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Applications, Science, and Sustainability of Coal Ash

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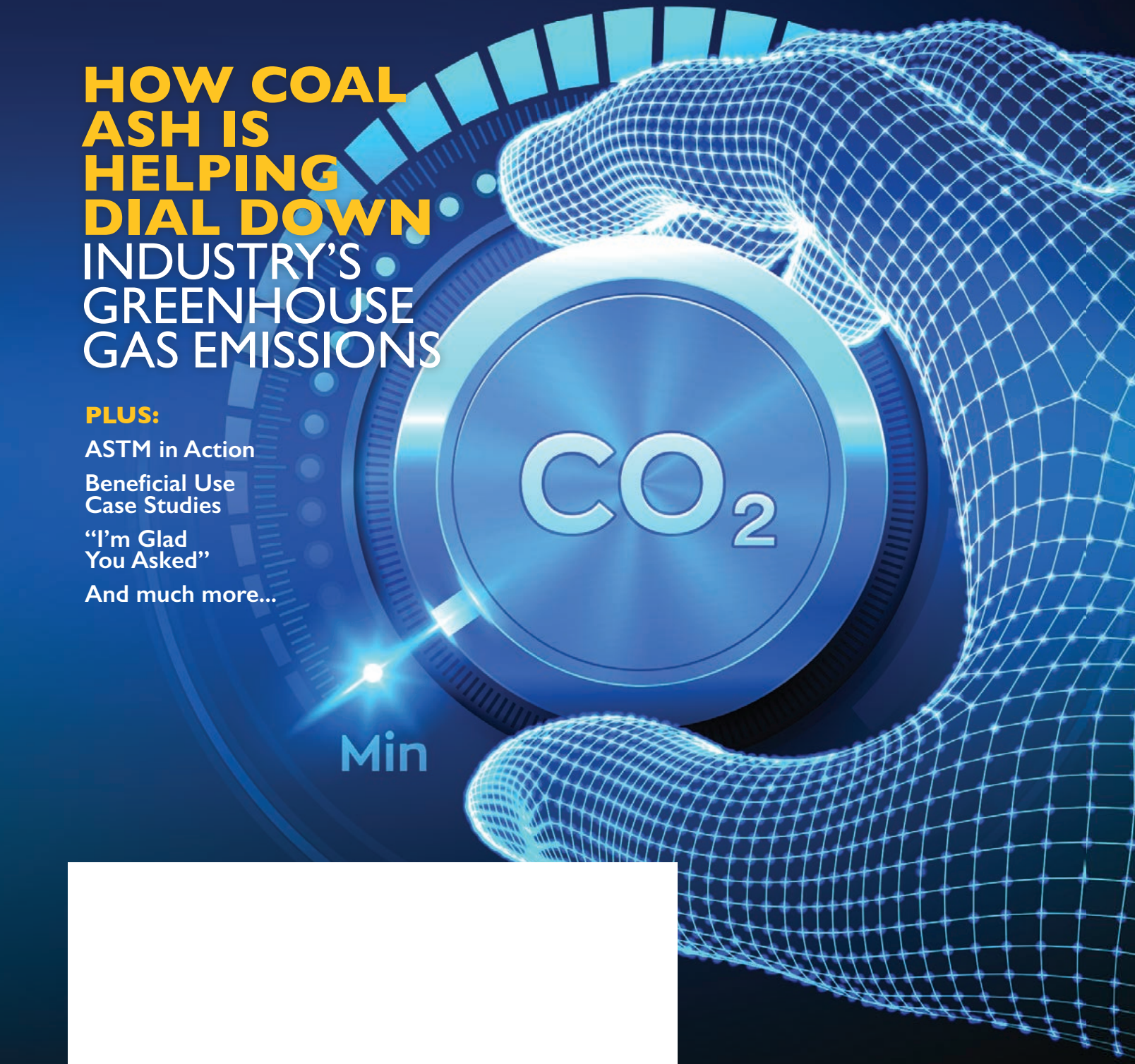

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ISSUE 1 • 2022

# ASH at work

**Applications, Science, and Sustainability of Coal Ash**

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### On the Cover

Each ton of fly ash that replaces portland cement in concrete saves slightly less than one ton of CO2 emissions. But that's only part of coal ash's environmental benefits.

# Back to the Future with ESG

*By Steve Benza, ACAA Chair*

You can't open a business publication these days without encountering some discussion of ESG. "Environmental, Social, and Corporate Governance" considerations are increasingly migrating from the boardrooms of the most socially conscious enterprises to companies of all shapes and sizes.

It's a relatively new phenomenon. According to Wikipedia, "The term ESG was first coined in 2005 in a landmark study entitled 'Who Cares Wins' (at) a conference that first brought together institutional investors, asset managers, buy-side and sell-side research analysts, global consultants, and government bodies and regulators to examine the role of environmental, social, and governance value drivers in asset management and financial research. In less than 20 years, the ESG movement has grown from a corporate social responsibility initiative launched by the United Nations into a global phenomenon representing more than US$30 trillion in assets under management. In the year 2019 alone, capital totaling US$17.67 billion flowed into ESG-linked products, an almost 525 percent increase from 2015, according to Morningstar."

You may or may not work for a publicly traded company. But many of your customers almost certainly do. And as the ESG movement continues to snowball, a large percentage of them are paying more and more attention to the concept.

What does this have to do with coal ash? A great deal when you stop to think about it. Beneficial use of coal combustion products conserves natural resources and energy, reduces greenhouse gas emissions, helps address more discrete environmental problems such as nutrient pollution of waterways, and reduces the need for disposal facilities that are often located in environmental justice communities. All of these are significant ESG benefits.

In my 40-plus years of working in the coal ash beneficial use industry, it has been fascinating to observe how these environmental benefits have been perceived and valued by different audiences. We were still a quarter century away from "ESG" when I stepped into my first fly ash marketing role in 1978. But I can tell you that the pioneers of the coal ash beneficial use movement whom I met then were environmentalists at heart. In fact, they were, in my opinion, the best kind of environmentalists—people concerned about creating workable and sustainable solutions in a marketplace where they could create tangible and lasting value.

Since then, the perception of coal ash use environmental benefits has ebbed and flowed. Our industry by necessity placed a huge emphasis on the physical performance benefits of coal combustion products. Regulatory challenges related to the disposal of coal ash have periodically clouded the view of beneficial use environmental benefits. And relentless "toxic coal ash" branding by well-funded groups that are, in my opinion, the worst kind of environmentalists (primarily sowing fear while ignoring beneficial use) has obviously had an impact on perceptions of this resource.

But now ESG presents us with the perfect opportunity to go "back to the future." The environmental benefits that were at the core of this industry's foundation are becoming strategic tools for accomplishing corporate goals. Although there was probably a time when performance-focused project engineers overlooked the environmental benefits of using our products, those same engineers today are being asked to achieve environmental and social progress, as well. We are naturally positioned to help them.

Wikipedia's ESG discussion also notes: "Critics claim ESG-linked products have not had and are unlikely to have the intended impact of raising the cost of capital for polluting firms, and have accused the movement of greenwashing." Once again, our industry stands ready to fulfill a need. The environmental benefits of coal combustion products beneficial use are real, measurable, and lasting. It's now up to us to show CCP consumers how these practices will help them achieve their individual ESG goals in a way that will stand up to scrutiny.

Both editions of *ASH at Work* magazine this year will help support that educational effort. I hope you enjoy and freely share the information we have compiled documenting the environmental benefits of what our industry does. And as we move back into the future, I hope each of us will embrace our roles as the best kind of environmentalists.












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# The Zero-Carbon Craze

*By Thomas H. Adams, ACAA Executive Director*

Today it is almost impossible to read business news reports without some kind of story on achieving "zero-carbon" status for a product or process. We are told that reducing our carbon footprint is vital to saving the world. No one can explain exactly why zero-carbon is so necessary. Apparently, any carbon, no matter how small the quantity, is dangerous to human health. And no one can explain what the pursuit of zero-carbon will eventually cost. When I have asked this question, some respond with amazement—questioning costs is foolish when we are trying to save the world. My concern is that other important needs—such as clean water projects—will be underfunded as we chase the zero-carbon goal.

Personally, I choose to take a more pragmatic view of the zero-carbon effort. Yes, we all want to reduce the levels of emissions that impact human health negatively. It is well known that the U.S. has done a great deal to address emission levels. However, many other countries have not shown the same commitment or progress. Unless and until other countries step up their efforts, global emission levels will not change significantly.

The cement and concrete industries are ramping up industry efforts to address the carbon emissions related to concrete production. Carbon-neutral concrete is the industry goal. Getting to zero-carbon in this industry is not achievable. However, carbon-neutral status is within reach.

- The Portland Cement Association (PCA) has taken major steps to drive down the carbon intensity associated with the manufacture of portland cement. Since many cement companies operate outside the U.S., these efforts will have some global impact beyond our shores. Almost all PCA members have announced conversion from selling type I cement to type IL. Type IL specifications allow for up to 15 percent replacement of clinker with ground limestone. Cement clinker production is a major contributor to greenhouse gas emissions. Type IL conversion is a significant step in reducing CO2 emissions.
- The National Ready Mixed Concrete Association is working to identify opportunities for carbon emission reduction related to concrete production and delivery.
- The American Concrete Institute has established the Center of Excellence for Carbon Neutral Concrete. ACI is recognized as a global leader in developing and distributing information on technologies and processes for producing and using the most versatile building material on this planet—concrete. The mission of the center—to be known as the NEU Center—is to collaborate globally to drive research, education, awareness, and adoption of carbon-neutral materials and technologies in the built environment.

So, what does all that mean for ACAA? Our mission statement makes it clear that one of our reasons for existing is to improve the environment by promoting the responsible beneficial use of coal combustion products (CCPs). Indeed, our members have been making major contributions to the reduction of greenhouse gas emissions for a *very* long time by promoting the use of fly ash to optimize concrete mixtures, resulting in avoided cement production. Use of FGD gypsum to produce gypsum panel products is clearly a more sustainable approach than using mined gypsum. Using CCPs for structural fills has provided a sustainable solution to geotechnical needs at lower costs that involves less mining and transportation, improving sustainability.

It is time to take up this story and tell it again. In this issue of *ASH at Work*, and in the second issue of 2022, we will be featuring stories that demonstrate the environmental successes of beneficial use and future opportunities for even more successes.

Nice to see other organizations getting on board with the ACAA.

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# Decarbonizing Cement

*By John Simpson*

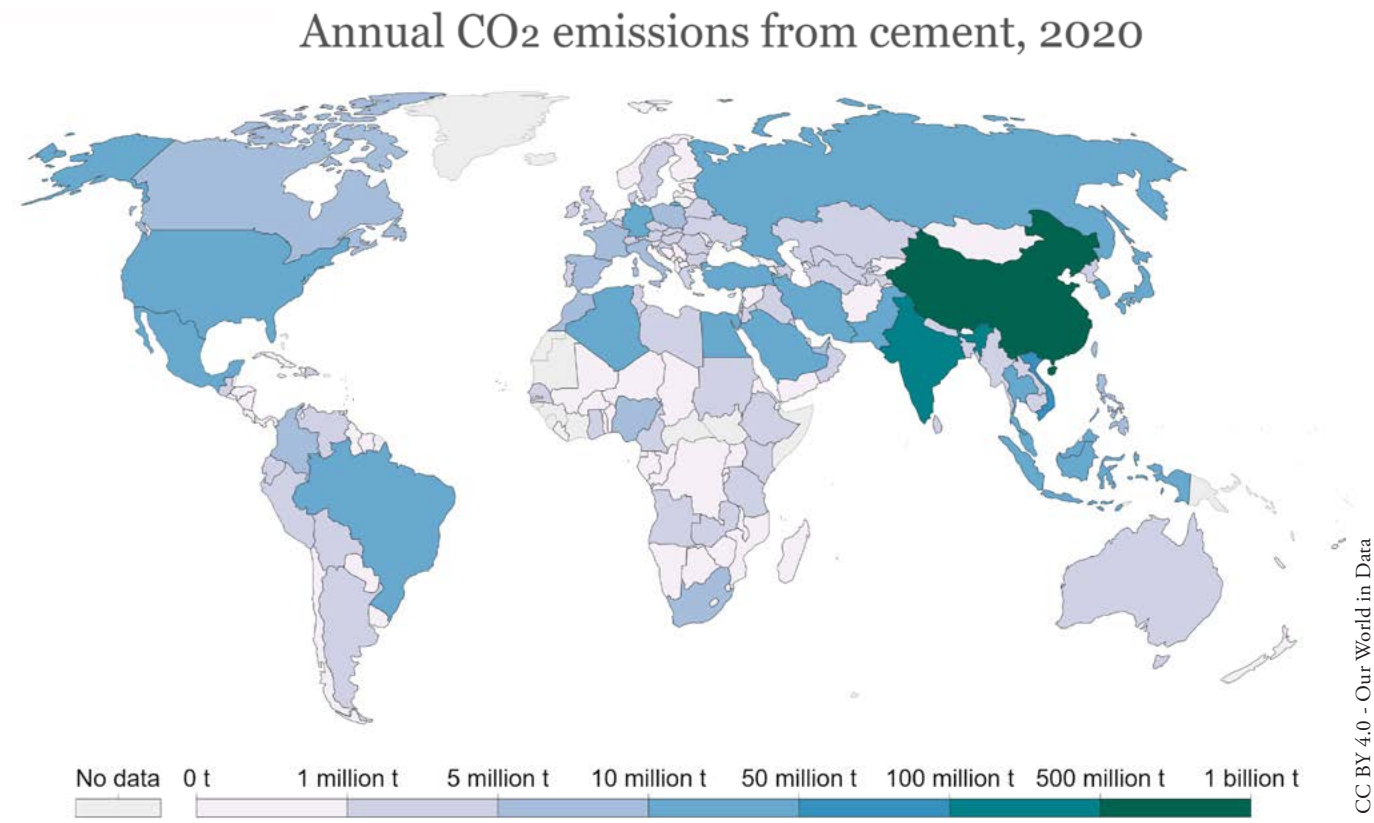
Approximately four billion metric tons of cement are produced globally each year—or roughly half a ton for every man, woman, and child on earth. As a primary component in concrete, in which it acts as the "glue" that binds the aggregate materials, cement is essential to the construction of buildings, roads, bridges, dams, tunnels, and other basic infrastructure the world over.

And its use is growing at an increasing rate. In 2016, the global building floor area was an estimated 235 billion square meters[1]; by 2050 that figure is expected to double—the equivalent of adding an entire New York City to the world every month over that period.[2]

Most of this growth is expected to take place in developing markets in south and east Asia, including population-dense countries such as India and Indonesia, where sustainable development depends on the construction of infrastructure to meet requirements for power, sanitation, and transportation. Accommodating the largest growth in the built environment

1 *United Nations. "Time Is Running Out for Construction Sector to Cut Energy Use, Meet Climate Goals - UN. UN News. December 12, 2017.*

2 *architecture2030.org. https://architecture2030.org/why-the-building-sector. Retrieved on March 17, 2022.*




in human history, however, coincides with climate directives broadly aimed at halting and reversing the growth of atmospheric greenhouse gas emissions—of which cement manufacturers are a leading emitter.

