile, coal refuse must either be removed, flattened or buried. Without refuse burning facilities, the refuse is often just covered and planted over with vegetation. The industry's standards, in contrast, require the removal and landfilling of the polluting coal refuse at higher cost. They are also privately funded and earn their operating costs by selling their electricity.

They do claim the Coal Refuse Energy and

Reclamation Tax Credit, which has an annual cap of \$20 million, as well as credits as a Tier II Alternative Energy producer,¹ which have a weighted average price of approximately \$0.25 per credit from 2008 to 2018. In 2016, the price fell as low as \$0.10 per credit.²

With these exceptions, their operations which re-mine, transport, burn and remediate, come at no cost to the taxpayer and work continuously year-round. On the other hand, grants for publicly funded projects are often difficult to obtain and meeting all regulatory requirements can take years. Unless a pile is actively burning, federal Abandoned Mine Land funds consider them low priority.

According to ARIPPA's 2019 report, in order to remove 8 million tons per year, it would cost the government from \$93 to \$267 million dollars without the industry's help.³ This avoided cost, the industry argues, is what makes them indispensable for perma-

nently clearing coal refuse from Pennsylvania.

In addition, while these plants are operational, they employ residents from struggling legacy coal areas and support the economy with \$363 million in direct purchases. They also pay \$18 million in state taxes and fees.¹

LOOMIS BANK OPERATION

Northampton Fuel Supply Company, Inc., (NFS) was awarded the "Excellence in Surface Coal Mining and Reclamation" award in 2016 for their work at the Loomis Bank Operation in Luzerne County, Pennsylvania.

This 100 acre, actively burning bank was mined for 11 years, providing NFS with over a million tons of coal. According to OSMRE:

The project "saved the state millions in AML funding while also providing the potential for future jobs in the small town."

