

# There's More to CCPs Than Fly Ash

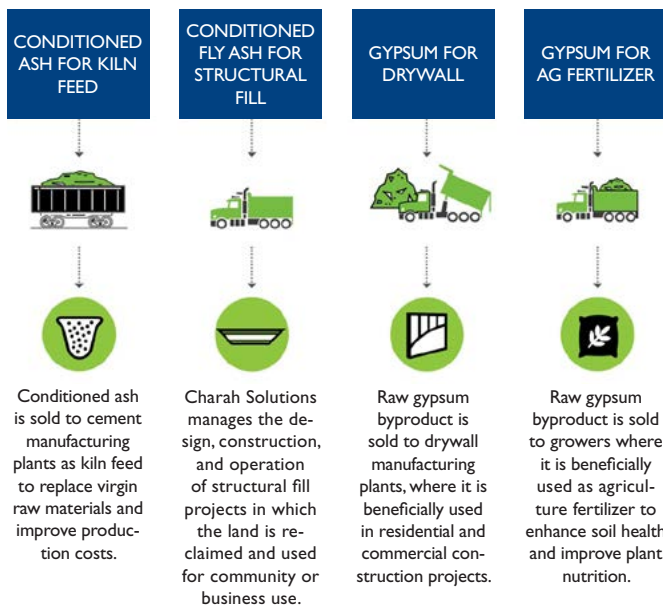
By Eric Effinger

According to the American Coal Ash Association, approximately 41 million tons of coal combustion products (CCPs), or 52 percent of those generated, were beneficially used in 2019. The most commonly used CCP is fly ash, which is a more affordable substitute for cement in the production of concrete. Approximately 12.6 million tons of fly ash was used in concrete production in 2019.

While fly ash concrete represents the largest use of recycled CCPs, it is just one part of the CCP equation, with other beneficial uses including:

- Conditioned ash for structural fill and land reclamation;
- Conditioned ash for cement kiln feed used in the production of cement;
- Gypsum for drywall; and
- Gypsum for agricultural fertilizer.

Charah Solutions recycles CCPs for use in all of these applications. In 2020 alone, we recycled more than 2.58 million tons of CCPs, saving 2.24 million tons of CO2 from entering the atmosphere. In addition to reducing greenhouse gas emissions, these beneficial uses help to conserve water and virgin resources, as well as reduce the amount of waste sent to landfills. Since the Environmental Protection Agency's 2015 Coal Combustion Residuals (CCR) Rule took effect, the company has also reclaimed approximately 300 acres of land and committed to remediate and return 90 percent of land owned to its natural habitat or redevelop the land in a sustainable manner.



