

2017 PA ABANDONED MINE RECLAMATION CONFERENCE:

ECONOMIC & ENVIRONMENTAL BENEFITS OF THE PA COAL REFUSE TO ENERGY INDUSTRY

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BACKGROUND

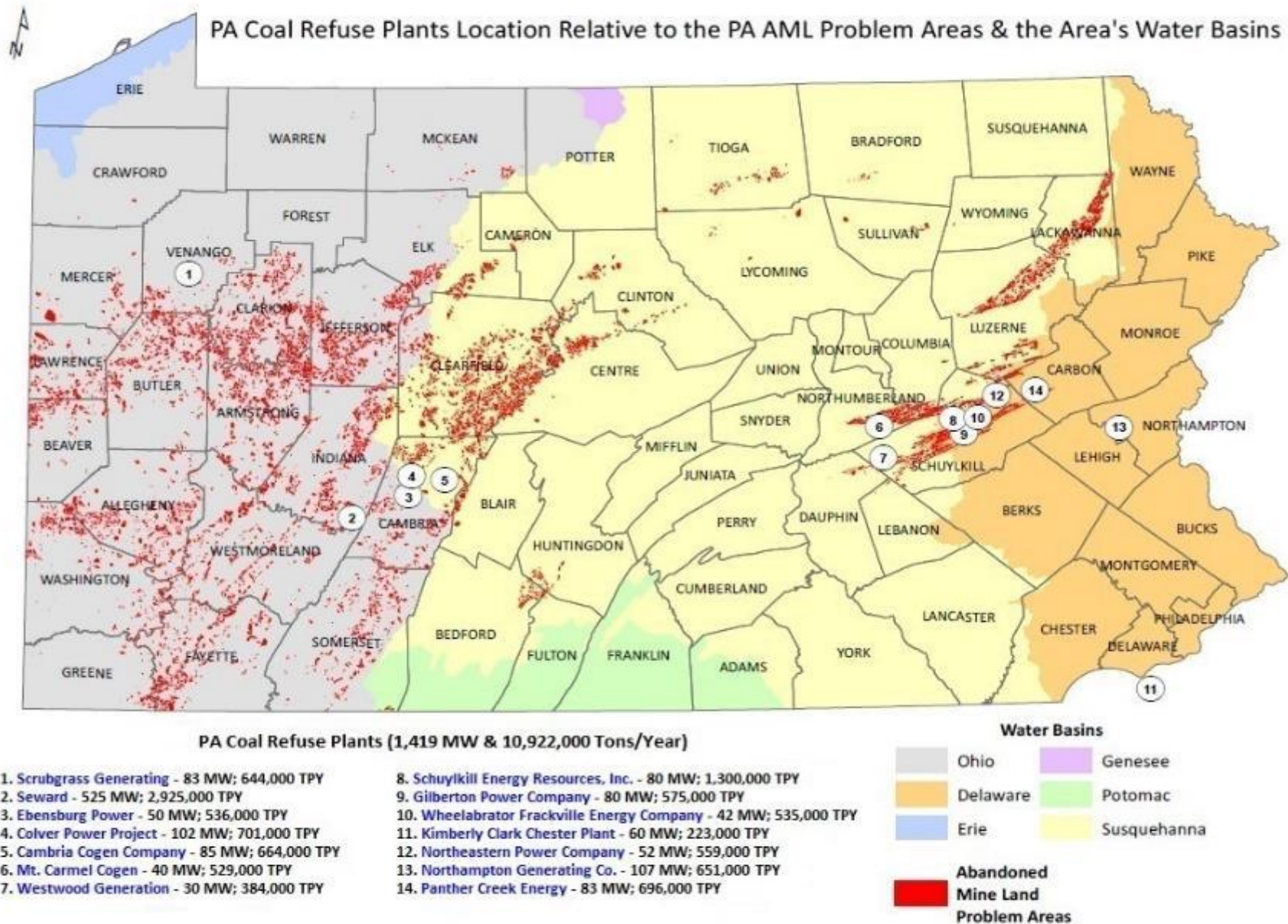
- ARIPPA represents PA's coal refuse to energy industry, an industry which has helped the Commonwealth turn its environmental challenges into economic opportunities.
- Comprised of electric generation facilities that utilize circulating fluidized bed (CFB) boiler technology to convert coal refuse into energy.
- The industry consists of 14 generating plants located in PA – 5 that use bituminous coal refuse and 9 that use anthracite coal refuse.



