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# ASH **at work**

Applications, Science, and Sustainability of Coal Ash

## ASH AS A RECOVERABLE RESOURCE



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*A recently installed triboelectrostatic separator.*

## Value Streams from Coal Fly Ash Ponds and Landfills: Actual Sustainable Gains

By Martin Koepenick

For decades fly ash has proven to be a valuable additive for concrete buildings, bridges, and other structures. However, as coal-fueled power plants are phased out, a steady supply source is diminishing. Because of declining coal power generation, rising demand as a cement extender in concrete, and environmental concerns for fly ash stored in landfills and ash ponds, harvesting and beneficiating fly ash residing in impoundments is gaining momentum. With over a billion tons stored in impoundments, there is enough fly ash to meet demand for decades.

What is referred to as Class F fly ash is what's of interest to the cement and concrete industry. And while ASTM C618 calls for the loss on ignition (LOI), an indicator of carbon content, to be less than 6 percent, in practice the market generally expects values to be less than 3-3.5 percent. There are currently two commercial methods used to reduce the carbon content, i.e., beneficiate, fly ash: triboelectrostatic separation or combustion. This article will focus on triboelectrostatic separation and its application with harvested ash because of its history of proven performance and the far greater number of installations.

There are performance benefits associated with substituting fly ash for cement. Still, from an environmental standpoint,

the ability to reduce CO<sub>2</sub> generated from cement production by utilizing a waste stream is an attractive driver, which is compounded by the desire to remove the billion-plus tons of ash from landfills and ash ponds to protect the environment from groundwater contamination. With an eye on maximizing sustainability, comprehensive solutions, including every aspect of remediation, must be sustainable—i.e., environmentally friendly/responsible, minimizing the environmental impact—and financially accountable.

A core technology from Separation Technologies (ST), triboelectrostatic separation, ensures harvested fly ash can be beneficiated through a sustainable carbon removal process to produce a building materials product with the quality required for even the most challenging construction projects (e.g., the new World Trade Center). Simple and robust, ST's technology is small enough to fit inside a shipping container. Having few moving parts, it consumes almost no energy. A technology now proven over two decades, it could be the de facto standard for beneficiating harvested ash into a premium construction product.

In addition to its separation technology, utilities are looking to ST to supply other equipment, such as drying and screening



systems, and the know-how to make the most of ash value streams. ST has the advantage of providing its brand, ProAsh®, to its parent Titan America, a cement manufacturer and leader in AI-driven process and product gains for the industry.

Seeking to showcase recent advances in harvesting, *ASH at Work* sat down with Tom Cerullo, President of Separation Technologies (ST), a subsidiary of Titan America LLC, for an update on developments at the company. Cerullo invited several pioneering customers to participate as well.

**ASH at Work (AW):** Tell us about ST's role in reclaiming fly ash from coal ash.

**Tom Cerullo:** Over the past two decades, ST has delivered small-footprint electrostatic separation modules to recover fly ash in North America, Europe, and Asia. Our electrostatic separators are a proven approach for utilities to turn waste from coal combustion into construction materials that meet specifications for the most demanding projects using the most sustainable, environmentally friendly process available. And, as expected, our separation technology performs equally well on harvested ash. With a lower capital investment and operating costs, we believe our combustion-free, highly sustainable process is the solution of choice for the utility, ratepayers, the community, and the environment. While our separation technology is at our core, with Titan's expertise, we are also able to provide

comprehensive solutions. Our scope can be very narrow or big-picture comprehensive.

**Scott Blair, VP, Major Projects, Talen Energy:** Talen Energy and ST's collaboration began in 1999 with the start-up of an electrostatic separation-enabling fly ash beneficiation at our Brandon Shores Power Station in Anne Arundel County, Maryland. Our relationship expanded with a ProAsh® equipment installation at Brunner Island in 2006. Since then, ST has processed and marketed millions of tons of the branded material to our mutual benefit. The most famous building we supplied with ProAsh® is the One World Trade Center (Freedom Tower) in Manhattan, but many other signature structures have a connection to us.

The next logical step in our ash remediation developments was a demonstration plant to explore more comprehensive processing of harvested ash. So, in 2021 ST provided a complete industrial-scale operation to reclaim fly ash from coal ash impoundment basins. We now have the opportunity to produce more ProAsh®, ST's established ASTM C618 concrete-grade fly ash product, and EcoTherm, an alternative to bauxite, silicon dioxide, aluminum oxide, and iron oxide sources, to augment ground limestone in cement kiln raw feed. We can handle highly variable feeds and process fast and consistently.