## Cement Manufacturing

The process for manufacturing ordinary portland cement (OPC)—the most common type of cement in use today—was developed two centuries ago and has evolved relatively little in the interim. Cement is manufactured by combining a variety of commonly available materials, including limestone, sand, shale, and clay, and heating them at high temperature (to approximately 2,700° F) in a rotary kiln to form clinker.[3] OPC generally comprises between 92 percent and 95 percent clinker.[4]

Super-heating the limestone drives carbon dioxide out of the rock and directly into the atmosphere as calcium and magnesium carbonates are converted into calcium and magnesium oxides.[5] More than half of the CO2 emissions associated with cement production stem from this part of the process.[6] Carbon dioxide is also emitted from the combustion of the kiln fuel, as well as from the electricity used during the manufacturing process (assuming it was not generated from renewables) and any associated transportation of materials.

The production of one kg of OPC comprising >90 percent clinker results in the release of 0.93 kg of CO2, on average, into the atmosphere.[7] As such, the cement industry is one of the two largest producers of carbon dioxide (CO2), responsible for up to 8 percent of worldwide man-made emissions of this gas.[8]

Since the 1990s, the cement industry has developed process improvements to reduce CO2 emissions, including boosting the thermal and electric efficiency of kilns and related equipment; switching the operation of kilns from fossil fuels to alternatives such as biomass and waste; and substituting a portion of the clinker in cement with materials such as fly ash.

3 *National Ready Mixed Concrete Association. "Climate Change and Concrete." PowerPoint presentation. Undated. p 14.*
4 *Ibid. p 15.*
5 *California Climate Action Registry. "Greenhouse Gas Emission Reductions from Blended Cement Production." Issues Paper. December 19, 2008. p 2.*
6 *Lehne, Johanna, et al. "Making Concrete Change: Innovation in Low-Carbon Cement and Concrete." June 13, 2018.*
7 *Ibid.*
8 *Timperley, Jocelyn. "Q&A: Why Cement Emissions Matter for Climate Change." Carbon Brief. September 13, 2018.*

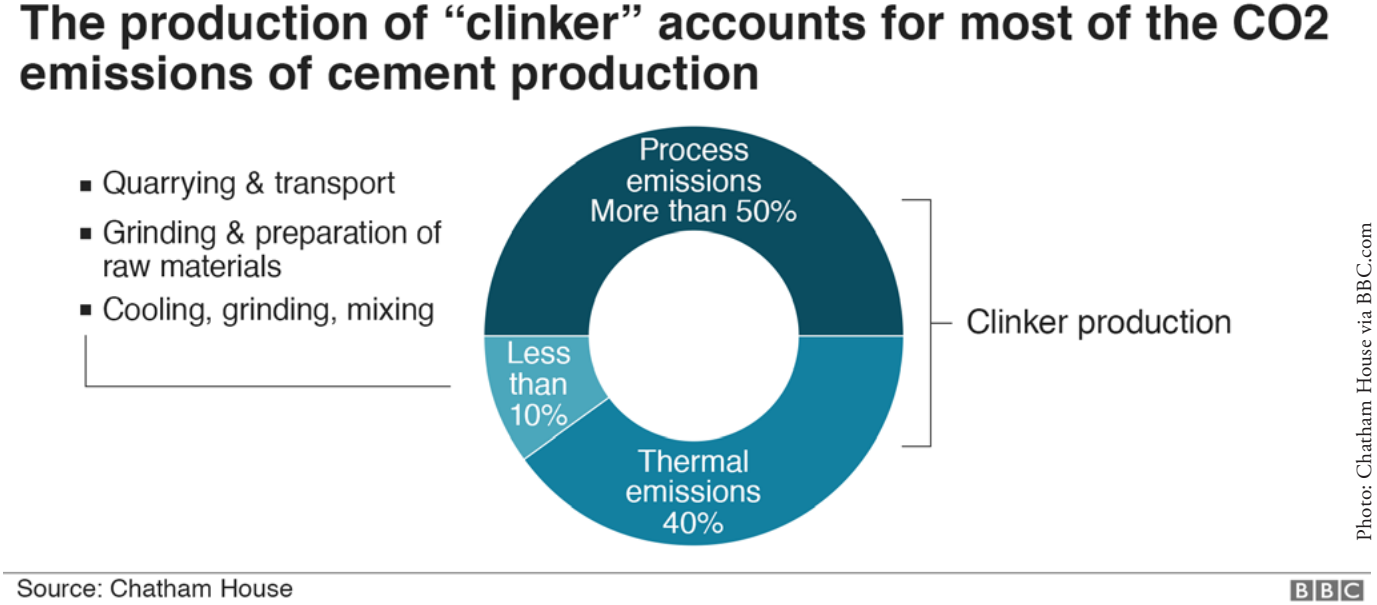



Photo: Chatham House via BBC.com

But while these advances have lowered the global average CO2 intensity of cement production since 1990 by an estimated 18 percent, growth in the demand for cement has led to an almost 50 percent increase in the industry's total global emissions over the same period.[9]

## Fly Ash for Clinker Substitution and Cement Blends

Certainly all of the aforementioned process improvements are commendable and merit further research and refinement in an effort to drive down emissions associated with cement manufacturing to their lowest possible level. However, we focus here on the potential to use fly ash in the cement manufacturing process to reduce CO2 emissions associated with the production of clinker. There are several reasons for this focus, including:

- Production of clinker via the heating of limestone accounts for fully half of the CO2 emissions associated with cement production;

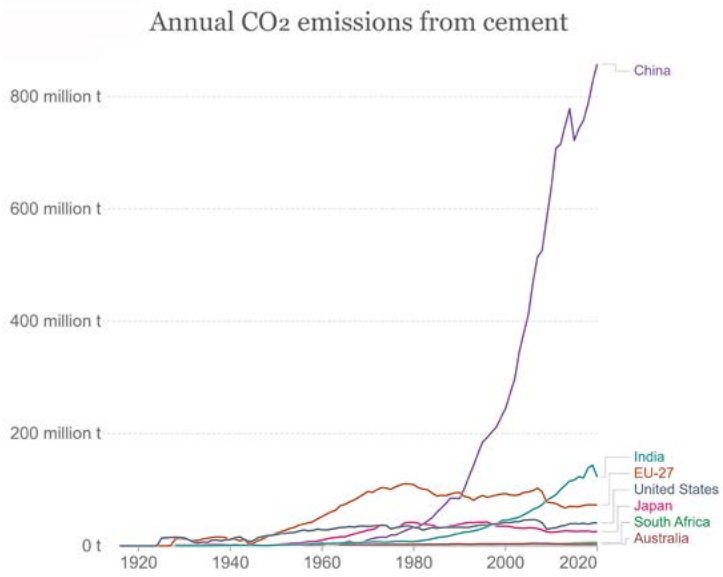
- The large ramp-up in cement production in the past several decades has relied heavily upon newer, more efficient kiln designs—leaving relatively little margin for further efficiency improvements in this area; and

- Unlike (still largely experimental) technologies such as carbon capture and sequestration, incorporating fly ash and other supplementary cementitious materials in the cement manufacturing process generally requires little to no equipment retrofitting or switching of fuel sources.[10]

Substituting fly ash for a portion of the materials commonly used to manufacture cement is a well-established method for producing a high-quality cement with significantly lower process CO2 emissions than those associated with standard OPC. Manufacture of such cements emits lower CO2 emissions because they require less energy—and thus have lower energy-related emissions—and their lower lime content results in lower calcination emissions.[11]

According to the Environmental Protection Agency, introducing fly ash into the raw material feed or the clinker grinding process to reduce the amount of raw material needed to produce a given amount of clinker can result in energy savings of 1.12 MMBtu/ton cement. This may be slightly offset by the need to dry the fly ash, which can consume approximately 0.07 MMBtu/ton cement, EPA notes. However, where a low-alkali cement product is desired, the use of fly ash lowers the alkali content of the finished product, which may, in and of itself, save 0.16 MMBtu/ton cement by reducing the need to bypass kiln exit gases to remove alkali-rich dust.[12]

9 *Lehne, Johanna, et al. "Making Concrete Change: Innovation in Low-Carbon Cement and Concrete." June 13, 2018.*
10 *Ibid.*
11 *Miller, Sabbie A., et al. "Achieving Net Zero Greenhouse Gas Emissions in the Cement Industry Via Value Chain Mitigation Strategies." One Earth. Volume 4, Issue 10, October 22, 2021.*
12 *Environmental Protection Agency. Available and Emerging Technologies for Reducing Greenhouse Gas Emissions from the Portland Cement Industry." Office of Air and Radiation. October 2010. p 30.*

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*13 Ibid. p 33.*
*14 Ibid. p 32.*
*15 Ibid. p 34.*

Blended cements contain supplementary cementitious materials that replace a portion of the clinker used to make portland cement. These materials are broadly divided into cementitious materials and pozzolans such as fly ash—the pozzolanic material most widely used for such purposes.[13] Use of a given supply of fly ash in blended cement depends on a number of factors, including its material properties, price, the cement's intended application, and the proximity of the fly ash to the cement plant, among other factors.[14] Where its use is deemed feasible, incorporating fly ash as a blending material may reduce the kiln's energy requirements by 200-500 MJ/ton cement for a blend with a fly ash content of 25-35 percent by mass. The resulting CO2 emission reductions generally range from 100-280 lbs. of CO2/ton of cement.[15]

## Conclusion

As the cement industry sets increasingly aggressive CO2 emission-reduction goals, fly ash has a meaningful role to play in replacing limestone and clinker in the cement manufacturing process to reduce energy- and calcination-related emissions. Expanding its use—as a component in raw feed, mixed with finished cement, and/or interground with cement clinker—should be considered as part of a comprehensive plan to reduce greenhouse gas emissions related to cement production.

***John Simpson** is editor of ASH at Work.*

# Towards Greener Concrete

*By John Simpson*

Concrete is the most commonly used building material in the world; an estimated 70 percent of the global population lives in a structure at least partly made from concrete. Besides water, it is the second-most consumed substance in the world,[1] with over 20 billion tons produced annually[2]—or roughly three tons per year for every person on the planet.

And with good reason. Upon setting, concrete—comprising cement (and/or a supplementary cementitious material), water, and aggregates—forms a strong, highly durable construction material. As such, it can last longer than many other building materials, thus requiring repair and/or replacement less often. Moreover, compared to many competing building materials, it has a low embodied energy per unit of mass. At the end of its useful life, it is also recyclable, as crushed concrete can be used again as aggregate in new construction.

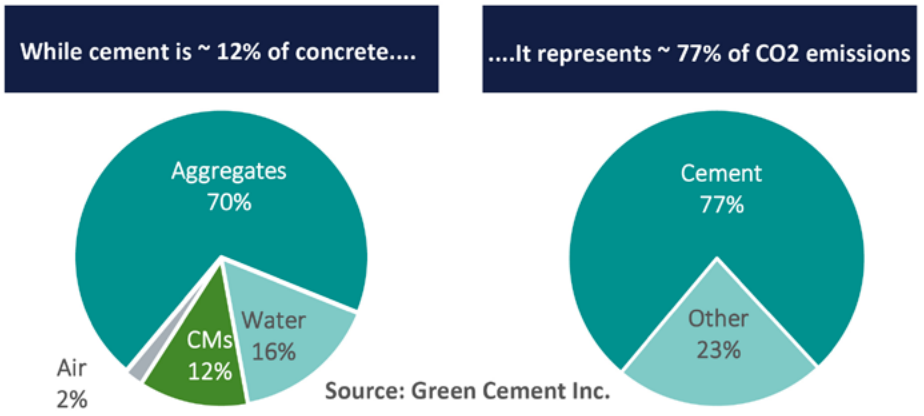
As a result of its many useful attributes, concrete production is growing—fast. Over the next 30 years, global concrete demand is projected to grow by as much as 50 percent[3] as the need for infrastructure such as roads, bridges, housing, dams, and pipelines grows more acute, particularly in the developing world.

The problem with this tremendous growth in the concrete market is the greenhouse gas emissions that are associated with its production. While cement comprises typically only 10-15 percent of the volume of a concrete mix, it accounts for approximately 77 percent of the associated carbon-dioxide emissions.[4] Cement manufacturing contributes greenhouse gas emissions via the generation of carbon dioxide when limestone—a principal component of cement—is heated, as well as from the combustion of fuels required to fire the cement kiln itself. Cement production—the majority of which is ultimately used to manufacture concrete—is responsible for up to 8 percent of man-made CO2 emissions.[5]

Given the imperatives to reduce the concentrations of CO2 in the atmosphere that are associated with climate change, how, then, can the concrete industry reduce its carbon footprint? While there are a number of potential avenues worth pursuing—including improving cement kiln efficiency and implementing carbon sequestration strategies, among others—an established and proven method for reducing the environmental impact of concrete production is to substitute fly ash for a portion of the cement used to manufacture concrete. (Note: fly ash can also be used as raw reed in the production of cement itself and in blended cements to reduce manufacturing-related emissions; see the article "Decarbonizing Cement" on page 6.)

## Why Fly Ash Concrete?

Fly ash is a powdery material that is captured by emissions control equipment following the combustion of pulverized coal in an electric generating plant. Comprised mostly of silicas, aluminas, and calcium compounds, fly ash is pozzolanic,




1 *Cement, Concrete & Aggregates Australia. "6 Interesting Facts About Concrete." https://www.ccaa.com.au/CCAA/Industry/Concrete/CCAA/Public_Content/INDUSTRY/Concrete/Concrete_Overview.aspx? Retrieved on March 25, 2022.*

2 *Patel, Prachi. "Engineers have created a cement alternative to reduce concrete's carbon footprint" Quartz. June 26, 2018.*

3 *Jacoby, Mitch. "Alternative materials could shrink concrete's giant carbon footprint." Chemical & Engineering News. November 22, 2020.*

4 *Green Cement Inc. "Low Carbon Cement for the Ages." PowerPoint Presentation. https://secureservercdn.net/104.238.69.81/4k4.1b2.myftpupload.com/wp-content/uploads/2021/11/Green_Cement_Presv11_09_21_website.pdf. p 2.*

5 *Timperley, Jocelyn. "Q&A: Why Cement Emissions Matter for Climate Change." Carbon Brief. September 13, 2018.*

USACE photo by Lee Roberts

meaning that it reacts with calcium hydroxide and alkali to form cementitious compounds.[6] This cementitious property makes it useful as a substitute for cement in concrete. Moreover, it confers a variety of performance, economic, and—not the least—*environmental* benefits to the concrete manufacturing process.

The first large-scale application of fly ash in the United States was as a partial replacement for ordinary portland cement in the construction of the Hungry Horse Dam in the late 1940s.[7] Engineers demonstrated that, in addition to being an economical substitute for cement, fly ash improved the concrete mix's workability, compressive strength, durability, permeability, and heat of hydration.