## Conditioned Ash for Structural Fill and Land Reclamation

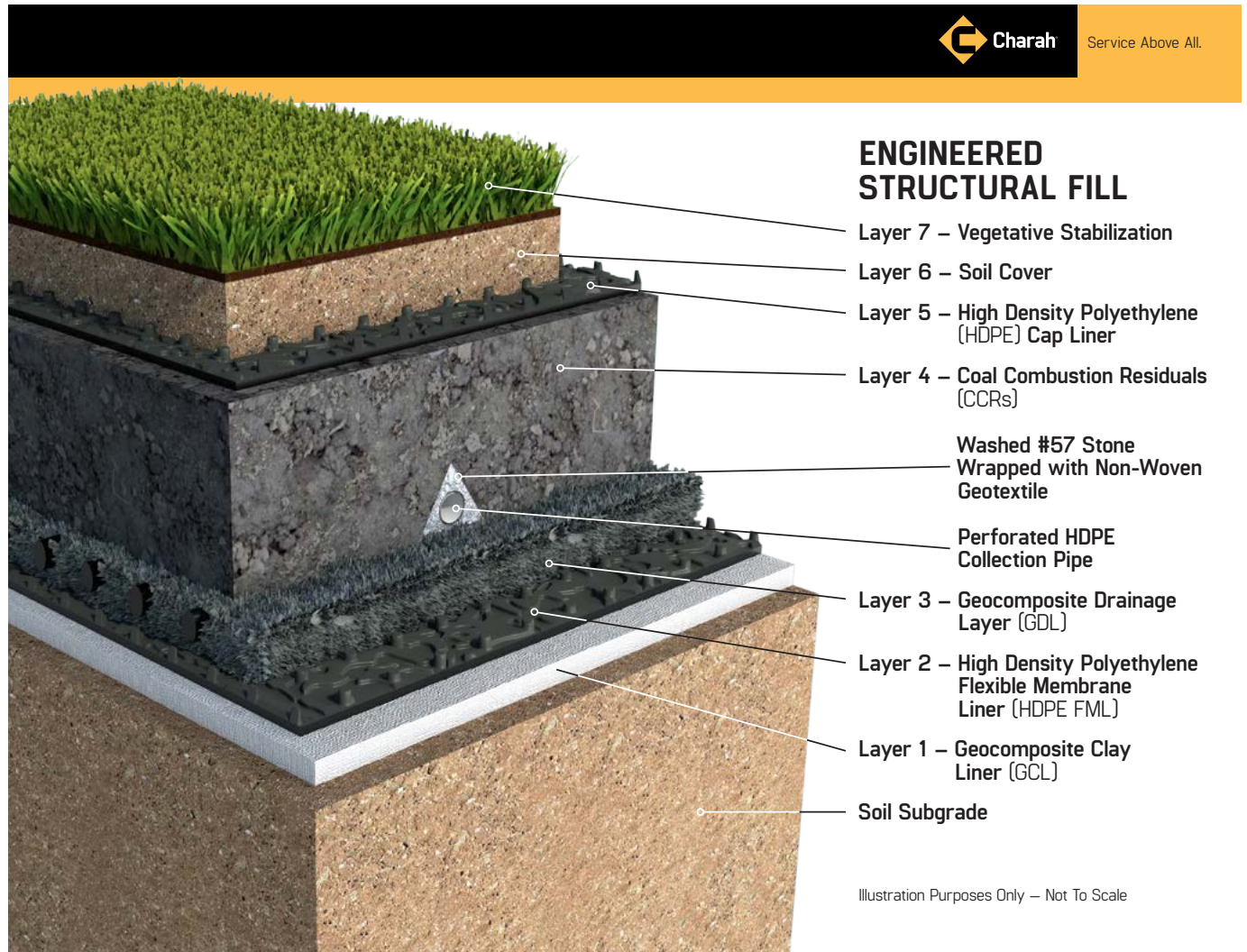
A major application of recycled CCPs is the beneficial use of conditioned ash as structural fill, in which ash is utilized as fill material to help reclaim unusable land for community, residential, or business use rather than being disposed of in a surface impoundment or landfill. Charah Solutions manages the design, construction, and operation of these fully lined structural fill projects, which recycle the ash and return hundreds of acres of land back to the community. This includes the beneficial use of over 10 million tons of ash in structural fill projects and approximately 300 acres of reclaimed land.

Conditioned ash as a structural fill material is placed and compacted in accordance with approved design criteria in order to improve land for an intended use. Conditioned ash is a useful fill material due to its low unit weight, relatively high shear strength, and ease of handling and compaction. In a fully lined structural fill, the ash is placed in a series of liners, with the top and bottom impermeable liners heat welded together to

encapsulate the ash covered by soil—meeting state and federal standards for a structural fill including strict groundwater monitoring standards and reporting.

The use of conditioned ash as structural fill material not only eliminates the need to dispose of ash in landfills, but it is also a

cheaper alternative than using traditional structural fill materials such as soil and natural aggregates. This conserves resources by substituting recycled materials for virgin ones that would typically be mined and also reduces greenhouse gas emissions as less equipment is used in the process.