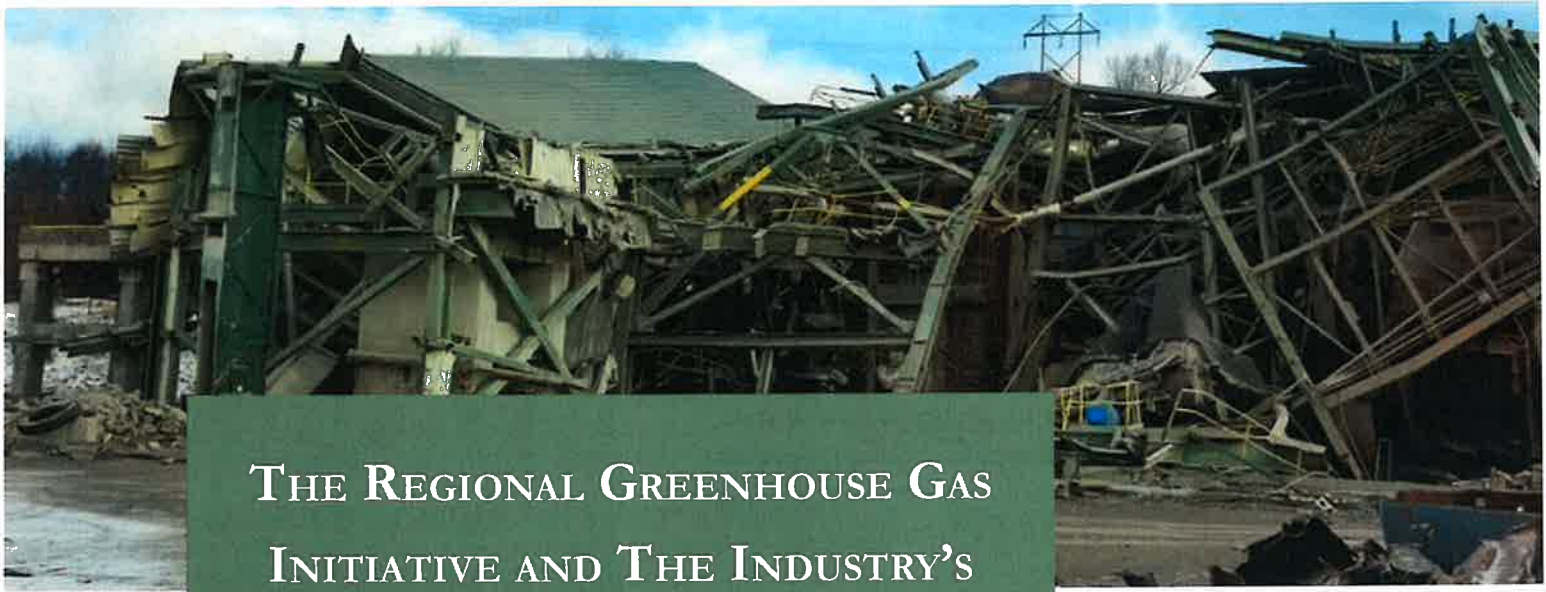
1 - *Statement of Gibbons.*

2 - Pricing. (2020). Retrieved April 17, 2020, from <https://www.pennaeps.com/reports/>.

3 - Econsult Solutions Group Inc. (2019, June).

Pictured below: The Loomis Bank coal refuse pile fire (left), and the remediated land after NFS removed and remediated the pile.





THE REGIONAL GREENHOUSE GAS INITIATIVE AND THE INDUSTRY'S FINANCIAL CRISIS

The Regional Greenhouse Gas Initiative (RGGI) is a cap and invest program that includes several Northeastern states: Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island and Vermont. The program implements a greenhouse gas cap, or maximum limit for the region for the year. This cap then reduces by 2.5 percent each year - leading the state to lower GHG emissions over time with the goal of addressing climate change. Fossil fuel-fired power plants in participating states with more than 25 megawatts of capacity are required to participate.¹

In 2019, Governor Tom Wolf directed the DEP to draft a proposed rule in line with RGGI's requirements. In the DEP's draft proposed rulemaking, there is a set-aside for the coal refuse reclamation to energy industry. The Department's first proposed set-aside looked at the emissions from the industry for the past three years and set the limit as the highest emitting year. In 2018, all plants combined were responsible for 7.9 million tons of CO² emissions. However, on May 7, 2020, the DEP announced revisions to the proposed trading program. Now, the calculation is based on a 5-year period, increasing it to 9.3 million tons.²

This allows the industry's capacity to increase somewhat without having to purchase emission allowances. However, avoiding additional expenses alone will not keep them from facing closure. Wholesale electricity prices have dropped due to low natural gas prices and growth in renewable energy. These prices are too low for coal refuse reclamation to energy plants to recoup costs from operating.

The two state-sourced funds that the industry uses are the Coal Refuse Energy and Reclamation (CRER) Tax Credit and credits for being classified as a Tier II Alternative Energy producer. The

1 - Regional Greenhouse Gas Initiative. (2020). <https://www.rggi.org>

2 - Pennsylvania Department of Environmental Protection. (2020, May 7). *Draft Proposed Rulemaking: Chapter 145. Interstate Pollution Transport Reduction*. <https://files.dep.pa.us/AirQuality/>.

original intended assistance that the CRER tax credit was meant to provide the industry was \$4 per ton of waste coal. However, the \$20 million cap has been reached each year, limiting the average price that the industry receives per ton to approximately \$1.20.

Coal refuse reclamation to energy is also included under Tier II of the Alternative Energy Portfolio Standards. Like the tax credit, these credits have been devalued, with the weighted average price falling to \$0.25 per credit or lower.¹

Between the stunted governmental reimbursement, low market prices and asymmetrical regulations from the federal, state and local government, the industry is on the brink of collapse.