It is only more recently that fly ash's contributions to green building have been appreciated. Substituting fly ash for ordinary portland cement in concrete manufacturing:

- ***Greatly reduces the greenhouse gas emissions associated with concrete manufacturing.*** For every ton of cement produced, roughly one ton of carbon-dioxide is emitted. If that ton of cement is replaced with one ton of fly ash, virtually the entirety of those cement-related emissions are avoided. For perspective, one ton of carbon-dioxide is roughly equal to two months of emissions from a standard vehicle. Beneficial use of fly ash in U.S. concrete production alone last year is estimated to have reduced emissions associated with concrete manufacturing by 11 million tons (or the equivalent of removing two million vehicles from all road use for one year).[8]

- ***Saves natural resources.*** Use of fly ash preserves natural resources by replacing at least a portion of the materials, including limestone, silica, aluminates, and feric minerals, that are mined to manufacture cement. It also reduces the amount of water required in concrete mixes.[9]

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6 *U.S. Concrete. "Low CO2 Concrete." https://www.us-concrete.com/low-co2-concrete. Retrieved on March 25, 2022.*

7 *National Institute of Standards and Technology. "Hungry Horse Dam." https://www.nist.gov/image/13el004hungryhorsedamlrjpg. Retrieved on March 25, 2022.*

8 *American Coal Ash Association. "About Coal Ash." Frequently Asked Questions. https://acaa-usa.org/about-coal-ash/faqs. Retrieved on March 25, 2022.*

9 *American Coal Council. "Further information on Coal Combustion Products." https://www.americancoalcouncil.org/page/ccp_extra_info. Retrieved on March 25, 2022.*

## Fly Ash by the Numbers

*Energy Savings and Life-Cycle Impacts of Using One Ton of Fly Ash In Concrete...*

**TOTAL CO2 -EQUIVALENT GREENHOUSE GASES AVOIDED:** 0.8 TONS

**WATER SAVINGS:** 99.4 GALLONS

**PASSENGER CARS NOT DRIVEN FOR A YEAR:** 0.2

**GASOLINE CONSUMPTION AVOIDED:** 82 GALLONS

**OIL CONSUMPTION AVOIDED:** 53.5 GALLONS

*Source: "Energy Savings & Life Cycle Impacts of Fly Ash Use." Eco Material Technologies. Technical Bulletin.*

- ***Decreases the energy required to produce concrete, as well as the emissions associated with that energy expenditure.*** Fly ash does not require the energy-intensive kilning associated with the manufacture of portland cement. Use of fly ash also commensurately reduces the need for the energy-intensive operations to mine and process the virgin materials it replaces—and the emissions associated with those operations. An environmental life-cycle inventory of portland cement concrete, published by the Portland Cement Association in 2002, found that a 1 percent replacement of cement with fly ash results in approximately a 0.7 percent reduction in energy consumption per unit of concrete in a 3,000 PSI concrete mix;[10] in a 30 percent fly ash concrete mix, that would equate to a 21 percent reduction in energy consumption compared with a pure portland cement concrete.

- ***Accelerates the rate of concrete carbonation.*** Concrete absorbs CO2 throughout its lifetime via a process known as carbonation that helps reduce its initial carbon footprint. Use of fly ash to replace cement in concrete at rates of 10 percent and 30 percent have been demonstrated to speed the rate of carbonation by approximately 5 percent and 10 percent, respectively[11]—thus accelerating the pace at which concrete reabsorbs carbon to reduce its overall environmental footprint.

- ***Reduces the need for landfills.*** Beneficial use of fly ash in concrete lowers the need for its storage or disposal in landfills.

- ***Lengthens concrete's life expectancy.*** Use of fly ash in concrete helps strengthen it against alkali-silica reaction, sulfate attack, and water penetration. Fly ash concrete's enhanced durability thus lengthens concrete's life-cycle and reduces the need for repair and replacement of concrete structures—and the energy, emissions, and use of natural resources associated with such repair and replacement.

Use of fly ash in concrete already has the endorsement of many U.S. government agencies, including the Environmental Protection Agency, the U.S. Army Corps of Engineers, and the Federal Highway Administration. Recognizing fly ash concrete's numerous advantages over portland cement concrete, the EPA in January 1983 issued guidelines requiring all federal agencies—as well as all state and local government agencies and contractors that use federal funds to purchase cement and concrete—"to implement a preference program favoring the purchase of cement and concrete containing coal fly ash."[12]

More recently, no less an authority than the U.S. Green Building Council has validated fly ash concrete's environmental credentials. USGBC will award points for the use of fly ash in concrete toward its certification of a building as Platinum, Gold, Silver, or Certified in Leadership in Energy and Environmental Design (LEED).

The economics and versatility of concrete construction ensure that it will continue to grow at an increasing rate for the foreseeable future. Expanded use of fly ash will contribute to enhancing concrete's durability while simultaneously dramatically reducing its carbon footprint.

***John Simpson*** *is editor of ASH at Work.*

10 *Nisbet, Michael A., et al. "Environmental Life Cycle Inventory of Portland Cement Concrete." Published by the Portland Cement Association. July 2002. p 21.*

11 *Santero, Nicholas. "Greenhouse Gas Emissions Reduction Opportunities for Concrete Pavements." Journal of Industrial Ecology. 2013. p 3.*

12 *U.S. Environmental Protection Agency. "EPA Guideline for Purchasing Cement and Concrete Containing Fly Ash." Environmental Fact Sheet. 1992. p 1.*

# The Green Attributes of FGD Gypsum

*By Eric Effinger*

While fly ash used in the production of concrete is the most common and largest use of recycled coal combustion products (CCPs), gypsum is not far behind in the overall recycled use and sustainability story. Today, flue gas desulfurization (FGD) gypsum represents the second-highest volume of recycled CCP in the U.S. (trailing only fly ash), with the second-highest beneficial use rate (trailing only FBC ash).

According to the ACAA's 2020 Production and Use Survey, the rate of coal ash recycling overall in the U.S. increased in 2020, reversing two years of declines. During 2020, 59 percent of the CCPs produced across the country were recycled, up from 52 percent in 2019. 2020 represented the sixth consecutive year that more than half of all the coal ash produced was beneficially used rather than disposed. 40.8 million tons of CCPs were beneficially used in 2020, nearly the same as the previous year, but production of new CCPs declined from 78.6 million tons in 2019 to 69.2 million tons in 2020.

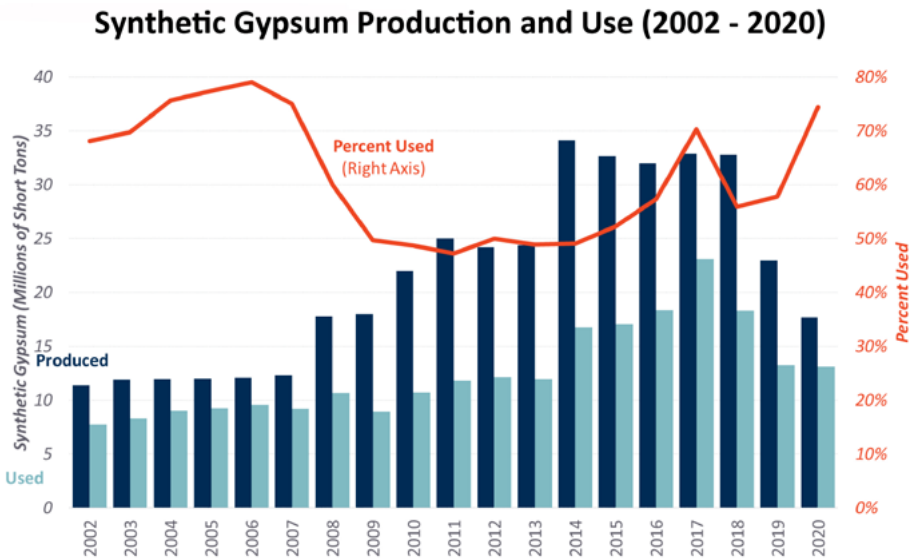
Approximately 18 million tons of FGD gypsum were produced in the U.S. in 2020, of which over 74 percent was beneficially used. Nearly 10 million tons were used by the wallboard manufacturing industry and approximately 848,000 tons were used by the agriculture industry, up 3 percent and 34 percent from the previous year, respectively.

## About Synthetic Gypsum

While natural gypsum is mined, synthetic gypsum is a routine product of flue gas desulfurization (FGD) and sulfur dioxide ($SO_2$) compliance operations at coal-fueled power plants. Synthetic gypsum is a byproduct generated by removing sulfur from the combustion gases via emissions control devices known as scrubbers. Using high-calcium sorbents, such as lime or limestone, scrubbers absorb sulfur and other elements from flue gases, creating these non-ash byproducts that are managed and regulated as CCPs. FGD gypsum has the same chemical formulation—calcium sulfate dihydrate—as mined gypsum and is often more pure than natural gypsum, with a purity rate above 90 percent.

Over 50 years ago, the 1970 Clean Air Act and its policies related to sulfur dioxide ($SO_2$) emission standards set the stage for the beneficial use of FGD gypsum. Additional Clean Air Act amendments in 1990 relating to acid rain further established the goal of reducing $SO_2$ emissions by 10 million tons annually by 2010, or roughly 50 percent below 1980 levels. As a result, coal-fueled utilities installed emission-control technologies, including FGD systems, in order to comply. Many of these technologies operated at 97 percent efficiency, creating a continuous supply of FGD, or synthetic, gypsum and established a market for this important and high-quality sustainable product.

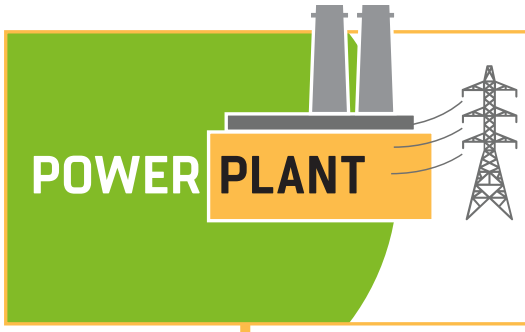
Today it is most widely used in the manufacture of gypsum panel products, or wallboard, which are predominantly used in the construction of interior walls and ceilings. More than half of the gypsum wallboard produced in the U.S. uses recycled synthetic gypsum. Synthetic gypsum is also increasingly applied to agricultural fields to improve soil condition and performance while preventing fertilizer, pesticide, phosphorous, and other runoff. The recently passed (November 2021) Infrastructure Investment and Jobs Act is expected to continue to drive demand for CCPs.




Graph: ACAA 2020 Production and Use Survey

## Beneficial Use of FGD Gypsum

Raw gypsum byproduct is sold to manufacturing plants, where it is beneficially used in residential and commercial construction projects. The beneficial use of gypsum in drywall offers product benefits, including fire resistance, sound control, versatility, quality, convenience, and cost-effectiveness. From an environmental perspective, it eliminates the need for utilities to dispose of FGD material in landfills or ponds while reducing water and energy consumption.



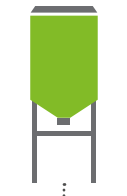

Coal ash is generated by burning coal in the boiler furnace, which creates bottom ash. The ash then goes into the electrostatic precipitator or fabric filter which creates fly ash; then into the flue gas desulfurization (FGD) creating gypsum - all byproducts which are managed by Charah Solutions and can be beneficially used creating a sustainable process.

## BENEFICIAL USE of CCPs

Charah Solutions manages the coal combustion products (CCPs) including fly ash, bottom ash, conditioned ash, ponded ash, and gypsum, which are collected and beneficially used in products for multiple industries. By beneficially using more than 2.58 million tons of ash and supplementary cementitious materials (SCMs) each year, we dramatically reduce greenhouse gas emissions and the amount of waste sent to landfills.


**WE BENEFICIALLY RECYCLED MORE THAN 2.58 MILLION TONS OF CCPs IN 2020**

### DRY FLY ASH FOR READY MIX CONCRETE



Class C and Class F fly ash is transported via truck, barge, or rail to ready mix concrete producers where it is beneficially used by mixing with other ingredients to produce concrete.

### CONDITIONED FLY ASH FOR STRUCTURAL FILL

Charah Solutions manages the design, construction, and operation of structural fill projects in which the land is reclaimed and used for community or business use.

### GYPSUM FOR DRYWALL

Raw gypsum byproduct is sold to drywall manufacturing plants where it is beneficially used in residential and commercial construction projects.

### GYPSUM FOR AG FERTILIZER

Raw gypsum byproduct is sold to growers where it is beneficially used as agriculture fertilizer to enhance soil health and improve plant nutrition.

Photo: CC BY-NC-ND 2.0 - Rene De la Garza

***Beneficial use of FGD gypsum reduces the need to mine virgin gypsum (pictured above), thus preserving natural resources.***

Moreover, recycling this CCP reduces the need to mine virgin gypsum and thus preserves natural resources.

In addition, after its use as wallboard, FGD gypsum can be recycled and beneficially used again in other applications—as an additive to concrete, plaster, and stucco. According to the Gypsum Association, the core material can be reused as a soil amendment, as a water treatment to settle suspended clay particles, and as an addition to animal bedding to absorb moisture. Research is also being conducted on incorporating gypsum core into large-scale composting efforts.

Raw gypsum byproduct is also sold to growers, who beneficially use it 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 and sulfur that provides plant nutrition and can increase crop yield. It also improves acid soils and treats aluminum toxicity, resulting in increased root growth. Gypsum improves soil structure, enhances water infiltration, and helps reduce runoff and erosion.

Charah Solutions has years of experience managing FGD operations and marketing wallboard-grade quality gypsum. We provide comprehensive operations and maintenance for FGD plants and processes from limestone delivery management, to unloading and crushing, to final gypsum loadout. Charah Solutions then provides marketing and management services, including operations support for onsite management or implementing innovative loading, transportation, and marketing solutions to deliver cost savings to our customers and recycle gypsum for the manufacturing of drywall and agricultural fertilizer.

Increasing beneficial use requires marketers to ensure that products are consistent and available when and where customers need them—from drywall manufacturers to the farmers themselves. Over the past five years, Charah Solutions has ramped up efficient distribution of fly ash, gypsum, and other CCPs through expansion of its MultiSource® terminal network. The Charah Solutions 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, including gypsum, for ready-mix concrete producers, wallboard manufacturers, farmers, and other customers throughout the U.S.


The MultiSource materials logistics 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 now able to reliably purchase CCPs, including ash and gypsum, through the MultiSource network in the Midwest, Northeast, and Southern regions. In addition, Charah Solutions continues to strategically expand the network to meet growing customer demand.

## The Green Benefits of Recycling

Today, more than ever, the importance of Environmental, Social, and Governance (ESG) actions and commitments of corporations are driving real environmental and social change across the country to improve our planet and lives. These matters will only continue to increase in relevance for companies of all sizes as regulators look to standardize ESG reporting across the globe and hold all businesses accountable to ensure they are doing their part to improve ESG compliance.

FGD gypsum is a great example of sustainability in action. The beneficial use of FGD gypsum and other CCPs conserves virgin resources and water, reduces greenhouse gases, and decreases landfill disposal, all while providing essential recycled products that contribute to the growth of our economy and land remediation for the community. The beneficial use of synthetic gypsum not only helps conserve natural resources, but dramatically reduces the need for landfill disposal.

Recycling more than 2.58 million tons of ash and other supplementary cementitious materials (SCMs) each year, Charah Solutions is proud of the role it plays in helping dramatically reduce greenhouse gas emissions, conserve water and virgin resources, and lower the volume of materials sent to landfills. We beneficially recycle gypsum to produce drywall and fertilizer, as well as recycle ash into green concrete and environmentally sound structural fill projects that return thousands of acres of land to the community for recreational or commercial use. In 2020 alone, per the EPA WARM model, Charah Solutions saved 2.24 million tons of CO2 from entering the atmosphere through the recycling of these CCPs.