## Conditioned Ash for Kiln Feed in Cement Production

Tightening federal, state, and local guidelines are forcing many utilities to think beyond the ready-mix concrete industry for their byproduct sales and marketing efforts. For example, recent state legislation gave a large utility 15 years to remove approximately 15 million cubic yards of coal ash currently stored in its ponds. The material must be recycled or placed in a lined landfill that meets federal and state guidelines for CCRs. To meet the standards mandated, the utility has contracted with Charah Solutions for the beneficiation of a portion of this ash through 2032.

As part of the beneficiation and marketing contract, Charah Solutions will load conditioned ash and ship it directly to cement kilns, where it is used as raw feed to replace virgin materials and improve production costs for the customer. This supply of ash will also be a long-term, consistent sourcing solution for the cement producers, allowing them to be confident in the supply volume and quality for years to come. To support the volume of ponded ash, Charah will develop a new high-volume enclosed rail loadout facility, deploy processing and material handling equipment, and use our rail transportation infrastructure to transfer the reclaimed material to cement plants in the eastern U.S.—leveraging more than a decade of our ash kiln supply experience. The beneficiated ash product can replace other currently utilized virgin raw materials in the production of portland cement at multiple cement kiln locations for the next 10+ years and help supply the growing demand for concrete in the construction industry. In addition, every ton of coal ash used to replace traditional virgin raw materials in the production of cement reduces carbon dioxide emissions entering the atmosphere.

There are several factors that guide decisions regarding what materials a cement kiln can use. Quality, economics, and handling characteristics are all important; however, economics tend to be the major driver. Raw materials bring multiple mineral components to the mix and are evaluated as such. Handling characteristics of each material determine its compatibility with existing equipment. Extremely fine or high-moisture materials can be challenging to handle, as well as materials that are not uniform in size or are oversized and thus require more energy to process. Quality and environmental factors are extremely critical, as the amount of heavy metals, primarily mercury, as well as elevated levels of carbon, sulfur, and chlorides, can preclude a certain ash, or portion of a ponded deposit, as a cement kiln feed candidate. Additionally, the presence of organic materials can be problematic, as higher levels can result in air emission exceedances in measured parameters such as total hydrocarbons or volatile organic compounds. Each cement plant is guided by its own individual plant Operating Permit (generally known as a Title V Permit [Clean Air Act]). Cement plants are highly regulated by the EPA and state government agencies to control for air emissions, water discharges, and safety.

Substituting dried, graded CCPs for virgin aluminum-, iron- and silica-bearing materials may equate to a lower carbon dioxide emissions factor per ton of cement mill output—a metric cement producers increasingly prioritize for their environmental profiles. The contract and infrastructure outlay are indicative of a changing regulatory and supply chain landscape for power utilities and cement producers alike. The site's scale of viable material, coupled with the utility's incentives to pursue ponded ash recycling vs. permanent disposal measures, allows cement producers the opportunity to improve production economics as well as environmental performance.

## Gypsum for Drywall and Agricultural Fertilizer

While natural gypsum is mined, synthetic gypsum is a routine product of flue gas desulfurization (FGD) and sulfur dioxide compliance operations at coal-fueled power plants. Charah Solutions provides marketing and management services, including operations support, for onsite management or implementation of loading, transportation, and marketing solutions to deliver cost savings to customers and recycle gypsum for the manufacture of drywall and agricultural fertilizer.