Many plants have been forced to switch from full-time operation to idling when energy prices are low. This is not sustainable in the long run and many plants face the possibility of shutting down. Once plants are closed, they are usually demolished immediately, removing the possibility of reopening them once economic conditions are more favorable. For this reason, in order to maintain the environmental services they provide, supportive measures would need to take place within the year.¹

1 - *Statement of Gibbons.*

Pictured: Former coal refuse site in Clearfield



Pennsylvania CRRTE Plant Closures to Date

*2013: Piney Creek Power
Plant
Clarion County*

*2018: Northeastern Power
Company
Schuylkill County*

*2019: Cambria Cogen
Cambria County*

*2019: Kimberly Clark Ches-
ter Operations (Converted to
natural gas)
Delaware County*

*2020: Wheelabrator Frack-
ville
Schuylkill County*

*2020 (Pending): Colver Power
Cambria County*



RECOMMENDATIONS

Circulating fluidized bed boilers are currently the only way to extract value from coal refuse. Otherwise, the piles simply represent a future cost to taxpayers either via pollutants or tax dollars used to remediate them. Public projects taken on without partnerships with the coal refuse to energy industry will be even more costly than they are currently. The industry invests private funds into the removal and remediation projects, they eliminate the refuse permanently and they generate beneficial coal ash to return to the site.

However, with the current trajectory of lowering GHGs, sustaining fossil-fuel fired plants seems counter-intuitive, but beyond removing coal refuse, there are climate benefits to supporting the industry.

For example, 40 coal refuse piles that Pennsylvania is aware of have ignited and continuously burn, representing an uncontrolled release of CO² and toxic compounds. If these piles remain, more will likely combust and continue releasing GHGs and pollutants until the coal refuse is exhausted. This burning is not only uncontrolled, but it is unproductive. Failure to capitalize on the energy potential in refuse piles would mean more electricity generated elsewhere on the grid.

Additionally, the coal refuse reclamation to energy industry represents a small section of the GHGs generated in Pennsylvania. In total, their capacity is less than 1,200 megawatts and they release significantly less dioxins and toxic metals per ton than a traditional bituminous coal plant.¹ Creating an exception for this small subset in exchange for remediating legacy coal piles at significantly lower cost to the taxpayer could be a sensible move.

With that in mind, the Joint Legislative Conservation Committee offers these recommendations. Note that these are various options and not all would need to be enacted to preserve the industry.

1 - Pennsylvania Department of Environmental Protection. (2004). *Analysis of Emissions from Waste Coal-fired Combustion Units in Pennsylvania*. [https://files.dep.state.pa.us/Air/AirQuality/AQPortal Files/](https://files.dep.state.pa.us/Air/AirQuality/AQPortalFiles/).

- Increase the Coal Refuse Energy and Reclamation tax credit's annual cap to \$40 million from the current \$20 million, while also amending the credit to allow the full price per pound to be accessed by the industry, including reassessing facility based caps.
- Advocate for a long-term, industry-sustaining federal credit of at least \$12 per ton of refuse burned to eventually replace Pennsylvania's current credit.
- Create a Power Purchase Agreement with local utilities or state and federal agencies to ensure the plants continue to operate regardless of fluctuations in the energy market.
- The coal refuse to energy industry set-aside in the DEP's Draft CO² rule is vital, however, consider increasing the set-aside amount to 12.5 million tons of coal equivalent to account for decreased production in recent years. Alternatively, a flexible cap could be adopted to allow for future growth.
- Limit participation in Tier II of the Alternative Energy Portfolio Standards program to in-state resources to increase credit value.