As federal and state guidelines around the recycling of CCPs, including gypsum, become more defined and mandated, utilities need to focus beyond the recycling of ash into the concrete industry for their byproduct sales and marketing efforts. With growing demand for construction projects, as well as increased construction material prices, the future of FGD gypsum use in recycled materials, including wallboard and crop fertilizer, will continue to grow. As a result, there is great opportunity for byproduct sales organizations, as well as utilities that look to meet environmental goals as well as state and federal regulations, to recycle more byproducts, lower greenhouse gas emissions, and reduce volumes of landfilled materials. In the end, this increased demand for recycled gypsum will benefit the entire industry, including suppliers, utilities, manufacturers, farmers, and—not the least—the environment.

**Today, more than ever, the importance of Environmental, Social, and Governance (ESG) actions and commitments of corporations are driving real environmental and social change across the country to improve our planet and lives.**

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***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.*

# Sustainability, Transparency, and Environmental Product Declaration

*By Rafic Minkara, Ph.D., P.E.*

We all know the developmental history of our material—from the first production of pulverized coal fly ash in Milwaukee and the early documented uses in monumental dam projects to our current situation, where we are dealing with supply constraints due to power plant decommissioning. Fly ash has been contributing to the sustainability of the built environment before that terminology became fashionable. Improved workability for placement, control of heat of hydration, reduced water/cement ratio, lower permeability, resistance to sulfate attack, and mitigation of deleterious alkali silicate reactions in infrastructure concrete are all made possible with the use of fly ash as partial replacement for portland cement and contribute to stronger and more durable concrete—hence imparting concrete with the sustainability for extended service life.

The manufacture of portland cement consumes significant volumes of mined natural resources, such as limestone, shale, clay, sand, and iron ore. These natural resources are ground, blended, then heated to nearly 1,500 degrees Celsius to make clinker. The clinker is then ground into fine powder and blended with other minor ingredients to make portland cement. In addition to requiring mineral natural resources, the manufacture of cement consumes considerable energy in the form of coal or natural gas to make the clinker and electricity for material handling and fine grinding. Traditional portland cement manufacturing produces 0.9 tons of $CO_2$ per ton of cement; thus, one cubic yard of concrete would contribute about 400 lbs. of $CO_2$ from the use of portland cement.

## Sustainability:

- The ability to be maintained at a certain level: "The durability of concrete"
- Avoidance of the depletion of natural resources: "The replacement of portland cement"

Fly ash is typically used as partial replacement for portland cement in concrete. Replacement levels vary from 15 percent to over 50 percent, depending on the ash and desired concrete performance. In addition to avoiding the depletion of natural resources, replacing portland cement with fly ash reduces the carbon footprint of concrete products.

### The Evolving Fly Ash Industry

However, our industry is becoming more complex. Gone are the days of simply loading and hauling fly ash from the power plant silo to nearby concrete producers. Fly ash is now being transported great distances by rail, river barges, and marine vessels. The business continues to require significant technical know-how for understanding the durability benefits of ash in concrete and for developing technologies to address and resolve

***EPDs for various concrete products have been developed using data published in the EPDs of their respective ingredients, such as cement, slag, and aggregates. Currently, however, there are no EPDs published for any fly ash products marketed in the U.S.***

critical quality issues, such as mitigating carbon impact on air entrainment or reducing the carbon from fly ash by combustion or electrostatic separation. The regional shortages of concrete-quality fly ash from operating power plants have also driven the need to explore and recover legacy deposits. Understanding what we have in the ground, coupled with challenging material conversion options within an evolving regulatory framework, is making the industry wickedly complex.

Transparency, which is tenable through greater availability of information, is increasingly seen as part of the solution to complex social, economic, and environmental issues. Accurate and easy-to-find environmental information empowers public officials, corporations, workers, and consumers to make informed decisions that impact our well-being.

Unfortunately, "greenwashing" has become more prevalent in recent years, examples of which include misleading plastic packaging/recycling statements, false low emission claims, and insincere sustainability disclosures. The spread in hype and greenwashing, along with rising investor focus and reliance on climate and ESG-related disclosure and investment, led the SEC last year to announce the creation of a climate and ESG task force in its division of enforcement. The mission of the task force is to identify ESG-related misconduct and potential violations. In addition, a growing number of local, state, and federal procurement regulations and policies are requiring the reporting of the carbon footprint, or embodied carbon of construction materials and products, used in their buildings, roads, and other infrastructure. Said reporting is typically done using Environmental Product Declarations (EPDs).

For example, a proposed bill to amend the Buy Clean California Act would require an awarding authority to require a successful bidder for a contract to submit a current EPD for each concrete product before the product is installed in the project. The bill would also require the state's Air Resources Board to establish a maximum global warming potential (GWP) for concrete at the industry average within each project region and performance class. The bill would require a successful bidder to demonstrate compliance with these requirements and that concrete with higher-than-the-maximum-acceptable GWP be disqualified. The bill also includes incentives in the form of a low-embodied-carbon discount of up to 5 percent of a bid's concrete price in comparison to other qualified bids for an eligible project.

***As the coal ash industry evolves from capturing s econdary material from operating power plants to reclaiming and processing legacy deposits, EPDs will become essential for use by downstream customers to develop their own product EPDs.***

## EPD Basics

An EPD is a document that transparently communicates the environmental performance of a product or material over its lifetime. Within the electric power generation and construction industries, EPDs are used to compare the impacts of different materials and products in order to select sustainable options. For specifiers, architects, and engineers, EPDs allow them to choose the most sustainable options for their projects. Manufacturers, such as ready-mix concrete producers, are able to optimize the impact of the products and market their carbon transparency.

**PCR:** Product Category Rules
**LCA:** Life Cycle Assessment
**EPD:** Environmental Product Declaration

In fact, there are hundreds of published EPDs for concrete products that have been verified by third parties, such as the NRMCA, ASTM, NSF, and UL. EPDs for various concrete products are developed using data and information that have been published in the EPDs of their respective ingredients,

such as cement, slag, and aggregates. Currently, there are no EPDs published for any fly ash products marketed in the U.S. Concrete EPDs reference fly ash and similar materials as secondary or waste materials. As our industry evolves from capturing secondary material from operating power plants to reclaiming and processing legacy deposits, EPDs will become essential for use by our customers to develop their own product EPDs. There will be no single EPD or industry average EPD for fly ash. For full transparency, product-specific EPDs are highly encouraged. That has been the case for the various cements and concrete products on the market.

The first step in preparing an ISO-compliant EPD is to find or create an appropriate Product Category Rule (PCR). The PCR is basically the standard that is applicable to a particular product category, such as fly ash or related SCMs such as ground bottom ash. The PCR provides the guidelines or the recipe as well as the calculations and reporting requirements needed to create Life Cycle Assessments (LCAs) and product-specific EPDs.

Currently, there is no PCR for fly ash. However, there are PCRs for concrete, cement, and slag. ACAA had initiated work on a PCR for fly ash in 2013-2014. At that time, we were ahead of the curve and within one year of the development of the inaugural PCR, which was released in November 2012. The Association should serve as a key stakeholder in the development of the industry PCR that would be applicable and used by the ash and associated industries. ACAA would need to rely on the expertise of Program Operators, such as UL, NSF, and/or others for the development of the industry PCR. ACAA, through its technical committee, would take the role of sponsor and contributor in support of the lead organization developing the PCR. Once the PCR has been developed in accordance with applicable ISO standards, individual companies could prepare the LCA and EPDs for their particular fly ash product.

The LCA, performed according to the PCR, would document the cradle-to-grave impacts of the product, addressing sourcing and extraction of the material; manufacturing processes; health, safety, and environmental aspects of production; and generation of wastes. Product delivery considerations such as distance to markets would also be included. The LCA report for a specific fly ash product would not be made available to the public. However, the results, data, methods, assumptions and limitations, and conclusions of the LCA would be provided in enough detail to allow an independent EPD verifier to confirm compliance with applicable ISO and other industry standards.

The EPD would be a compilation of the LCA results along with additional information about the product's performance and other sustainability attributes. It would require verification by a third party, be registered and published, and typically remain valid for a period of five years.

EPDs are becoming the standard tools to communicate the environmental impacts of products and materials. There is an emerging need to showcase the environmental benefits of using fly ash as a partial replacement for portland cement. We have a good story. Let's tell it.

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***Rafic Minkara**, Ph.D., P.E. is Vice President, Product & Business Development, at Eco Material Technologies. He also serves as the Chair of ACAA's Technical Committee. Rafic has over 30 years of diverse professional experience including engineering design, construction management, and research and development in the environmental and utility industries. He received his BS, MS, and Ph.D. degrees in engineering and his MBA from the University of Toledo.*

# ACAA Encourages EPA to Expand CCPs' Role in Federal Procurement

*By John Simpson*

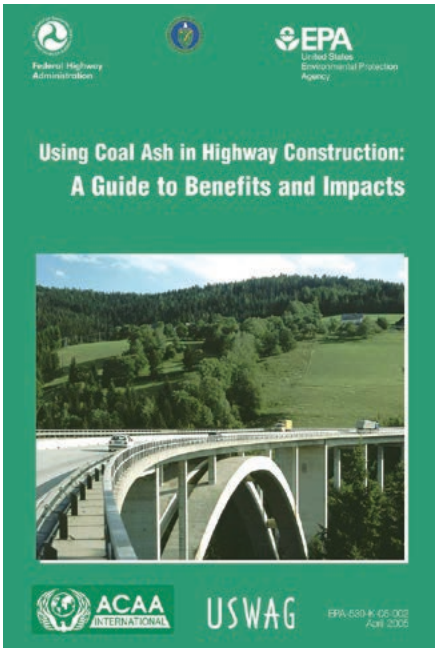
For many Americans, the significance of the U.S. Environmental Protection Agency (EPA) centers on its issuance of regulations regarding common consumer products—such as automobiles, gasoline, and pesticides—and in its exhortations to "reduce, reuse, and recycle." EPA's impact on environmental policy runs much deeper than that, of course. And one of the ways that the agency most profoundly affects the quality of the environment is in the role it plays in shaping federal procurement policies.

As the single largest purchaser of goods and services in the United States—$665 billion in 2020 alone[1]—the federal government wields outsized influence on which products and materials are used for publicly financed projects, from highways to runways to buildings and more. The government's stature in this regard was implicitly recognized in the 1976 Resource and Conservation Recovery Act—the Congressional law that creates the framework for the management of hazardous and non-hazardous solid waste. "…Each procuring agency shall procure items composed of the highest percentage of recovered materials practicable consistent with maintaining a satisfactory level of competition," the Act's Section 6002 states[2]—and it vests the EPA with the authority to deliver guidance on how agencies can satisfy that stipulation.

In the early 1980s, EPA issued the first of what would become known as "Comprehensive Procurement Guidelines" (CPGs) to promote the use of recovered materials that have a lesser effect

1 *U.S. Government Accountability Office. "A Snapshot of Government-Wide Contracting For FY 2020." June 22, 2021.*
2 *Resource and Conservation Recovery Act. Public Law 94-580. 94th Congress. 1976. https://www.govinfo.gov/content/pkg/STATUTE-90/pdf/STATUTE-90-Pg2795.pdf#page=28.*

on human health and the environment when compared to other products and services that serve the same purpose. Perhaps unsurprisingly, the subject of the very first such guideline that the agency issued concerned "Cement and Concrete Containing Fly Ash"—whose stated purpose was to "increase the use of cement and concrete containing fly ash" so as to "conserve both significant amounts of energy and natural resources" used in the manufacture of these two products. "Cost savings can be achieved while providing a product that can be equivalent or even superior to cement and concrete made using only virgin materials," EPA added.[3]




EPA would go on to include flowable fill—a low-strength material made from coal ash that is mixed to a wet, flowable slurry and can be used as an economical fill or backfill material in place of concrete, compacted soils, or sand—to its list of Comprehensive Procurement Guidelines in 2000.[4] By 2007, EPA had assigned a total of 61 products that are made from recovered materials to its CPG list[5] and—as environmentally preferable to the alternatives—required procuring agencies to purchase those composed of the highest percentage of recovered materials practicable for use in federally funded projects. As part of the CPG designation process, the agency also published recommended recycled-content levels in its Recovered Materials Advisory Notices.

Thirteen years after EPA last updated its CPG designations and procurement recommendations, in 2020, the agency invited public comment on what changes might be made to the process. In particular, the agency requested input regarding whether the correct products are on the list; if any should be deleted, added, or modified; and whether the current recycled-content and procurement specifications are appropriate.[6]

In July 2020, ACAA weighed in with comments acknowledging EPA's decades-long policy of support for beneficial use of CCPs and urged the agency to continue its existing CPGs for cement and concrete containing fly ash, as well as flowable fill

***EPA, FHWA, the Army Corps of Engineers, and other federal agencies have long understood and championed the beneficial use of coal combustion products.***

containing fly ash. The Association further recommended that EPA should:

- Adopt a new CPG for the utilization of wallboard containing recovered FGD (synthetic) gypsum.
- Adopt a new CPG for the utilization of CCP in soil and waste stabilization.
- Adopt a new CPG for the utilization of fly ash in asphalt.
- Adopt a new CPG for the utilization of CCP in structural fills.
- In continuing support for fly ash use in flowable fill, revise its conclusion in an unrelated rulemaking that flowable fill is an "unencapsulated" application. ACAA counseled that the terms "bound" and "unbound" are more accurate to capture the concept EPA was pursuing in that rulemaking.[7]

In comments supporting its recommendations, ACAA noted that, for decades, EPA has expressly supported CCP beneficial use—and quoted from the agency thusly:

*"EPA encourages the beneficial use of coal ash in an appropriate and protective manner because this practice can produce positive environmental, economic, and product benefits such as:*

- *Reduced use of virgin resources,*
- *Lower greenhouse gas emissions,*
- *Reduced cost of coal ash disposal, and*
- *Improved strength and durability of materials."*[8]

3 *Environmental Protection Agency. "Cement and Concrete Containing Fly Ash; Guideline for Federal Procurement." January 28, 1983. p 3.*
4 *U.S. Environmental Protection Agency. "Comprehensive Guideline for Procurement of Products Containing Recovered Materials." 65 FR 3069. January 19, 2000.*
5 *U.S. Environmental Protection Agency. "EPA Comprehensive Procurement Guideline Program." 2007. p 1.*
6 *U.S. Environmental Protection Agency. "EPA Requests Comments on Designations and Recommendations for Recycled-Content Products." Press Release. April 7, 2020.*
7 *American Coal Ash Association. Comment Letter re: Docket ID No. EPA-HQ-OLEM-2019-0589. July 6, 2020. p 2.*
8 *Ibid. p 5.*

Photo: Gypsum Association

***ACAA has recommended that EPA adopt a new CPG for the utilization of wallboard containing recovered FGD gypsum.***

In February of 2014, EPA's Office of Solid Waste and Emergency Response prepared the beneficial use and risk study "Coal Combustion Residual Beneficial Use Evaluation: Fly Ash Concrete and FGD Gypsum Wallboard," which, ACAA noted, concluded as follows (note: ACAA members may access the full comment letter and supporting documentation in the "**Members Only**" section of the Association's website):

