

COAL FLY ASH AT WORK

There are many uses for the fly ash generated by coal-burning power plants. But is utilizing this byproduct a wise choice? At OPPD, we believe it is, both for our customer-owners and the district's bottom line. Recently, concerns have been raised about the Coal Combustion Residuals requirements. Here, we explain that reusing fly ash is not only safe and effective under the new law, it also isn't harmful to the environment.

WHAT IS FLY ASH?

A naturally-occurring product of the coal combustion process. The composition of fly ash is nearly identical to volcanic ash.

HOW FLY ASH IS USED IN CONCRETE

When mixed with calcium hydroxide, it has many of the same properties as cement. **Replacing a portion of the cement with fly ash** creates a material that, when used with other aggregates and compounds, **produces concrete well-suited for road, airport runway and bridge construction.**

PROJECTS THAT USE FLY ASH

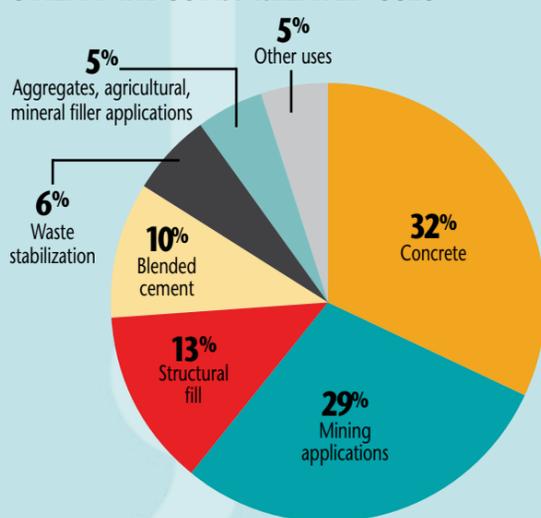
75%

of transportation infrastructure concrete uses fly ash.

65%

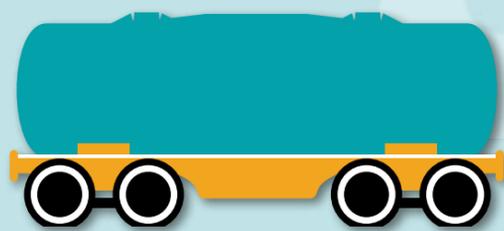
of bridges in the United States were built with concrete that contains fly ash

UTILITY INDUSTRY-RELATED USES



NOTABLE PROJECTS AROUND THE COUNTRY

- ✦ **Dallas/Fort Worth Airport**
Fly ash was used in the concrete for a runway-expansion project, as well as to stabilize the soil.
- ✦ **San Francisco - Oakland Bay Bridge**
When a section of the structure was replaced, Caltrans required all concrete have a minimum of 25% fly ash replacement. Up to 50% fly ash replacement was used for footings and structural supports.
- ✦ **Hoover Dam**
Projects like dams benefit from the added strength fly ash provides to concrete mixtures.
- ✦ **Road Construction**
Fly ash has been used in the concrete of road embankments in 14 states.



HOW OPPD USES FLY ASH

OPPD has been selling its fly ash and working with an ash marketer to find applications for the fly ash **since the 1970s**. The utility **saved money on transportation costs for wholesale fly ash by using existing railroad lines** to move the fly ash to neighboring states for use in projects such as the Denver International Airport.

IN THE LAST 5 YEARS

710,000

tons of fly ash has been marketed from North Omaha Station and Nebraska City Station Unit 1 or about

70%

of the plants' total production

IN COMPARISON... The rest of the United States is using, on average, **43% of their fly ash** for sale or internal use.

ENVIRONMENTAL BENEFITS

1 ton = 1 ton = 1 ton
of fly ash of cement production offset reduction in carbon dioxide emissions

DID YOU KNOW?

The yearly carbon dioxide emission reduction from reusing fly ash in the United States is greater than the total yearly emissions for the entire country of Singapore.



IN 2007, FLY ASH USE:

- ✦ Reduced carbon dioxide emissions by as much as **15 million tons**
- ✦ Saved **1.5 billion gallons of gasoline**
- ✦ Saved **1 billion gallons of oil**
- ✦ Saved **1.8 billion gallons of water**



IS IT DANGEROUS?