Joint Legislative Conservation Committee

Contact Information

Phone :
717.787.7570

Website :
jcc.legis.state.pa.us

Location:
Room 408
Finance Building
Harrisburg, PA 17120

Mailing Address:
Joint Legislative
Conservation Committee
PA House of Representatives
P.O. Box 202254
Harrisburg, PA 17120-2254

APPENDIX A

JLCC HEARING TESTIFIERS AND GUEST SPEAKERS

FEBRUARY 3, 2020 - HARRISBURG

- Patrick McDonnell, Secretary, Department of Environmental Protection
- Jaret Gibbons, Executive Director, ARIPPA
- Vince Brisini, Director of Environmental Affairs, Olympus Power, LLC.
- Heather Smiles, Division Chief, PAFBC Environmental Services Division
- Mike Nerozzi, Director of Policy and Planning, PAFBC
- Gladys Brown Dutrieuille, Chairman, Public Utility Commission

FEBRUARY 21, 2020 - McADOO

- Vince Brisini, Director of Environmental Affairs, Olympus Power, LLC.
- Henry Zielinski, Fuels Manager, Northampton Generating Company
- Robert Hughes, Executive Director, EPCAMR
- William Reichert, President, Schuylkill Headwaters Association
- Jaret Gibbons, Executive Director, ARIPPA
- John Bland, Business Manager, Boilermakers Union Local 13, Philadelphia
- Terry Kaufman, Former Senior Mechanic, Northeastern Power Company
- Matthew Cochran, Asset Manager, Olympus Power, LLC.
- John Rampolla, Chief Financial Officer, Gilberton Coal Company

MARCH 5, 2020 - MON VALLEY

- Gary Merritt, Regulatory Affairs Manager, Northern Star Generation
- Tom Roberts, Plant Manager, Ebensburg Power Company
- Jaret Gibbons, Executive Director, ARIPPA

APPENDIX B

- Cravotta, C.A., Brady, K.B.C. (2015). *Priority Pollutants and Associated Constituents in Untreated and Treated Discharges from Coal Mining or Processing Facilities in Pennsylvania, USA*. Applied Geochemistry. <https://doi.org/10.1016/j.apgeochem.2015.03.001>.
- Eastern Pennsylvania Coalition for Abandoned Mine Reclamation. (n.d.) *Swoyersville Culm Pile Removal AML Pilot Project*. <http://epcamr.org/home/current-initiatives/funding-project-management/swoyersville-culm-pile-removal-aml-pilot-project/>.
- Econsult Solutions Group Inc. (2019, June). *The Coal Refuse Reclamation to Energy Industry*. <https://arippa.org/wp-content/uploads/2019/07/ARIPPA-Report-FINAL-June-2019.pdf>.
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- Pennsylvania Department of Environmental Protection BAMR. (2010, April 15). *Barnes-Watkins Refuse Pile Reclamation Project*. <http://files.dep.state.pa.us/Mining/Abandoned%20Mine%20Reclamation/AbandonedMinePortalFiles/2010Nomination.pdf>.
- Pennsylvania Department of Environmental Protection. (2004). *Analysis of Emissions from Waste Coal-fired Combustion Units in Pennsylvania*. <https://files.dep.state.pa.us/>.
- Pennsylvania Department of Environmental Protection. (2020, May 7). *Draft Proposed Rulemaking: Chapter 145. Interstate Pollution Transport Reduction*. <https://files.dep.state.pa.us/>.
- Pennsylvania Department of Environmental Protection. (2019 December). *Pennsylvania Greenhouse Gas Inventory*. <http://files.dep.state.pa.us/Energy>.
- Pennsylvania. House. Joint Legislative Conservation Committee. Hearing on the Status of the Coal Refuse Reclamation to Energy Industry. Feb. 2, 2020. (Statement of Heather Smiles, Chief, PFBC Division of Environmental Services).
- Pennsylvania. House. Joint Legislative Conservation Committee. Hearing on the Status of the Coal Refuse Reclamation to Energy Industry. Feb. 2, 2020. (Statement of Jaret Gibbons, Executive Director, Appalachian Region Independent Power Producers Association).
- Pennsylvania. House. Joint Legislative Conservation Committee. Hearing on the Status of the Coal Refuse Reclamation to Energy Industry. Feb. 2, 2020. (Statement of Patrick McDonnell, Secretary, Department of Environmental Protection).
- Pennsylvania. House. Joint Legislative Conservation Committee. Hearing on the Status of the Coal Refuse Reclamation to Energy Industry. Mar. 5, 2020. (Statement of Gary Merritt, Regulatory Affairs Manager, Northern Star Generation).
- Pricing. (2020). Retrieved April 17, 2020, from <https://www.pennaeps.com/reports/>.