*"Based on the analysis set forth in this document, the evaluation concludes that environmental releases of constituents of potential concern from CCR fly ash concrete and FGD gypsum wallboard during use by the consumer are comparable to or lower than those from analogous non-CCR products, or are at or below relevant regulatory and health-based benchmarks for human and ecological receptors. The beneficial use of CCRs, when conducted in an environmentally sound manner, can contribute significant environmental and economic benefits. Environmental benefits can include reduced greenhouse gas emissions, reduced need for disposing of CCRs in landfills, and reduced use of virgin resources. Economic benefits can include job creation in the beneficial use industry, reduced costs associated with CCR disposal, increased revenue from the sale of CCRs, and savings from using CCRs in place of other more costly materials. Based on the conclusion of the analysis in this document, and the available environmental and economic benefits, EPA supports the beneficial use of coal fly ash in concrete and FGD gypsum in wallboard. The Agency believes that these beneficial uses provide significant opportunities to advance Sustainable Materials Management (SMM)."*[9]

Given the scope of EPA's notice and request for comments on this issue—and keen interest by stakeholders across many industries—the agency will have much to ponder as it weighs up potential changes to its CPG guidelines. As it does, however, it would be wise to consider its own comments on SMM and the built environment:

*"Globally, consumption of materials continues to increase, with the greatest increases for construction minerals, ores, and industrial minerals, according to the International Resource Panel. Within the United States alone, billions of tons of concrete, steel, and wallboard will be required to construct, maintain, and operate our nation's built environment, resulting in substantial economic costs. As competition for natural resources continues to intensify due to global population and economic growth, the availability of materials will be subject to increased uncertainty. Furthermore, the extraction, transportation, use and disposal of these materials result in substantial environmental impacts, including emissions to the air, water, and land; energy and petroleum consumption; use of non-renewable mineral resources; expenditure of fresh water; and land and habitat use.*

*SMM, the use and reuse of materials in the most productive and sustainable way over their entire life-cycles, can help the U.S. address its material and resource needs in the built environment while remaining competitive in the global economy. The application of SMM in the built environment includes practices such as…beneficially using industrial non-hazardous secondary materials as replacements for virgin materials in construction (e.g. coal ash, foundry sand, iron and steel slag, etc.)"*[10]


***John Simpson*** *is editor of ASH at Work.*

9 *Ibid. pp. 5-6.*

10 *U.S. Environmental Protection Agency. "Basic Information about the Built Environment." https://www.epa.gov/smm/basic-information-about-built-environment. Retrieved on April 2, 2022.*

# WITH CREATIVITY AND INNOVATION, WE CONTINUE TO BE YOUR BEST SOURCE FOR FLY ASH

## HARVESTING

SRMG harvested fly ash is in production at our expanded Coronado facilities near St. Johns, AZ. Harvesting of landfilled fly ash involves reclaiming the fly ash from the existing landfill followed by several beneficiation processes resulting in a long-term high-quality supply of ASTM C618 Class F fly ash. SRMG's Coronado Harvesting Project adds 300,000 tons per year to the SRMG fly ash supply network and closes the gap on seasonal fly ash shortages in the marketplace.

## BLENDING

SRMG has added advanced blending capabilities in Phoenix and Tucson to increase its supply of Class F fly ash. In Phoenix, SRMG is blending Class C fly ash with Class F fly ash, resulting in an ASTM C618 Class F fly ash. In Tucson, SRMG is blending Class N natural pozzolan with Class F fly ash to produce a product known as Tucson Pozzolan which complies with ASTM C618 Class F requirements. In a market where many are experiencing supply shortages, SRMG continues to provide innovative solutions such as blending and harvesting.

## IP CEMENT

Phoenix Cement® Portland Pozzolan Type IP (25) is Phoenix Cement® Type I/II/V (LA) and ASTM C 618 Class F fly ash which are intimately ground and blended at the mill. For concrete products producers with limited silo space, or seeking logistic advantages from single sourcing, or who simply want the many benefits of utilizing fly ash, Type IP (25) is the logical choice. Produced year-round at our Clarkdale Plant, Type IP (25) is available in bulk and 94lb bags.

FLYASHHARVESTING.COM

SRMG
Salt River Materials Group

SRMATERIALS.COM

# ASTM in Action

*By Thomas H. Adams*

ASTM International is arguably the premier standard-setting organization in the world. The organization was founded in 1898 as the American Society for Testing and Materials. However, as the interest in using ASTM standards grew outside the U.S., an adjustment to the name of the organization was adopted to reflect its global reach. Today, ASTM has over 12,500 active standards, with 30,000 volunteer members from 140 countries who oversee these standards. These standards cover a wide range of materials and products to help everyone have confidence in the things they buy and use—from the toy in a child's hand to the aircraft overhead and even coal ash.

ASTM does more than publish standards. It provides proficiency testing, training, certification, and operates the cement and concrete reference laboratory. By understanding commercial needs and consumer priorities, ASTM touches virtually every part of our daily lives and helps our world work better.

Most people with an interest in coal ash know that there are a variety of standards that cover the beneficial use of fly ash, bottom ash, boiler slag, and FGD gypsum. In its document inventory, ASTM lists 496 products and services that contain a reference to fly ash alone. The most well known is ASTM C618, Standard Specification for Coal Fly Ash and Raw or Calcined Pozzolan for Use in Concrete. This specification is overseen by Committee C09, Concrete and Concrete Aggregates, and Subcommittee C09.24, Supplementary Cementitious Materials. Currently, there is activity in this committee that, if adopted, will make key changes in the materials approved for use under this specification. A major part of the changes is the recognition of bottom ash and harvested ash. Proposals are also being considered to permit blending of materials with coal ash. In addition, new standards are up for consideration that will allow for the use of new materials not currently recognized in any ASTM standard.

To support and encourage harvesting of coal combustion products from disposal in landfills and surface impoundments, Committee E50, Environmental Assessment, Risk Management and Corrective Action is writing guide documents on harvesting through Subcommittee E50.03, Beneficial Use. The first document was E3183, Standard Guide for Harvesting Coal Combustion Products Stored in Active and Inactive Storage Areas for Beneficial Use. This guide provides a framework to address critical aspects related to the harvesting of CCPs placed in active and inactive storage areas. These storage areas may be used for wet or dry material, and may be located at active or inactive facilities. The document provides the user with the best practices to adopt when considering initiation of harvesting activity.

To further support harvesting activity, the subcommittee is drafting a guide to provide a roadmap for characterizing a site under consideration for harvesting. Similar to a survey of a potential site for mining aggregates, this guide will provide the steps necessary for determining the types and quality of materials in storage, the location of these materials, and an estimate of the quantity stored. Drafting of this important follow-up to E3183 is being done by a task group led by Bill Petruzzi and his team at Verdantas. Several ACAA members also serve on this task group. The first subcommittee ballot on this guide is expected by June 1.

ASTM International is occasionally criticized for the length of time it takes to steer documents through the approval process. Those who make that complaint do not appreciate the fact that ASTM is a consensus organization that values balance in the voting process among producers, consumers, users, and general interests so that no one segment can dominate voting. An ASTM-approved document truly represents the position of a majority of those with some interest in the product or process. The wait is worthwhile, as having thoroughly vetted documents provides an element critical to acceptance—credibility.

If you are not an ASTM member as yet, consider joining and help improve the standards that support beneficial use. For more information, visit www.astm.org.

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***Thomas H. Adams*** *is Executive Director of the American Coal Ash Association.*

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# CCP Beneficial Use in our Nation's Capital

*Ronald Reagan Building*

**Two millennia ago,** Romans discovered that pozzolanic volcanic ash could be used to make a particularly durable type of concrete. "Roman concrete" would be used to build the Pantheon, the Colosseum, and many other structures that survive at least partially intact to this day. It is perhaps fitting, then, that our nation's capital, which draws much of its architectural inspiration from ancient Rome, should incorporate fly ash into so many of its great public buildings.

## EPA Leads the Way

On January 28, 1983, the U.S. Environmental Protection Agency (EPA) issued guidelines requiring all federal agencies, as well as all state and local government agencies and contractors that use federal funds to purchase cement and concrete, "to implement a preference program favoring the purchase of cement and concrete containing coal fly ash." Five years later, after Congress approved funds for the construction of the Ronald Reagan Building to house the agency's staff, EPA's New Headquarters Project team was established to work on the building's design.

In keeping with its mission of environmental protection, EPA worked to ensure that the facility's design minimized adverse impacts on the environment. Although EPA had a limited role in the design of the building, the agency was successful "in altering the building to reflect a number of sustainable design and mission features, including…use of fly ash in the cement," the agency noted in a 1997 case study describing the building's construction, *Leading by Example.*

Specific fly ash volumes and mix designs are not disclosed in EPA's case study. Upon the building's completion, however, it became the second-largest federal office complex, covering 11 acres, with 3.1 million square feet of office space, and incorporating enough concrete to pave a 106-mile-long two-lane highway.

## Other Notable DC Structures Using Fly Ash

EPA's headquarters is hardly alone among notable Washington, D.C., structures that incorporate fly ash. Others include:

- Washington, D.C.'s subway system incorporates more than 200,000 cubic yards of fly ash concrete.
- The iconic USA Today towers, located in Arlington, Va., were built with cast-in-place fly ash concrete floors on both of the complex's 26-story buildings.
- Restoration activities at the U.S. Capitol in the 1980s required installation of tower cranes in front of the building that sat on two 400-cubic-yard pads of fly ash concrete, which have remained in place on the restored grounds ever since.
- Rosalie Island, the point of first landfall for the Woodrow Wilson Bridge in Maryland, was constructed with low-density fill that incorporated over 10,000 tons of fly ash.
- World Bank and International Monetary Fund headquarters buildings
- Ritz Carlton and Willard Hotels
- Vietnam Veterans Memorial
- U.S. Department of Energy headquarters
- Embassies of France and Japan

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# Beneficial Use Case Study

## Peña Boulevard Concrete Pavement Replacement

### Coal Combustion Product Type
Class F Fly Ash

### Project Name
Peña Boulevard Concrete Pavement Replacement

### Project Location
Denver, Colorado

### Project Participants
City and County of Denver, Headwaters Inc., Holcim (US) Inc., Plum Creek Structures, Aggregate Industries, Castle Rock Concrete Construction Company of Colorado, Euclid Chemical, and CESARE Inc.

### Project Completion Date
2014

### Project Summary
Peña Boulevard is a major thoroughfare connecting Denver via Interstate 70 with the city's international airport. Originally built in the early 1990s, the road's jointed plain concrete pavement (JPCP) two decades later had begun showing signs of severe alkali-silica reactivity (ASR) distress that required expensive repair. Initial plans for the road's overhaul called for placement of an 11-inch doweled JPCP atop a 12-inch Colorado Department of Transportation (CDOT) Class 6 aggregate base. Owing to concerns over the project's cost and potentially lengthy duration, airport authorities sought a different solution.

### Project Description
Peña Boulevard is a heavily traveled road that carries up to 65,000 vehicles per day between the city of Denver and one of the country's busiest airports. As such, when it came time for resurfacing a three-mile stretch of the road near Denver International Airport, it was deemed imperative that construction work not unduly impede the flow of traffic. Combined with a recent Colorado state initiative to lower the environmental impact of construction, project designers were encouraged to seek out both innovative road repair materials and processes.

Since ASR had been the primary reason for Peña Boulevard requiring repair, the project team designed and tested the materials in the concrete mix to meet CDOT specifications for resistance to reactivity and sulfate attack. Ultimately, a mix incorporating Holcim's Envirocore® portland-limestone cement (PLC) together with 20 percent Class F fly ash was selected for the concrete binder. Rather than removing roadway segments, reconditioning the subgrade, and placing a CDOT Class 6 aggregate base, the team chose to rubblize the existing JPCP to serve as a foundation for the new pavement.

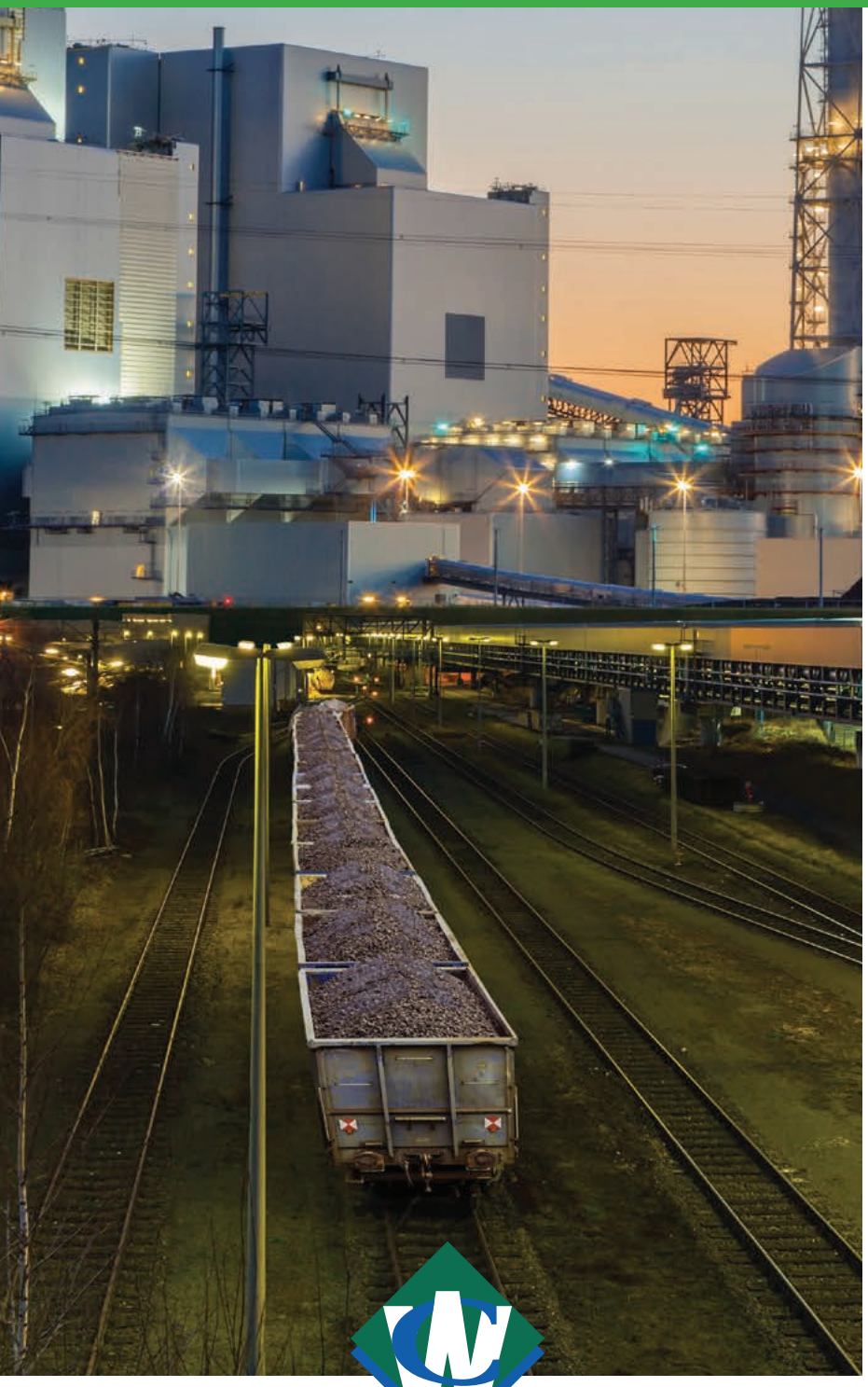
The project results were highly favorable across all economic and environmental criteria when judged against a business-as-usual approach to pavement reconstruction and include:

- Use of fly ash and PLC lowered the concrete's overall carbon footprint by reducing the amount of clinker used, as well as the energy associated with its production; and
- Crushing, recycling, and reusing roadway concrete in place saved the time, expense, and environmental impact of transporting old pavement and new base materials. This process saved an estimated several weeks of labor and $500,000 in associated costs, 1,250 gallons of diesel fuel, and 1.5 tons of avoided CO2 emissions.