ARIPPA PLANTS BY COUNTY

County	Plant	Operating Capacity (MW)	Year First Unit in Service	Tons of Coal Refuse Burned in 2016
Cambria	Cambria Cogeneration	87.5	1991	585,921
Cambria	Colver Power Project	110	1995	591,795
Cambria	Ebensburg Power Company	50	1991	276,362
Carbon	Panther Creek	83	1992	143,620
Delaware	Kimberly Clark Chester Operations	67	1986	171,285
Indiana	Seward Waste Coal	521	2004	2,428,714
Northampton	Northampton	112	1995	217,392
Northumberland	Mount Carmel Cogeneration	43	1990	602,452
Schuylkill	John B. Rich Memorial Power Station (Gilberton)	80	1988	663,535
Schuylkill	Northeastern Power Cogeneration Facility	52	1989	232,413
Schuylkill	St. Nicholas Cogeneration (SER)	86	1990	1,478,011
Schuylkill	Westwood Generating Station	30	1987	105,354
Schuylkill	Wheelabrator Frackville Energy Company	42.5	1988	505,328
Venango	Scrubgrass	86.1	1993	440,519
	TOTALS	1450.1		8,442,701

Source: ARIPPA, *Electric Power Outlook for Pennsylvania 2015-2020*
prepared by PA PUC (2016)



*MW = Installed Capacity; TPY = Average Tons per Year from 2009-2013

MULTIMEDIA ENVIRONMENTAL BENEFITS

- What distinguishes these plants from traditional EGUs is the role they play in environmental remediation by removing abandoned coal refuse piles from the landscape, cleaning/reclaiming the underlying land, restoring impacted water resources, and protecting human health and safety.
- This is done without shifting environmental clean-up costs onto public sources.
- These plants have been designated as a Tier 2 alternative fuel source under PA's AEPS Law.

WHAT IS COAL REFUSE



- Remnants of centuries-old coal mining, conducted before the advent of modern environmental protection laws like SMCRA
- Consists of low quality coal mixed with rock, shale, slate, coal and other material
- Also referred to as “culm” or “gob” piles, discarded as “waste” during original mining process and randomly disposed in piles near the mine sites

RISKS / THREATS

- Prior to CFB technology, there was no productive use for coal refuse and these piles continued to scar our land and pollute our waterways.
- More than eyesores – prone to subsidence, spontaneous combustion, acid seepage and leachate production, and low soil fertility.
- Disposal costs and funding constraints militate against public removal until the piles suddenly combust or become an immediate public health and safety threat.
- If not removed by coal refuse industry, highly likely that these piles will remain in place.

ENVIRONMENTAL SCORECARD

To date, the 14 power plants that make up PA's coal refuse industry have:

- Removed and burned as fuel more than 200 million tons of coal waste
- Restored or improved more than 1,200 miles of streams
- Reclaimed over 7,000 acres of AML
- Currently remove on average about 10 million tons of waste and reclaim 200 acres/year

ANNUAL ECONOMIC & ENVIRONMENTAL BENEFITS

- Combined total value to PA of about \$780 million/year
- Economic - \$736 million (3,600 jobs; \$223 million in payroll)
- Environmental clean-up (\$26 million/year)
- Another \$20 million/year in fees and taxes



Source: Econsult Solutions (Sept. 8, 2016)

QUANTIFICATION OF ENVIRONMENTAL AND PUBLIC USE BENEFITS GOING FORWARD (\$M)