- ✦ Fly ash has been studied extensively for decades by universities and government regulatory agencies. The standard tests for toxicity of solids has routinely demonstrated that fly ash is not hazardous.
- ✦ The Nebraska Department of Environmental Quality lists of **nine safe and beneficial uses for fly ash, including in the mixing of concrete.**

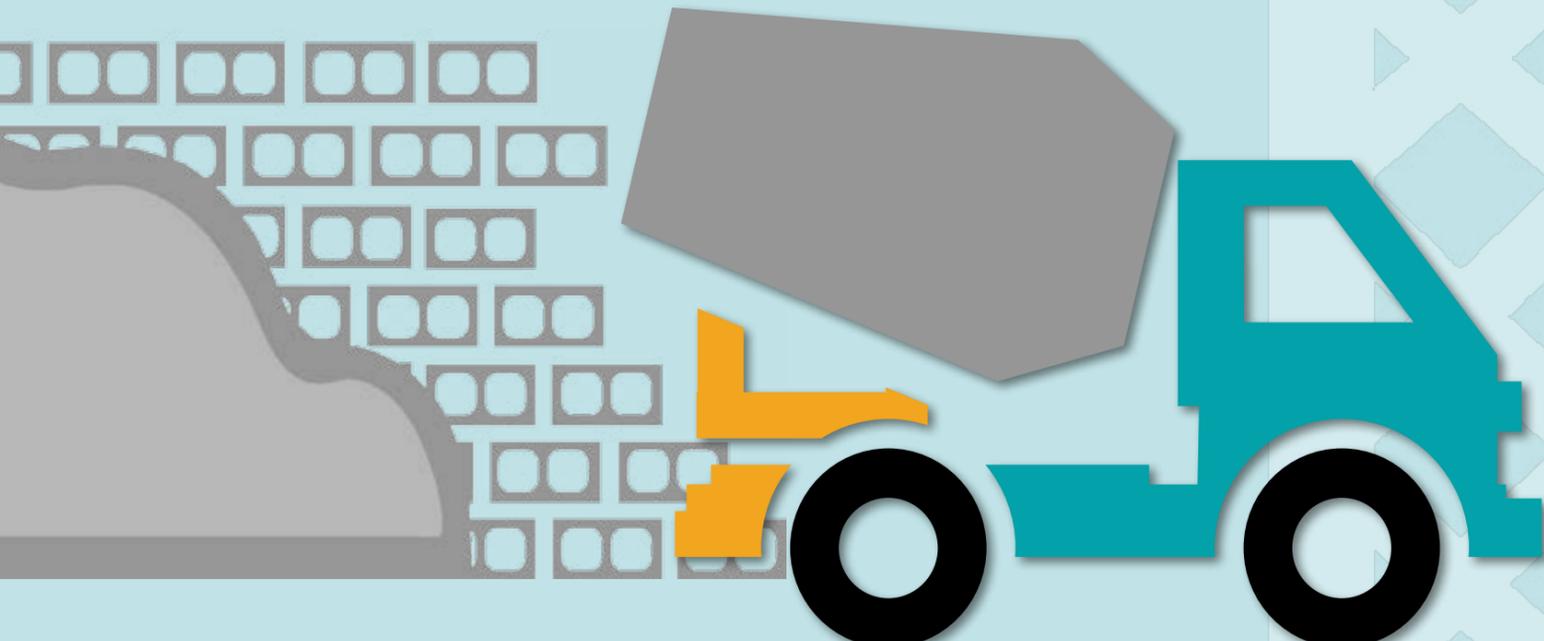
95%

of fly ash is made up of compounds (silica, alumina, lime and iron oxide) naturally found in soils across the United States

WHAT THIS MEANS FOR OPPD CUSTOMERS

Selling coal fly ash for industrial use has two benefits:

- 1** The proceeds of the sales **offset the costs of disposing** of the fly ash onsite.
- 2** This savings **allows OPPD to keep operational costs low**, helping keep customer rates reasonable.



CREDITS: Laura King-Homan, Jade Krivanek, Mark Hansen

SOURCES: ASTM International, "Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete"; Nebraska Department of Environmental Quality, "Beneficial Use of Coal Combustion By-Products, Steel Manufacturing By-Products, and Other Similar Materials"; Environmental Protection Agency, "Life Cycle Impacts per Metric Ton of RMC Substituted for Finished Portland Cement in Concrete"; World Bank (carbon dioxide emissions); OPPD data; The Virginian-Pilot, "Above ground, a golf course. Just beneath it, potential health risks" (March 30, 2008).