For these achievements, the project received a number of industry accolades, including the 2015 Triad Award by *Public Works* magazine and the 2015 American Concrete Pavement Association's Paving Contractor Award for Excellence.

Photo: Colorado Department of Transportation

# Safe, Reliable and Cost-Effective CCR Management



Waste Connections is the solutions partner to meet the evolving demands placed on your coal-fired power generation facilities. Strategically aligned with Boral Resources, the largest CCR management company for beneficial use, Waste Connections has the expertise, capabilities and financial foundation to provide a viable solution, whether treating legacy impoundments or the current generation of coal ash.

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# Beneficial Use Case Study

## San Francisco Public Utilities Commission Headquarters

### Coal Combustion Product Type
Fly Ash

### Project Name
San Francisco Public Utilities Commission Headquarters

### Project Location
San Francisco

### Project Participants
KMD Architects, Stevens + Associates JV, Tipping Mar Structural Engineering, SOHA Engineers, Webcor Builders/Concrete, Central Concrete Supply, Lehigh Southwest Cement Company

### Project Completion Date
2012

### Project Summary
Initial plans for what would become the headquarters of the San Francisco Public Utilities Commission were to construct a steel-framed, base-isolated building capable of withstanding the area's seismic activity with minimal damage. However, projected cost overruns led to the project being put on hold after completion of the design development phase. A new, more affordable design was developed that opted for a post-tensioned concrete shear-wall system with composite link beams.

Photo: CC BY 2.0 - UC Davis College of Engineering

### Project Description
From the outset of its involvement in the project, the San Francisco Public Utilities Commission aimed for its headquarters to achieve optimal structural and environmental performance. The structural objectives included the ability for the building to be easily repaired and immediately reoccupied following a major seismic event. The environmental objectives included optimizing the building's energy consumption, indoor air quality, and water conservation.

Once the decision to switch to concrete construction had been made, the choice to use supplementary cementitious materials was an obvious one. In all, six mix designs were formulated to reduce CO2 emissions in pursuit of a LEED Platinum rating—including a ternary mixture of 30% fly ash (and 40% slag cement) that was used for core wall concrete, mat slab, and columns to achieve a specified compressive strength of 8000 psi at 90 days. These elements, which support the vertically post-tensioned concrete structure, are designed to give the building the ability to re-center after an earthquake to minimize damage. Moreover, the lower-cement concrete mixes reduced embodied carbon by roughly half over conventional concrete—and lowered CO2 emissions associated with the building materials by 7 million pounds.

Use of concrete over steel framing yielded additional advantages to both the construction process and the finished design. The (50 percent) reduction in the use of structural steel helped reduce both wall congestion and construction time, lowered building costs, allowed for the construction of a 13th floor within the same zoning envelope (by decreasing the floor heights by one foot throughout the building) and improved daylighting (courtesy of the exposed concrete ceiling and walls).

The building received a host of plaudits, including the American Institute of Architects Committee on the Environment's Top Ten Green Projects, the Structural Engineers Association of California's Award of Excellence in Sustainable Design, and the National Council of Structural Engineers Associations' Outstanding Project Award: New Buildings Over $100M.

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# I'm Glad You Asked

*Editor's Note: "I'm Glad You Asked" is a recurring feature that invites a different expert each issue to answer a commonly asked question about coal combustion products. If you would like to submit a question and/or volunteer to provide a written answer to one, please contact the editor at johnfsimpson@gmail.com.*

*By Thomas H. Adams, ACAA Executive Director*

This issue's guest columnist is none other than Thomas Adams, Executive Director of the American Coal Ash Association—a role he has held since February 2009. Previously, Tom served as Manager of Chapter Relations and International Activities for the American Concrete Institute while simultaneously working as Executive Director of the American Shotcrete Association. Prior to that, he served as Executive Director of the Michigan Concrete Association.

Tom is an active participant in several organizations relevant to the beneficial use industry, including ASTM International, the American Concrete Institute, the Electric Power Research Institute, the National Ready Mixed Concrete Association, and the World Wide Coal Combustion Products Network. A native of Detroit, he studied business administration and strategic management at Wayne State University, in Detroit, and Aquinas College, in Grand Rapids.

**Q.** "How much fly ash is in landfills and ponds in the U.S.?"

**A.** In considering this frequently asked question, it seems the best place to start is the ACAA Production and Use Survey results. This survey was first done in 1968 and continues to this day on an annual basis. By taking the total amount of coal combustion products (CCPs) produced and subtracting the amount that has been put into beneficial use, we can get a quick idea of the quantity in disposal units. Using this information, the total amount disposed from 1968 to 2019 is in excess of 1.5 billion tons.

However, this figure does not include CCPs put into disposal *before* 1968. Coal-fueled generation of electricity started in the late 19th century. It is reasonable to assume that in the decades preceding the first ACAA survey, the volume of disposed CCPs would register at least another 500 million tons. This would bring the estimated quantity of CCPs in disposal units to over 2 billion tons.

Prior to changes to the Clean Air Act that spawned the widespread use of stack gas scrubbers around 1990, there was no significant quantity of FGD gypsum produced. Reporting of the production and use of FGD gypsum started around 1990.

Additional questions usually follow. These are the most common:

- Does ACAA have a breakdown by CCP type in disposal (fly ash, bottom ash, FGD gypsum, and boiler slag)?
- How much is stored in landfills and how much is in ponds?
- How much is comingled and how much is in a monofill?
- How much can be harvested?

ACAA does not have the data to answer these questions. With additional work, we could develop estimates, but each landfill and pond site under consideration for harvesting activity would have to go through an evaluation process.

ASTM Subcommittee E 50.03 is currently writing a guide to characterizing materials in disposal units. By using the guide, those interested in the harvesting potential of a site will have a roadmap to use in evaluating a site to qualify it for further harvesting development, just as would be done for any mining activity. The first ballot on this guide will be coming out soon.


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# Stay Safe on the Roads This Summer

*Editor's Note: As a service to our readers, ASH at Work publishes a recurring series on everyday health and safety topics. We welcome contributions from readers with expertise in health-related issues. Article length should be approximately 500 words. Please submit topic suggestions in advance to John Simpson at johnfsimpson@gmail.com.*


Photo Designed by Freepik

Summer is a time for roads trips and vacations, and statistics bear out that Americans drive more miles during the warm weather months than any other time of year. As a direct consequence of that, there are more fatalities at this time of year than any other. Minimize your risk as you head out for summer fun by taking the following precautions.

## BEFORE You Drive

Take your vehicle to a reputable maintenance shop for a check-up of the following items:

- Oil, cooling system, and fluids

- Battery, air-conditioning, and head/tail/brake lights
- Tires, belts and hoses, and wiper blades

Stock your vehicle with an emergency roadside kit containing:

- Cell phone and charger
- First-aid kit, nonperishable food, drinking water, and medicines
- Flashlight and flares
- Jumper cables
- Jack, lug-nut wrench, and basic repair tools
- Tire pressure gauge
- Emergency blankets and coats
- Maps

Ensure that your auto insurance is fully up to date and that all drivers are listed on your policy.

### WHEN You Drive

- Ensure you have had plenty of sleep the night before. On longer drives, stop every couple of hours for a break. Be aware that fatigue sets in more quickly while driving at night.
- When packing, ensure that weight is evenly distributed in and on top of your vehicle; don't pack items that obscure your view or your mirrors.
- Plan your route out, including where you will need to stop for gas. Ensure that you have maps in the event that your GPS fails.
- Check the weather, road conditions, and traffic prior to setting off—and allow ample time to reach your destination safely.
- Gas up, buckle up, and ensure that children are safely situated in car seats if required.
- Avoid risky behaviors and distractions, such as phoning, texting, eating, speeding, drinking (alcohol), or loud music.
- Focus on the road, not your passengers, and keep a close eye out for motorcyclists, bicyclists, and dangerous drivers.

# 6 Questions for John Simpson

*Editor's Note: "Six Questions for..." is a regular* ASH at Work *feature in which leaders with unique insight affecting the coal ash beneficial use industry are asked to answer six questions.*

John Simpson is Vice President of Editorial Services at John Ward Inc., a marketing, communications, and public affairs consultancy that provides association management services to the ACAA. He has served as the editor of *ASH at Work* magazine since 2017. We sat down with John to learn more about his work with ACAA and how he sees *ASH at Work*, and association communications more generally, evolving in the future.

**ASH at Work (AW):** Briefly describe your background and the work that you've been involved with for ACAA.

**John Simpson (JS):** I've been a writer, reporter, and association/corporate communications professional for over 35 years at this point. Much of my career has been spent in the energy and materials sectors—so that helped in preparing me to write about coal ash-related issues. Additionally, as a consultant for John Ward Inc., I perform communications work for several organizations that focus on topics and issues that overlap somewhat with those of ACAA. As editor of the National Coal Transportation Association's member magazine, in addition to delving into coal-related topics, I cover issues such as logistics, transportation, downstream markets—so there are some synergies that are derived from that.

For ACAA, while I occasionally write for *The Phoenix* newsletter, most of my work is in developing content for *ASH at Work* magazine. This is my fourth go-around as editor-in-chief of a magazine, and it can be tough work. But ACAA's members have been very generous with editorial contributions and advertising support.

**AW:** What, if anything, is different about ACAA compared with the other trade associations you've worked with?

**JS:** Although ACAA has over 100 members, the community feels close-knit and generally all tend to pull in the same direction. I've worked for associations where the larger companies dominate discussions and seem to get their way on almost every issue that goes before the membership. In my view, ACAA does a better job of building consensus on issues of concern to the association, and I credit not only the ACAA board, but also the members themselves who volunteer their labor and money to support projects that they understand will benefit the larger industry.

**AW:** What do you view as the importance of communications in association work?

**JS:** I'm biased, of course, but I think that communications are the lifeblood of an association and permeate every aspect of the work that is carried out. And it's not just magazines and newsletters that I'm referring to. The conferences, workshops, committee meetings, production and use surveys—communications vehicles all—are all central to advancing the mission of the ACAA.

I think it's also important to recognize the two-way nature of these communications: members provide feedback and input that is critical to the success of all of these undertakings. The published items that follow, such as conference proceedings, comment letters, white papers, and so forth, are just the end product of these collaborative efforts between the members and staff. The production and use surveys are a good case in point. Since 1968, CCP production and use data has been collected annually from ACAA members in a way that protects the anonymity of each to generate the only clear picture available of U.S. CCP usage and trends. This data is utilized widely by federal agencies, including the U.S. Environmental Protection Agency and U.S. Geological Survey, and more generally helps to underscore the economic and environmental importance of coal ash and advance the industry's interests.

**AW:** How is *ASH at Work* attempting to be responsive to the needs of ACAA's members?

**JS:** We've introduced a number of regular features to the magazine in the past several years designed to leverage the content we're developing to a wider audience. The beneficial-use case studies are among the more widely ready sections of the magazine. We print these one-page "three-minute reads" up on occasion for use as handouts at various venues—Capitol Hill visits, for example—where they can illustrate the central value proposition of the coal ash industry to legislators and other decision-makers.

Another feature we've launched is "I'm Glad You Asked." In these pieces, we invite a guest author who is expert in a particular subject area to address commonly asked questions about coal ash. The goal is to provide members and others in the coal ash industry some brief talking points on a frequently raised (and/or commonly misunderstood) issue together with the supporting science behind them. A couple of the topics we've covered so far include: "What happens to fly ash when concrete is recycled?" and "Is there a limit to the percentage of fly ash that can be used as a cement substitute in concrete?"

**AW:** How do you see the role of associations—and ACAA in particular—evolving in the future?

**JS:** Associations are impacted by many of the same trends that are shaping industries and businesses. Obviously, COVID has been a game-changer for how many workplaces are structured—with greater work-from-home opportunities and more reliance on digital technologies such as Zoom and virtual events. That may well present new opportunities for associations to "pick up the slack" and engage more frequently with workers who feel isolated in this evolving work environment.

ACAA has already carried off successful hybrid conferences that pair both live and virtual attendance options. It appears that these options are here to stay, and technology is probably not far off that will allow the incorporation of "virtual reality" meetings that can afford greater intimacy to get-togethers. Certainly, ACAA and other associations need to be exploring the availability of new digital technologies that not only ensure the comfort/safety of participants, but can improve the means of information exchange. There will always be a need and demand for ACAA's educational, career, standards, and other activities/programs, but the method of delivery will inevitably continue to evolve in the future.

**AW:** What do you do when you're not working on association communications?

**JS:** Right now, I'm in the midst of relocating from Denver to San Diego. Once things settle down and I have a little time on my hands, I guess I'll be trading in the snowboard for a twin-fin.

# ASH Allies: ECOBA

The European Coal Combustion Products Association (ECOBA) was founded in 1990 by European power producers to ensure full beneficial and high-grade utilization of all coal combustion products (CCPs). As such, ECOBA is active in the development of European standards and is represented on a number of European Committee for Standardization (CEN) committees. The objectives of the Association are to:

- Encourage the development of technology for the use of all CCPs on both the industrial and environmental levels;
- Promote the mutual interests of its members, internationally and particularly within the framework of European organizations that are of a scientific, technical, ecological, and legal nature;
- Establish and/or develop the necessary legal/regulatory measures for the recognition, acceptance, and promotion of the use of all CCPs as valuable recoverable resources;
- Participate in international activities, including cooperation within the framework of European organizations; and
- Ensure the exchange of information and documentation among the various national and international bodies.

To achieve these goals, ECOBA has concentrated on representing the interests of its members in CEN standardization work for cement (TC 51), concrete (TC 104), aggregates (TC 154), road materials (TC 227), gypsum and gypsum-based products (TC 241), and horizontal testing (TC 351). In addition, work on sustainability (TC 350) and earthwork (TC 396) is monitored. Supporting work is carried out by ECOBA's Standards Committee, which evaluates the impact of upcoming changes and compiles background argumentation and proposals for necessary amendments.

ECOBA's Environmental Issues Committee monitors the impact of environmental legislation on the utilization of CCPs. Its scope includes clean air legislation, best-available technologies for flue gas cleaning of power plants, and environmental regulations pertaining to the use of CCPs in various applications that are defined at the national level but have to be implemented in future product standards. The Committee comments on both legislative acts and standards under revision.

Promotional tasks at ECOBA are handled by its Communication Committee, including the distribution of information and data on the quality and availability of CCPs at the national and regional levels. In addition, the Committee disseminates information on the benefits of CCPs in sustainable and carbon-neutral construction.

In addition to the aforementioned committees, ECOBA has launched working groups on Calcareous Ash for issues specific to this ash type; on the Circular Economy for promotion of CCPs' sustainability benefits; and on Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) to track developments on chemical legislation and related registrations.

ECOBA promotes informational exchange among ECOBA members via its sponsorship of meetings, workshops, and conferences, including EUROCOALASH (covering scientific and technical issues) and ASHTRANS (trade-related issues). ECOBA is also a founding member of the World Wide Coal Combustion Products Network, a forum for the international exchange of information on CCPs.

Owing to coal plant retirements in its member states, ECOBA faces challenges related to CCP availability associated with non-continuous production. Going forward, logistics, imports, and re-use from stock are expected to form an increasing part of the scope of ECOBA's activities.