Category	Benefit Type	Year 1	Year 10	Year 20	Total	20 Year Avg
Water	Cumulative	\$1.5	\$14.6	\$29.2	\$306.2	\$15.3
Fire/Air	Cumulative	\$0.1	\$0.5	\$1.0	\$10.0	\$0.5
Public Safety	Cumulative	\$0.6	\$6.4	\$12.8	\$133.9	\$6.7
Land Reclamation	One-Time	\$2.0	\$2.0	\$2.0	\$40.4	\$2.0
Nearby Property Value	One-Time	\$1.6	\$1.6	\$1.6	\$32.6	\$1.6
Total		\$5.8	\$25.1	\$46.5	\$523.1	\$26.2

Source: ESI Calculations

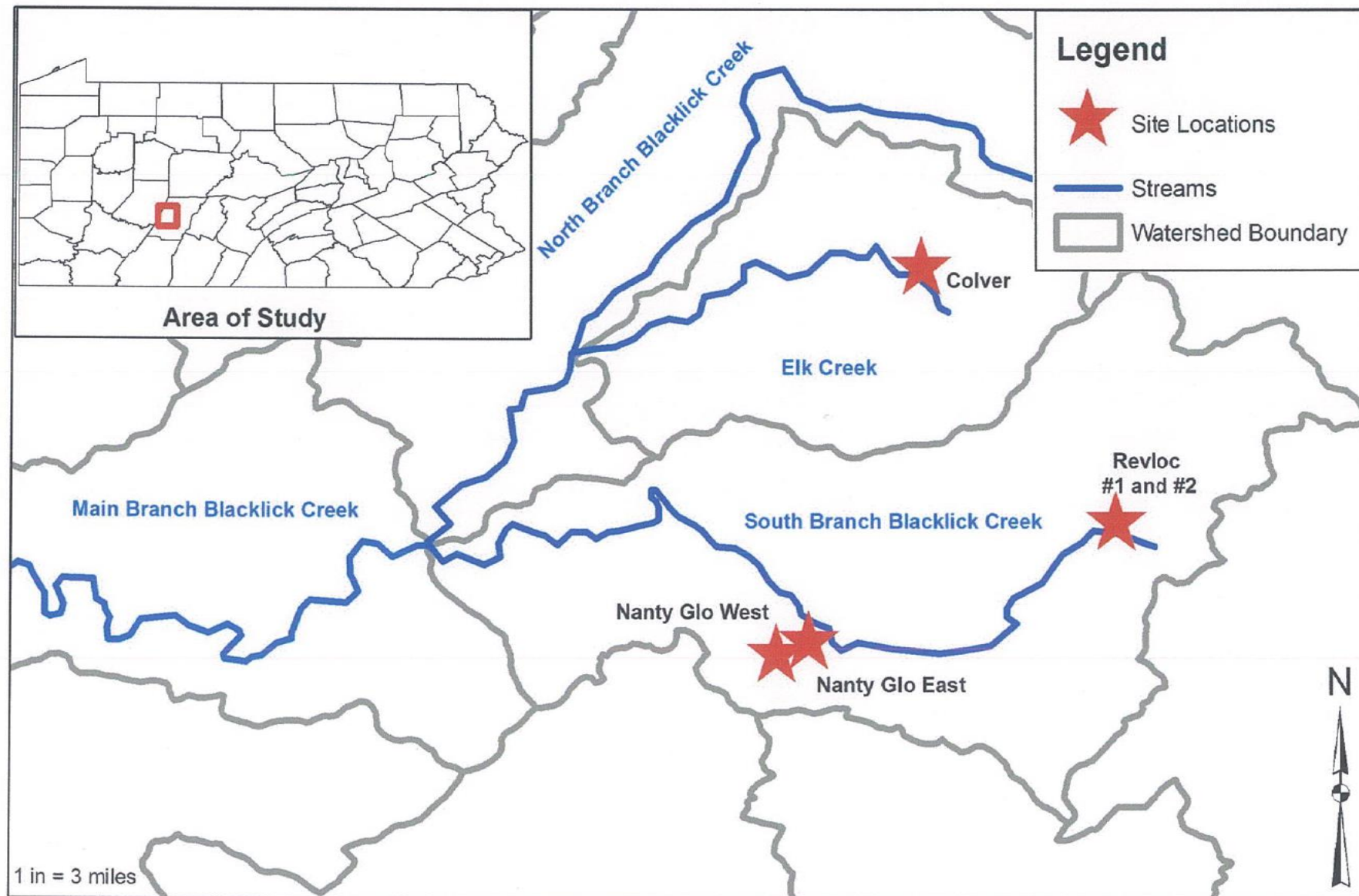
CASE STUDY – RECLAMATION OF BLACKLICK CREEK WATERSHED USING CFB ASH

Study Sites

- Five sites are included in the study (listed in the order that they were permitted)
 - Revloc #1 (Surface Mining Permit No. 11880201)
 - Colver (Surface Mining Permit Nos. 11900201 & 11970201)
 - Revloc #2 (Surface Mining Permit No. 11960202)
 - Nanty Glo West (Surface Mining Permit No. 11020202)
 - Nanty Glo East (Surface Mining Permit No. 11070202)

Revloc #1, Revloc #2, Nanty Glo West, and Nanty Glo East sites are operated by Ebensburg Power Company.

Colver site is operated by Maple Coal Company.



All five sites are located in Cambria County

Total Reductions in Loading to the Blacklick Creek Watershed

	Total Average Baseline Loading	Total Average Recent Loading	Total Reduction
Acidity (kg/day)	4,826	204	4,622
Iron (kg/day)	1,016	11	1,004
Aluminum (kg/day)	467	26	441
Manganese (kg/day)	23	3	20
Sulfate (kg/day)	3,789	689	3,100

ANNUAL ECONOMIC IMPACT OF THE COAL REFUSE INDUSTRY IN PENNSYLVANIA

	Base load	2015	% Change
Direct Jobs (FTE)	1,820	1,450	-26%
Direct Output (\$M)	\$432	\$347	-20%
Indirect & Induced Output (\$M)	\$304	\$241	-21%
Total Output (\$M)	\$736	\$589	-20%
Total Employment (FTE)	3,600	2,800	-20%
Total Earnings (\$M)	\$223	\$186	-17%

Source: ARIPPA (2016), ESI (2016), IMPLAN (2013)