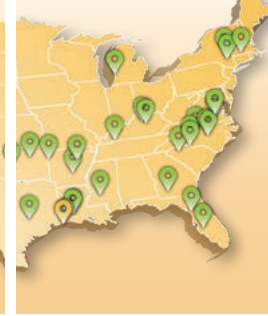
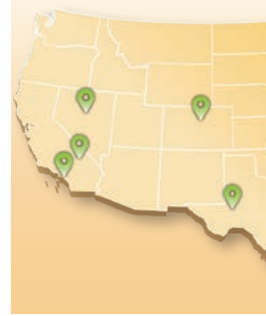
Raw gypsum byproduct is sold to drywall manufacturing plants, where it is beneficially used in residential and commercial construction projects. Charah Solutions has years of experience marketing wallboard-grade quality gypsum. The beneficial use of gypsum in drywall offers product benefits, including fire resistance, sound control, versatility, quality, convenience, and cost-effectiveness. In addition, it eliminates the need for utilities to dispose of FGD material in landfills or ponds, while reducing water and energy consumption and preserving natural resources.

Raw gypsum byproduct is also sold to growers, where it is beneficially used as agricultural fertilizer to enhance soil health and improve plant nutrition. Farmers have used gypsum (calcium sulfate dihydrate) for centuries as a soil amendment because of its many benefits. It is an excellent source of calcium sulfur for plant nutrition and improving crop yield. It also improves acid soils and treats aluminum toxicity, resulting in increased root growth. Additionally, gypsum enhances soil structure for root growth, improves water infiltration, and helps reduce runoff and erosion.

## Efficient Distribution Network

In recent years, Charah Solutions has increased the efficient distribution of ASTM C618 fly ash, cement kiln feed ash, gypsum, and other CCPs through development of our MultiSource® terminal network. The MultiSource materials network is a unique distribution system of more than 40 locations nationwide, with international sourcing and distribution and a national network of barge, rail, and truck services that provide a continuous and reliable supply of CCPs for structural fill projects, cement manufacturing, ready-mix concrete production, and other uses throughout the U.S.





## MULTISOURCE® MULTIPLIES YOUR FLY ASH SALES.

Effective byproduct sales and marketing is all about the strength of your network. Utilities and fly ash customers both know they can count on the Charah® Solutions MultiSource materials network and our dedicated sales team to deliver results. With nearly 40 strategic locations nationwide and our proven EnviroSource™ fly ash beneficiation technology, we are ready with the network, the team, and the expertise to keep your ash moving. **For more information, contact us at 877-314-7724 or visit charah.com.**

### Byproduct Sales

#### SCMs Sales & Marketing

- FLY ASH SALES
- ENVIROSOURCE™ ASH BENEFICIATION
- MULTIPOZZ™ POZZOLAN
- BOTTOM ASH SALES
- GYPSUM SALES
- IGCC SLAG SALES
- TERMINAL OPERATIONS
- KILN FEED PRODUCT SALES
- DELIVERY
- LOGISTICS



**Charah  
Solutions**

Service Above All®



The MultiSource® materials network provides CCPs to markets where they are needed, as well as sufficient storage to level out seasonal supply and demand fluctuations. With terminals and distribution hubs in place nationwide, customers are able to reliably purchase CCPs, including ash and gypsum, through the network across the country. In addition, Charah Solutions continues to strategically expand this network to meet growing customer demand.

Sustainability is central to everything we do at Charah Solutions. Our core business is centered on coal ash byproduct management, the beneficial recycling of ash products, and environmental remediation and compliance. While fly ash used in the production of concrete is the most commonly recycled CCP, there are many other applications—conditioned ash for structural fill, land reclamation, and cement kiln feed, as well as gypsum for drywall and agricultural fertilizer—for which ash and other CCPs can be responsibly recycled. These

options not only provide a lower-cost and better-performing product for customers, but reduce greenhouse gas emissions, conserve water and virgin resources, and reduce the amount of waste sent to landfills. We are proud to develop innovative sustainable solutions to complex environmental issues for the betterment of the planet and to benefit our customers who use these recycled products.



***Eric Effinger** is Vice President of Operations at Charah Solutions Inc. A registered professional engineer and certified project management professional, he has over 15 years of experience executing and managing large-scale heavy civil construction and utility-related projects throughout the United States. Effinger earned a Bachelor of Science in Civil Engineering Technology from the University of Southern Indiana.*