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# ASH Classics

## A Look Back at the Beginnings of the U.S. Coal Ash Industry

*"ASH Classics" is a recurring feature of ASH at Work that examines the early years of the American Coal Ash Association and its predecessor, the National Ash Association (NAA), focusing on issues and events that were part of the beneficial use industry's defining years.*

*A lead story in this ASH Classic, from 1984, describes the NAA's submission of a technical report to the U.S. Environmental Protection Agency supporting the development of federal procurement guidelines for the use of coal ash in transportation construction applications. The 198-page report noted that adopting this practice would be consistent with Section 6002 of the Resource Conservation and Recovery Act (RCRA), which states, among other things, that "Federal agencies must develop a procurement program to purchase recycled products to the maximum extent practicable."*

ASH AT WORK

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### EEI/NAA Communications Project Initiated; Julian Wise Hired To Implement Program

WASHINGTON — A coal by-products communications project designed to improve and expand the market potential for power plant ash has been initiated by the electric utility and ash industries.

The new pact was announced jointly by William McCollam Jr., president of Edison Electric Institute, and NAA President Tobias Anthony.

Hal F. Dunham, director of special projects and member services for EEI, will supervise the $40,000 project and coordinate the activity with the Utility Solid Waste Activity Group Chairman Dave Parks of Baltimore Gas & Electric Co.

The major goal of the program is to utilize communications tools to reduce the regulatory impact of land disposal by:

1. Increasing the number of users of power plant ash,
2. Encouraging research into new applications,
3. Laying a constructive foundation for a continuing communications program that will assist the ash industry to attain a goal of 80 percent utilization.

A media specialist, Julian Wise, has been hired to implement the program and will be headquartered at the NAA offices in Washington.

Attention will be focused on both internal and external audiences. In-house programs will be directed to get utility executives to recognize the potential benefits to market and utilize power plant ash. Outside targets will include allies in the ash industry. Corporations who currently use ash or have the potential to do so, and would extend to academic institutions, corporate research labs or others could contribute to developing new uses, architects, engineers, consultants who could incorporate ash in construction specifications.

"Budget restraints dictate that efforts, at the outset, concentrate on activities that will have a multiplier effect rather than on a specific communications to an

See EEI/NAA (Page 4)

### Wisconsin Electric Power Is NAA's Newest Member

Wisconsin Electric Power Company, headquartered in Milwaukee, is the newest utility member of the National Ash Association.

The firm's application for membership was approved at the June meeting of the Executive Committee, according to Board Chairman James P. Plumb. The NAA roster now includes 35 utilities operating one or more coal-fired electric generating stations.

Tommie J. Rodgers, Manager Technical Services & Control for WEPCO, has been named as the designated representative to the Board of Directors.



Mr. Rodgers

His alternate and the Technical Representative will be Frederick H. Gustin, Administrator Solid Waste Services.

The mid-west utility currently operates four coal-fired generating stations producing with a combined capacity of 2,724 MW of power. An additional 580 MW unit is to come on stream in 1985. The annual coal burn is in the 5.6 million ton range.

WEPCO serves about 2 million customers in a service area of 12,600 square miles. Founded in 1896, it is the largest electrical utility in the State of Wisconsin. The service area includes Metropolitan Milwaukee, the east-central and northern portions of Wisconsin and parts of the Upper Peninsula of Michigan.

In 1982, WEPCO was selected as the outstanding electric utility of the year by Electric Light & Power. The highlight of 1984 has been a lowering of electric rates.

### Technical Report On Ash Use Sent To EPA

WASHINGTON — A technical report to support the development of Federal guidelines for the use of power plant ash in transportation construction applications has been submitted to the Environmental Protection Agency here for review.

The sponsors are requesting that Federal procurement guidelines similar to those pertaining to the use of fly ash in portland cement concrete be adopted by the agency.

Work on the document, prepared by Valley Forge Laboratories in Devon, Pa., was initiated jointly by Utility Solid Waste Activities Group (USWAG) of the Edison Electric Institute and the National Ash Association.

The American Public Power Association and the National Rural Electric Cooperative Association joined as signatories in the final presentation.

NAA President Toby Anthony said the 198-page report addresses all pertinent aspects of the use of coal ash in various transportation applications. Additionally, seven detailed appendices have been compiled to support the report outlining applications, specification data, and patent information on proprietary uses.

The presentors maintain the reuse of ash in the construction of transportation facilities has the capability of consuming large volumes of power plant ash, he added. Anthony noted this concept is consistent with Section 6002 of the Resource Conservation & Recovery Act (RCRA).

Federal funding plays an important, if

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VOL. XVI, NO. 3 JUNE 1984

# ASH AT WORK

**James P. Plumb,** *Chairman of the Board* **Allan W. Babcock,** *Editor*

Published quarterly by the National Ash Association, 1819 H Street, NW, Washington, DC 20006, for its members, their friends and supporters.

## NAA Message Board

**Tobias Anthony**
*Executive Vice President*

Recently, Edison Electric Institute (EEI), the Utility Solid Waste Activity Group (USWAG) and the National Ash Association joined in a program designed to communicate the value of utilizing coal ash. Mr. Hal Dunham, EEI dubbed the program "Utility Ash: America's Undiscovered Resource." That title is apt, but we should all be dismayed by what it connotes. America's fourth most plentiful mineral produced is not reaching industrial and consumer markets as it should.

The reasons are not difficult to find. Absence of name recognition is the first one to come to mind. Of the twelve most plentiful minerals produced, only slag and perhaps gypsum are as obscure. Certainly not coal, cement, stone, iron ore, etc. Not much is known by user industries, in general, about the fascinating properties of this synthetic mineral because coal combustion until the late 60's was subordinated by oil and gas. But as is usual in this nation of ours, a body of unnoticed scientists, engineers and technicians inside and outside of the electric utility industry poured out a plethora of facts about this material, anyway.

The partners in this communication program believe it is imperative to bring a message to users that it is essential to substitute less costly synthetics for natural materials. Aside from the point that we face depletion of these materials, in the past decade we faced cartellizing of prices by third-world nations. It is to our benefit that our domestic source of coal ash is huge. Not only do we estimate more than 800 million tons of it exists but some 700-800 million tons will be produced in only the next decade.

Our purpose, then, as outlined in the program is at least two-fold. First, utilities must organize internally to achieve the goal of 80% use of ash in the future. Secondly, we must explain how ash can be used profitably in a multitude of existing and undiscovered markets.

That is what has to be done. That is what we intend to do.

**COMMUNICATIONS PROJECT DIRECTOR ON THE JOB — Mediator Specialist Julian Wise, above, is shown at his desk in NAA headquarters familiarizing himself with the technical aspects of ash utilization during his first day on the job as development director for the coal by-products communications project being jointly undertaken by the Edison Electric Institute and the National Ash Association in co-operation with EEI's Utility Solid Waste Activity Group (USWAG). (See editorial by President Tobias Anthony above, and news story on Page 1.)**

**DAVIS RETIRES — James E. Davis, Senior Vice President (Bulk Power) for the Allegheny Power Service Corporation in New York, retired on June 30 and relinquished his position on the Board of Directors of the National Ash Association. During his 10-year tenure with the NAA, Davis was elected to serve three consecutive terms as the trade association's chief executive officer, starting in 1976. The APS executive was active in many other capacities and was a leading advocate of electric utility participation in promoting ash utilization. He will be replaced as the APS designated representative by Charles S. Ault, Director, Fuels, and headquartered in the firm's Greensburg, PA offices.**

**Thanks, Jim, we'll miss you!**

## TECHNICAL REPORT

*(Continued from Page 1)*

not dominant, role in all forms of transportation construction including highways, airports, railroads, waterways, subways and other mass transit systems.

NAA members who participated in the study included Dave Parks and Don Ward, Baltimore Gas & Electric Co.; Dennis L. Kinder, American Electric Power Service Corporation and KBK Enterprises, Inc.; Steve Benza of Pennsylvania Power & Light Co. and KBK Enterprises, Inc.; Allan W. Babcock, Allegheny Power Service Corporation; Robert Collins, Valley Forge Laboratories; John H. Faber, Faber Associates and former NAA Executive Director; and Roy Aaron, former NAA technical director.

# PLANS FOR SEVENTH INTERNATIONAL SYMPOSIUM/EXPOSITION ON SCHEDULE

## Papers Due August 1; Exhibit Layout Is Set

WASHINGTON — Plans are moving ahead on schedule for staging the Seventh International Ash Utilization Symposium Exposition at the Sheraton Twin Towers in Orlando, Florida, on March 4-7, 1985, according to Co-Chairmen Allan W. Babcock and Jack Weber.

NAA staff members met here recently with representatives of Meeting Planning Associates to review the myriad of details relating to registration, housing, exhibits, technical presentations, and special tours.

The MPA team is headed by President Kathy Davis. Others assisting with the symposium preparations for the California consulting firm are Jill Higgins and Marcie Freeman.

The Technical Advisory Committee will meet here on August 6 to begin the screening process of abstracts of technical papers presented for consideration. Chairman Ronald Morrison has indicated priority will be given to topics relating to "hands on ash applications, rather than blue sky research proposals."

"Once the presenters have been selected, we can begin to put the program together and schedule the daily sessions," Chairman Babcock related.

At this writing, more than 20 abstracts have been received, including two papers by Hungarian ash technicians.

Papers have been solicited on ash applications relating to highway construction - sub-base, bases, flexible and rigid pavements; structural fills; injection grouting; the treatment of acid-bearing spoil banks and sanitary landfills; ash management techniques; uses in cement manufacture and concrete products.

During the planning discussions, a contract was approved with Astar Expositions, Inc., of Orlando, to handle the exhibits at the convention center.

Co-Chairman Weber explained the preliminary floor layout contains 31 booths for exhibits or live demonstrations. Space in the Exhibit Hall has been priced at $9.50 per square foot, with a minimum of 100 square feet.

Meanwhile, advance registrations for the symposium are being accepted by the NAA's Washington headquarters. The fee has been set at $340 through January 14, with late bookings jumping to $390 after that date.

SYMPOSIUM PLANNING SESSION — NAA President Tobias Anthony, at left, is shown discussing plans for the upcoming Seventh International Ash Utilization Symposium/Exposition with members of the Organizing Staff. The group includes (left to right) President Anthony, Ms. Jill Higgins (Meeting Planning Associates), MPA President Kathy Davis, NAA Staff Assistant John Gillis, Ms. Marcie Freeman of MPA, and Co-Chairman Jack Weber.

# HERE & THERE

OAKLAND, CA — Kaiser Engineers Corporation is evaluating the marketing and revenue potential of a coal ash Direct Hydrochloric Acid Leaching Process (DAL) developed by the Oak Ridge National Laboratory.

The DAL process would utilize both currently-produced ash and previously-disposed ash, including fly ash and bottom ash, and convert the ash into saleable products.

Another plus for utility producers would be elimination of ash disposal practices and the reclamation of land previously dedicated for disposal - both items representing ever increasing operating costs.

The study is being financed by the Electric Power Research Institute to promote greater ash utilization.

The multi-stage DAL process first extracts all the acid solubles such as calcium, magnesium, sodium, potassium, iron, etc. The insoluble ash residue is washed to remove all soluble acidic materials from the leached ash product composed primarily of inert aluminum silicate and silica particles.

Major products are metallurgical alumnia, high purity iron oxide, and leached ash for the paint, paper, rubber, plastic and cement industries as fillers, extenders, pigments, and admixtures.

• • • • •

LANSING, MI — A three-year research program for the utilization of fly ash in agriculture has concluded that the ash can substantially increase the crop yield in coarse textured soils.

The report, issued by the Department of Crop and Soil Sciences at Michigan State University, said application rates as high as 300 tons per acre are possible where ash is used as a soil amendment.

The results indicated the potential value as a fertilizer is limited although when used to modify coarse soils and increase water retention capacity, the fly ash can raise the crop yield potential.

• • • • •

SHEPHERDSTOWN, WV — A procedure is being developed for the possible pre-approval of fly ash sources by the U.S. Corps of Engineers.

John H. Faber of Faber Associates has been awarded a contract by the Corps of Engineers to develop and produce a "Pozzolan Quality Management System" for acceptance testing of fly ash.

Faber, one of the founders of the National Ash Association and its first executive director, said the PQMS is intended to provide the agency, and others who follow policies and guidelines relative to the placement of fly ash concrete, with a quality assurance program for pozzolans by establishing qualified sources of these materials and verifying the compliance of materials shipped from these sources with specification requirements.

The program is being developed as an appendix to Regulation No. ER 110-1-202 issued in January 1984.

Faber is being assisted by William Miller, a former chemist at the Corp's Vicksburg laboratory, in the preparation of the report.

# FROM POWER TO TOWER

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# ACAA Winter Meeting, Clearwater, Florida

## Board Elections

Three members of the American Coal Ash Association Board of Directors were elected February 8, 2022, during the Association's Winter Meeting in Clearwater, Florida. All will serve for the 2022-2025 term. Tara Masterson, Tennessee Valley Authority, was re-elected to a utility seat. Andy Hicks, ASH Mineral Solutions, was re-elected to an associate seat. Matt Brownlee, LafargeHolcim Geocycle, was elected to fill the marketer seat previously held by Dave Rylance, Kansas City Fly Ash, who did not stand for re-election.

ACAA Secretary/Treasurer Lisa JN Bradley announced her resignation from the officer position she has held since 2014. ACAA's board of directors will elect a new secretary/treasurer to serve the remainder of Dr. Bradley's term.

Earlier this year, John Halm, Byproducts Marketing Manager for Duke Energy, was selected by the American Coal Ash Association Board of Directors to serve as its Vice Chair. He fills the unexpired term of Julie Olivier, who resigned her ACAA position when she left Duke Energy to return to private practice.

John grew up in central Texas and Jacksonville, Florida, graduating from Clemson University with bachelor's degree in Chemical Engineering in 1986. He is a member of the EPRI P241 Coal Combustion Product Management Committee, where he serves as co-chairman. He has more than 35 years' experience in construction products and byproduct use-related industries. Prior to Duke, John worked for United States Gypsum Company for 22 years in wallboard manufacturing and research roles.

## ACAA Champion Award

Lawrence L. Sutter—Professor in Materials Science and Engineering, Associate Dean of Research and External Relations, and Director of the Applied Chemical and Morphological Analysis Laboratory at Michigan Technological University—was selected as the eighth recipient of the ACAA Champion Award.

For the past 40 years, Professor Sutter has been engaged in materials characterization, concrete materials research, and concrete durability issues. Much of that work has focused on secondary and recycled materials such as fly ash and blast furnace slag. He has also closely studied the effects of deicing chemicals on concrete pavements.

Professor Sutter is actively engaged in numerous committees and subcommittees of ASTM International and the American Concrete Institute. He is a fellow of both organizations and has received many awards from ASTM and ACI for his contributions. In recent years, he has worked to continually revise and improve ASTM C618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete—the cornerstone specification for the use of fly ash in concrete in the U.S.

"The current effort to revise 618 to recognize harvested ash and bottom ash is proving to be a big challenge. However, Larry has been leading the way," ACAA Chairman Steve Benza noted.

A registered engineer in the state of Michigan, Professor Sutter received his bachelor's degree, master's degree, and Ph.D. from Michigan Tech.