CURRENT INVENTORY

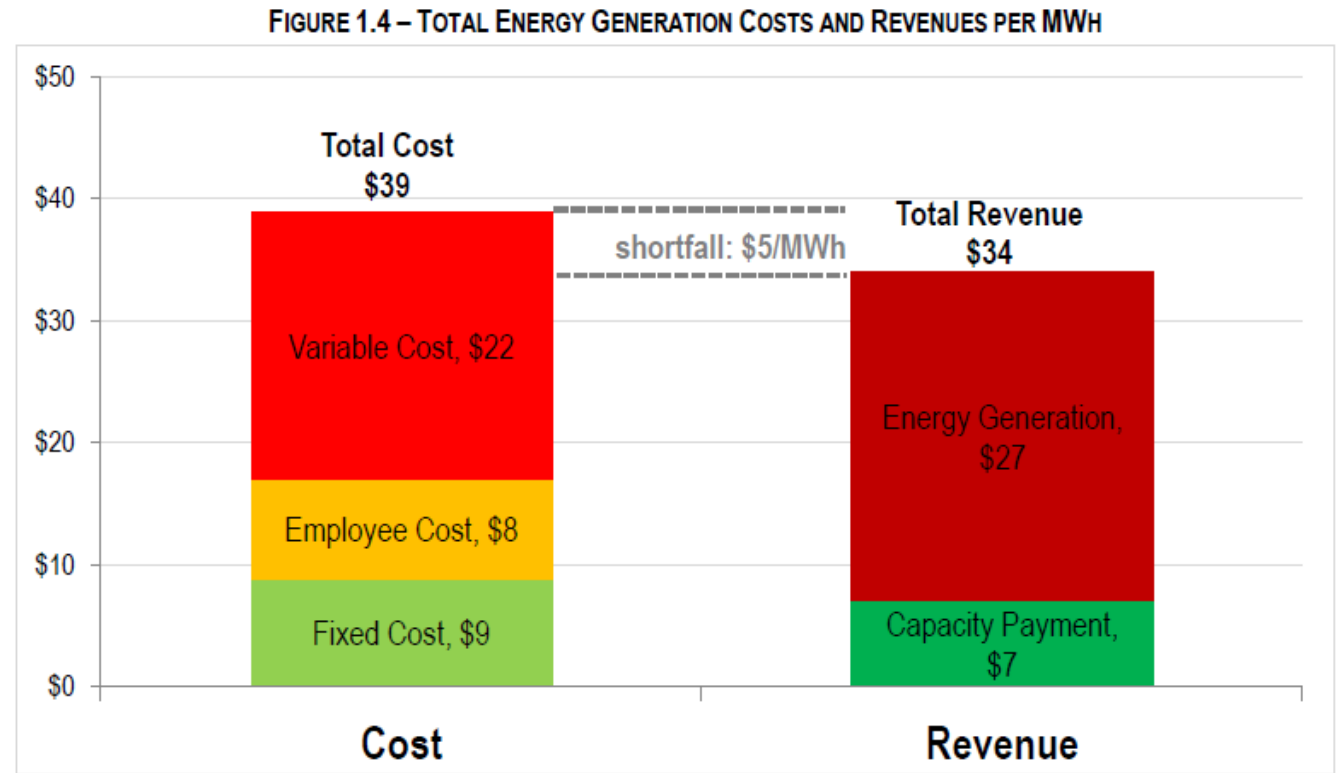


DEP's inventory of abandoned refuse piles in PA:

- Inventory is not static but growing
- 840 piles scattered throughout the coal fields
- 52 piles are currently burning
- Land mass covers an aggregate area of 10,000 acres
- Contain at least 300 million tons of coal refuse
- Studies conducted in the 1960s and 70s by the PA Dept. of Mines and Mineral Industries and Penn State indicate in excess of 2 billion tons of coal refuse in PA, split evenly between the anthracite and bituminous regions of the state.

IMPEDIMENTS TO INDUSTRY RECLAMATION

- Whole sales prices for electricity are low:
 - Restrictive regulatory requirements
 - Low demand for electricity
 - Glut of and extremely low prices for natural gas
- As a result, our cost to generate electricity - which includes the cost of our environmental remediation - exceeds our selling price



Source: ESI Analysis of ARIPPA Member and U.S. Energy Information Administration Data (2016)

PJM ENERGY RATES

LOCATION MARGIN PRICING \$/MW

Year	Quarter	Average LMP (\$/MW)	2016 % of 2014 LMP
2014	Q1	\$85.99	
	Q2	\$40.77	
	Q3	\$34.56	
	Q4	\$35.53	
2015	Q1	\$49.40	57%
	Q2	\$32.39	79%
	Q3	\$32.33	94%
	Q4	\$29.33	83%
2016	Q1	\$29.60	34%
	Q2	\$27.22	67%
	Q3	\$33.15	96%
	Q4	\$29.99	84%
2017	Q1	\$30.56	36%
Source: PJM Region Average Quarterly Rate, www.pjm.com			

ARE COMPETITIVE MARKETS WORKING?

- These financial challenges are not unique to the coal refuse industry.
- Wide-ranging uncertainty about the sustainability of the current power market pricing structure has sparked a series of reviews on matters affecting wholesale energy pricing and market design.
- FERC convened a technical conference on how state policy initiatives like subsidies can be integrated into power markets without disrupting price reliability and fuel diversity.
- DOE has initiated a 60-day study to explore critical issues central to preserving the reliability of the electric grid, including how regulatory burdens are impacting baseload generation.

CONCLUSION

- The outlook for public funding of AML is bleak:
 - AML fund expires in 4 years
 - ARC is targeted for elimination
 - Growing Greener funds have dwindled and no apparent political appetite to create a dedicated funding source
- To reverse this trend, we'd like to partner with you to promote the values of reclamation and find ways to secure multiple sources of funding that will sustain and increase the current level of AML reclamation activities.
- No one but the coal refuse industry can remove the abandoned coal waste piles and address these attendant environmental and safety hazards in a holistic and efficient manner.

QUESTIONS & CONTACT INFO

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