APPENDIX C

MEMORANDUM

TO: All House Members

FROM: Representative Doyle Heffley and Rep. Frank Burns

SUBJECT: Investing in Pennsylvania Energy and Environment: Close AEPS Tier II Border

DATE: May 28, 2020

In the near future, we will be introducing legislation to limit participation in Tier II of the Pennsylvania Alternative Energy Portfolio Standards (AEPS) program to energy sources originating in Pennsylvania. Currently, eligible Tier II resources may originate within Pennsylvania or anywhere in the PJM regional transmission organization (RTO). Pennsylvania is a net electricity exporter, yet our ratepayers are currently subsidizing out-of-state energy facilities, including utility owned resources in other PJM states.

The AEPS Act of 2004 requires that 18 percent of the electricity supplied by Pennsylvania's electric distribution companies (EDCs) and electric generation suppliers (EGSs) come from alternative energy resources by 2021. EDCs and EGSs can comply with AEPS by procuring Alternative Energy Credits (AECs) from qualified alternative energy resource facilities. AEPS establishes two tiers of eligible energy sources. Tier II sources include new and existing waste coal, distributed generation (DG), demand-side management, large-scale hydro, municipal solid waste, wood pulping and manufacturing byproducts, and integrated gasification combined cycle (IGCC) coal facilities. By 2021, EDCs and EGSs must supply 10 percent from Tier II energy sources.

AEPS was intended to provide economic development opportunities by increasing alternative electricity generation in Pennsylvania. However, in the 2018 AEPS Annual Report, the Pennsylvania Public Utility Commission (PUC) identified a nameplate capacity of 5544.3 MW from out-of-state Tier II resources compared to only 4177.6 MW of capacity from resources located in Pennsylvania. This leads to an oversupply of available credits from outside of Pennsylvania that depresses the value of Tier II AECs and limits the ability of the AEPS program to adequately support Tier II resources located in Pennsylvania.

Since 2008, the average price of Tier II AECs is only \$0.25 and has fallen as low as \$0.10, whereas during the same timeframe the price for Tier I AECs averaged \$8.00 and reached as much as \$14.56. The comparatively low price for Tier II credits has failed to incentivize the growth of Tier II resources and instead lead to many existing Tier II resources closing in recent years. For example, four waste coal reclamation-to-energy facilities have closed in the past two years. This industry alone provides \$37 million in annual environmental and public use benefits while supporting 3,000 jobs and \$615 million in annual economic benefits in Pennsylvania.

Please join us in co-sponsoring this legislation incentivizing Pennsylvania-based Tier II alternative energy resources to support jobs and alternative energy production in Pennsylvania and stop ratepayer dollars from continuing to flow to out-of-state resources.

Results of **Regulation Test** - **5/19/2022 14:10:00**

Testing Participant: **Direct Energy
Business
Marketing, LLC**

Testing Resource: PN Scrubgrass 1 F

Regid: **1077**

Resource Id: **53700101**

Test MW: **4**

Scoring Summary -

Accuracy: **0.8176**

Delay: **0.9512**

Precision: **0.6137**

Composite: **79.42%**

PASS

Report data, scoring details and graphical results are included in the attached spreadsheet file.
Let us know if there are any other questions on this.

Regards –
PJM Performance Compliance

Results of Regulation Test - 5/19/2022 14:10:00 Testing Company: Direct Energy Business Marketing, LLC

Testing Resource: PN Scrubgrass 1 F Regid: 1077 Resource Id: 53700101 Tested MW: 4

Scoring Summary - Accuracy: 0.8176 Delay: 0.9512 Precision: 0.6137 Composite: 79.42%