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ACAA


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# The World of Coal Ash 2022

## NORTHERN KENTUCKY

## *Welcome Back to WOCA!*

**Welcome back to the biggest and best forum on coal combustion products. This—the ninth iteration of World of Coal Ash (WOCA)—may well be the most highly anticipated ever.**

WOCA has grown from humble beginnings to what it is now known as—*the* global forum on coal ash. At WOCA 2022, you will have the chance to hear from, and mingle with, stakeholders representing all aspects of the industry. Consultants, engineering firms, power industry leaders, government officials, and academics all flock to WOCA to learn the latest news and developments in coal ash.

### OUR HOST CITY:
### *Covington, KY*

This year's conference marks WOCA's return to historic Covington, Kentucky, located across the Ohio River from Cincinnati. All WOCA events will be held in one central location—the Northern Kentucky Convention Center—affording the utmost in convenience to all attendees.

When it is time to relax and enjoy some time with colleagues, Covington is ready to welcome you and your guests. In addition to the waterfront hotels and restaurants located just outside the Convention Center, MainStrasse Village is located just a few blocks away. Filled with charming taverns, bistros, coffee shops, and pubs, this area is ready to welcome all of us for WOCA 2022.

ACAA AMERICAN COAL ASH ASSOCIATION

Center for Applied Energy Research

The World of Coal Ash (WOCA) is a joint project between the American Coal Ash Association (ACAA) and the University of Kentucky Center for Applied Energy Research

## *Short Course*

Whether you're a newcomer to the field of coal ash or an industry veteran, the 2022 Short Course has something for you! This year's Short Course is focused on why fly ash is such an important commodity, what is currently happening with fly ash regulation in the U.S. and around the world, and where fly ash is going in the future.

The WOCA 2022 Short Course will be held Monday, May 16, 2022. Please remember that you must register for the Short Course *and* the full conference if you would like to attend both events.

### *Topics covered will include:*

- **"History of Pozzolans—Why Are Pozzolans Important?"** Michael Thomas, University of New Brunswick
- **"Fly Ash in the Coming Built Environment—Discussion of the Supply and Future of Fly Ash"** Tom Adams, ACAA
- **"Offsetting CO2 Through Fly Ash Utilization"** Eric Koehler, Titan America
- **"International Perspective and Import Update"** Ivan Skidmore, Power Minerals
- **"Harvesting, Beneficiation, and Utilization of Fly Ash"** Jimmy Knowles, SEFA Group; Dale Diulus, Salt River Materials; Rafic Minkara, Eco Material Technologies
- **"ASTM Update"** Ivan Diaz, Eco Material Technologies
- **"Pond Closure Panel Discussion/Update"** Mark Rokoff, Burns & McDonnell
- **"Recent Regulatory Developments Panel Discussion/Update"** John Ward, John Ward Inc.

*For a complete schedule of sessions and events, please visit www.worldofcoalash.org.*

# Thank You, WOCA Sponsors!

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## Additional

**Student Poster Award**

EDUCATIONAL FOUNDATION — AMERICAN COAL ASH ASSOCIATION, INC. — ACAA

**Alice Marksberry Best Oral Presentation Award**

Center for Applied Energy Research

**Offsite Reception**

ECOMATERIAL TECHNOLOGIES

---

**Poster Award**

EPRI — ELECTRIC POWER RESEARCH INSTITUTE

**Technology Showcase**

FirmoGraphs — BUSINESS INTELLIGENCE. APPLIED

**Student Oral Presentation Award**

MIDWEST COAL ASH ASSOCIATION

**Offsite Reception**

# Welcome, New ACAA Members!

**Allu Inc.** manufactures a line of soil stabilization products that can be used to solidify fly ash in ponds. They join as an Associate Member. Please visit www.allu.net for more information.

**Coomtech** produces low-energy, bulk-material drying equipment—and coal ash harvesting is a key application of its technology. Coomtech's Kinetic Turbulent Air Dryer dries powders and granules using managed turbulent airflow, instead of heat, to shear surface moisture from the material, resulting in up to 75% less energy consumption than thermal drying. They join as an Associate Member. Please visit www.coomtech.com for more information.

**FMR Transportation Solutions** is a consulting services company based in Roanoke, Va., offering transportation management, supply chain analysis, and logistical strategies designed to enhance client-based operations. They join as an Associate Member.

**Franklin Technical Solutions, LLC** provides 30 years of experience in the R&D, cement, and SCM arena to bring technical assistance on a consulting basis to coal-fired utilities in utilization and certification of their respective by-products to state and federal agencies or for commercial applications. They join as an Associate Member.

**George E. Rouse** is a retired geological engineer/geochemist who was last employed as a consultant to an environmental company, ADA-ES. He joins as an Associate Member.

**JSW Energy Ltd.** is one of the leading private-sector power producers in India and part of the USD $14 billion JSW Group, which has significant presence in sectors such as steel, energy, infrastructure, cement, and sports. They join as an Associate Member. Please visit www.jsw.in for more information.

**Kline Consulting** focuses on the use of coal combustion residuals as cement substitutes; evaluates the effectiveness of activated carbon on mercury capture and concrete impact; and is interested in harvesting and beneficiation technologies. They join as an Associate Member.

**LB Industrial Systems** is a turnkey supplier of ash handling and other bulk material conveying, processing, and storage systems. With over 25 years of experience in projects for coal combustion products, cement, petroleum coke, and other bulk powder materials, the company delivers cost-effective services from feasibility studies through engineering, procurement, construction, start-up, performance certification, and operator training. They join as an Associate Member. Please visit www.lbindustrialsystems.com for more information.

**Lehigh Hanson** is a leading supplier of construction materials in North America. Its companies manufacture and distribute aggregates, cement, slag, fly ash, concrete, and asphalt through an integrated network of over 450 facilities. They join as a General Marketer Member. Please visit www.lehighhanson.com for more information.

**M A Norden Company** is in the development phase of using coal combustion products and ponded ash for recycling. They join as an Associate Member.

**QTS Group, LLC** provides EHS consulting, on-site support, and training services to utilities, manufacturing, construction managers, property owners, developers, general contractors, and equity owners to introduce, enhance, and maintain safety culture; provide third-party oversight and reporting; support compliance efforts with federal, state, and local regulatory requirements; and increase on-site productivity. They join as an Associate Member. Please visit www.qtsgrp.com for more information.

**Ramboll** balances the needs of coal-fired power plants amidst the ever-evolving coal combustion residual (CCR) regulatory landscape. Ramboll's interdisciplinary expertise, breadth of local and national regulatory proficiency, and geographical reach are integral to assisting clients through the complex parallels and overlaps between existing state regulations and the federal CCR Rule. The company takes a life-cycle approach to CCR challenges, relying on its strong scientific and engineering foundation to deliver clients robust technical solutions for compliance, management, disposal, and long-term monitoring of CCRs. They join as an Associate Member. Please visit www.ramboll.com for more information.

**The Mouat Company** is a turnkey design-build contractor. The company has built many industrial minerals plants, including drying, grinding, screening, and loadout. The company also recently built the Electric Power Research Institute's beneficial use facility at Georgia Power's Plant Bowen. They join as an Associate Member. Please visit www.mouat.com for more information.


# What Is Your

# Coal Ash Industry Career?

**An international company that is a leader in the recovery of power plant by-products**, supply of blasting abrasives, and industrial waste disposal is expanding its global trading and services activities in the cementitious and sustainable construction materials industries.

Recruiting is under way for senior-level positions - both full time employees and consultants - to manage business expansion in Asia and the Americas, as well as to provide technical and strategic support to existing operations and related businesses.

## We are hiring senior-level executives for the Americas in…

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Candidates must have relevant experience in coal combustion products and services.

Responsibilities for the executive positions include developing the company vision, designing and implementing the strategic business plan, and building a rewarding team culture. Positions require the skills to manage multiple and diverse business functions.

Candidates should have a solid business acumen, strong team building skills, exemplary work ethic, and experience in the industry in the Americas. Candidates should also have a proven track record of business development and growth.

Interested candidates should reply to **info@MyCoalAshFuture.com.**

All inquiries will be kept strictly confidential.

EP Power Minerals

*EP Power Minerals Americas Inc*.

# News Roundup

## EPA Moves Forward on Coal Ash Disposal Applications

The U.S. Environmental Protection Agency on January 11, 2022, announced it is moving forward on overdue applications by utilities for extensions of "cease receipts" deadlines and for alternative liner demonstrations. The utility requests were submitted in November 2020.

"I've seen firsthand how coal ash contamination can hurt people and communities. Coal ash surface impoundments and landfills must operate and close in a manner that protects public health and the environment," said EPA Administrator Michael S. Regan (pictured). "For too long, communities already disproportionately impacted by high levels of pollution have been burdened by improper coal ash disposal. Today's actions will help us protect communities and hold facilities accountable. We look forward to working with our state partners to reverse damage that has already occurred. EPA will support communities with stakeholder engagement, technical assistance, compliance assistance, and enforcement."

EPA said it reviewed the 57 demonstrations submitted by facilities for extensions to the cease-receipt-of-waste deadline. The Agency determined that four of the demonstrations submitted were incomplete, one was ineligible, and the rest were complete. EPA said it would take public comment through a separate online docket for each of the proposed determinations. The comment period ended on February 23, 2022.

EPA said it determined that the eight applications for alternative liner demonstrations were complete and further said it will announce proposed decisions on these applications "as expeditiously as possible." A November 30, 2021, deadline for submitting the actual demonstrations supporting these applications has already passed, however. "EPA is aware of this issue, which has arisen as a result of unanticipated delays in making determinations on the Part B applications that have been submitted," EPA said. "EPA is weighing possible solutions to this issue and intends to take actions to ensure that any facility approved to conduct a demonstration has the same amount of time anticipated by the current regulation to initiate and complete the demonstration after an approval."

EPA's news release noted that additional coal ash rulemakings remain open. "Moving forward, EPA will improve the current rules by finalizing a federal permitting program for the disposal of coal ash and establishing regulations for legacy coal ash surface impoundments. EPA will also continue its review of state-level CCR program applications to ensure they are as protective as federal regulations," the Agency said.

The announcement made no mention of EPA's obligation to revise its definition of coal ash beneficial use, which has been moved off of its formal regulatory agenda to a "long-term actions list."

## Illinois Regulators Address Coal Ash Fills

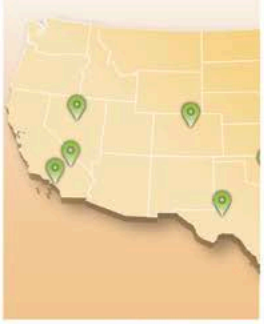
Illinois Pollution Control Board on March 3, 2022, reopened a proceeding to determine how to address "historic, unconsolidated coal ash fills" and "use of temporary storage piles of coal ash" in the state. Without making judgment on the merits, the Board published proposed regulations drafted by environmental groups for public comment.

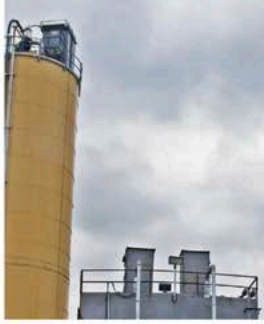
American Coal Ash Association on August 6, 2021, submitted comments to the Illinois Pollution Control Board on the two subjects that were left open after the state finalized its coal ash disposal regulations in February of that year. Only 13 other comments were received in that proceeding, with 10 of them coming from individual members of the public. ACAA's comments urged the Illinois regulators to adopt policies that encourage beneficial use as a preferred alternative to disposal and to resist actions that may inadvertently create barriers to beneficial use.

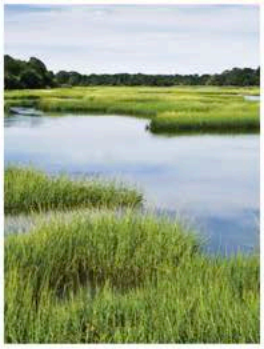
"The Board finds that the issues raised by the commenters should be further explored," the March 3, 2022, order stated. "To begin doing so, the Board presents the Environmental Groups' proposed rule text for public comment. In this sub-docket, only the Environmental Groups' public comment included proposed rules."

## GSA Issues Low Carbon Standards for Concrete

The U.S. General Services Administration on March 30, 2022, issued new standards for the concrete and asphalt used nationwide in GSA construction, modernization, and





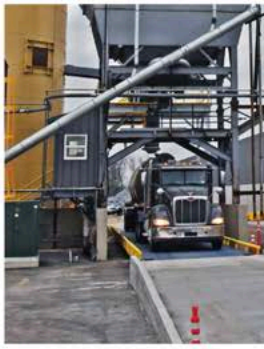




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Photo: U.S. Air Force photo by Senior Airman Elora J. Martinez

paving projects. The concrete standards require GSA project contractors to provide environmental product declarations, where available, and ask its contractors to provide concrete that meets specific numeric limits for the amount of greenhouse gas emissions, or "embodied carbon," associated with its production. GSA's standard reflects a 20 percent reduction from national concrete GHG limits.

GSA oversees $75 billion in annual contracts, and the federal agency's real estate portfolio comprises more than 370 million square feet. The new standards apply to all GSA design and construction contracts that involve at least 10 cubic yards of concrete or asphalt material, including the agency's Bipartisan Infrastructure Law projects. GSA is also implementing a whole building lifecycle assessment approach for its construction and major modernization projects.

"GSA is excited to deploy these groundbreaking standards as part of this administration's all-hands-on-deck effort to catalyze clean energy innovation and strengthen American leadership on clean manufacturing," said GSA Administrator Robin Carnahan in announcing the standards. "The feedback we received from industry is proof positive that combating climate change is also an opportunity to boost American innovation. We were impressed by the industry's overall 'can-do' response to our requests for information, and by the fact that over 44 percent of the manufacturers that responded were small businesses."

## Standards Writers Focus on Expanding CCP Supply

The American Concrete Institute held a two-part technical session March 27, 2022, on bottom ash use in concrete. Both sessions were well attended with standing-room-only crowds. Most of the top researchers on this subject made presentations. The consensus among the research community is that there is no apparent reason not to allow the use of bottom ash in concrete mixtures. When milled or ground sufficiently, the bottom ashes perform much like the fly ash from the same combustion. ACI Committee 232, Fly Ash and Bottom Ash Use in Concrete, voted to draft a Tech Note on the use of bottom ash in concrete.

ASTM International also remains focused on issues related to expanding access to coal ash for supplementary cementitious material use. An effort to revise ASTM C 618, Standard Specification for Coal Fly Ash and Raw or Natural Pozzolan for Use in Concrete, to recognize bottom ash and harvested ash is underway with active involvement by American Coal Ash Association Technical Committee members. Additionally, a draft of the new "Guide for Characterization of CCPs in Storage Area(s) for Beneficial Use" reached the subcommittee ballot stage in late March 2022.

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# New Name. Stellar Pedigree. Visionary Outlook.

**Eco Material Technologies** combines the operations of Boral Resources – America's largest manager and marketer of fly ash and other coal combustion products – with Green Cement Inc. – a manufacturer of near-zero carbon cement alternatives.

Building on more than two decades as a leader in providing construction materials industries with products that enhance performance and create environmental improvements, Eco Material Technologies is poised to play a key role in its customers' initiatives to achieve carbon neutrality.

Quality products. Proven technologies. Unparalleled experience. Operations coast to coast.

## Eco Material Technologies is your partner in a cleaner future.

www.ecomaterial.com