The opportunity to make sustainability gains is always of great interest to us and communities where we operate.



*ST's coarse screening operation removing coarse debris from ponded ash. From here, the screened reclaimed ash is transported to ST's beneficiation operation for drying, particle size control, and carbon removal (i.e., separation).*

**AW:** How are ash recovery efforts paying off in Poland?

**Piotr Solecki, Manager, Zakład Separacji Popiołów Siekierki Sp. z o.o.):** Since December 2017, our ash separation plant has run smoothly. The unit was developed as a joint-venture company of PGNiG TERMIKA SA (a local power and heat generation company) and Lafarge Cement SA. The plant uses technology from ST, employing its proprietary electrostatic process.

Using ST know-how and equipment to separate carbon particles from fly ash gives a new quality of ash. Thanks to the ST separator, two products are created from our fly ash: ProAsh® with a combustible content below 5 percent, which makes it an attractive product in the construction industry, and EcoTherm™, which is recycled for re-combustion in power boilers to reduce the amount of hard coal burned.

It is evident that companies such as ours or companies implementing new technologies, such as ST, are part of the broadly understood environmental protection policy and contribute to the minimization of human exploitation of the surrounding environment. I believe that this type of activity should be set as a model for others, in particular, to inspire and seek new and better solutions.

**AW:** What about progress in the American West?

**Dale Diulus, Salt River Materials Group, Senior VP, Pozzolan:** Our Phoenix Cement Company, dba Salt River Materials Group (SRMG), purchased and licensed the ST particle separator. ST also provided engineering and commissioning services for a fly ash beneficiation facility at a power generating station in Utah. ST equipment installation and operations began in August 2021.

Turning waste into a value stream has its challenges. A commercially effective and reliable beneficiation process is a must. Because of our decades-long approach to beneficiating fly ash, we have successfully recycled millions of tons of fly ash that otherwise would have ended up in landfills forever. We build customer confidence in our products and are the respected fly ash supplier in the southwestern U.S.

I want to point out a few facts about Salt River Materials Group. SRMG, headquartered at the Salt River Pima-Maricopa Indian Community's Chaparral Business Park near Scottsdale, Arizona, is the only Native American-owned producer of portland cement in the U.S. It is also a major manufacturer and marketer of sand and gravel and recycled coal combustion products (fly ash) and pozzolans throughout Arizona and the southwestern United States. Sustainability is truly the foundation of our approach to business.

**AW:** Comment on environmental and social issues that you face.

**Justin Canipe, SRMG Operations Manager:** Being owned by the Salt River Pima-Maricopa Indian Community, we are especially aware of the importance of going beyond environmental compliance and setting a standard for waste-to-value manufacturing. ST shares similar values. Together we are making a real difference. After all, why consider any product to be waste when it has a valuable purpose?

It's common for our Native American owners to look far into the future concerning any decisions they make. Seven generations ahead are the norm. They have considerable respect and honor for the earth—the sun, water, and what we do to generate energy sustainably.

**AW:** What's ahead for ST separators and new technologies to harvest coal ash?

**Tom Cerullo:** In our 25th year of developing industry-leading solutions for the construction material and power generation sectors, we are proud of our reputation as having the most environmentally friendly, sustainable, robust, and proven process available. By harnessing the power of our separation and related technologies, ST turns waste into high-grade, low-carbon construction products and fuel-rich products for cement manufacturing and power generation.

Fly ash ponds and landfill reclamation represent the future of the supplementary cementitious materials industry. This is clear from our customers featured in this interview and global leaders. Our separation technology will continue to be the best choice for sustainably processing fly ash to maximize beneficial use and minimize the volumes left in or returned to landfills. While we are known for separation technology, we can offer additional services for reclamation projects. Where multiple providers are chosen, we are open to working with third parties.

This technology and others in development support the Titan Group's commitment to sustainable business practices, carbon dioxide reduction, and developing environmentally responsible projects and products.

ST's separation technology, proven over more than 25 years at North American utilities and across eight countries, produces consistent, high-quality fly ash for concrete-mix designs with a lower CO2 footprint compared to those with portland cement as the sole binder or those using fly ash produced using combustion to remove carbon. We are focused on maximizing the volume of ash removed from the earth and processed for beneficial use to effect long-term environmental benefits using the most sustainable solutions available.

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