Krubera Management Group, LLC

Low-Profile Pumped-Storage Hydroelectricity Utilizing CCR

US Coal Ash Ponds

https://earthjustice.org/features/coal-ash-contaminated-sites-map

The Problem

Decades of operation of coal-fired power plants has resulted in the production of nearly 2 billion tons of coal combustion residuals (CCR). Such CCR often contains trace amounts of hazardous materials like arsenic, lead, mercury, and many others. Historically, nearly all CCR produced in the United States has been disposed of in coal ash ponds that have been known to leak huge amounts of CCR into ground water. As a result, the EPA published the so called “CCR Rules” of 2015 establishing new environmental safety requirements for the disposal or reuse of CCR. The result is that there are still hundreds of unlined coal ash ponds across the US that must now have their coal ash dug up to be moved somewhere it will be less likely to cause environmental harm.

The competition

Most of the CCR that has been removed from unlined “open ponds” so far has simply been reburied in lined ponds at landfills able to meet the required standards of safe disposal. This has been an exorbitantly expensive and understandably frustrating process.

Consequently, corporations owning CCR buried in unsafe conditions have been searching for ways to put their CCR to use as a valuable material. This recycling of CCR is encouraged by the “CCR Rules” provided that the CCR reuse project meets the standard of “beneficial use.” Unfortunately, the only substantially successful means of reusing CCR are as a cement additive, gypsum additive, and in the construction of embankments. These can be very safe means of disposal that can lower production costs of some types of cement and gypsum. However, these industries, as large as they are, can only use so much CCR annually, much less than is produced. This leaves the vast majority of CCR with nowhere to go but back into the ground at great cost to the owner.

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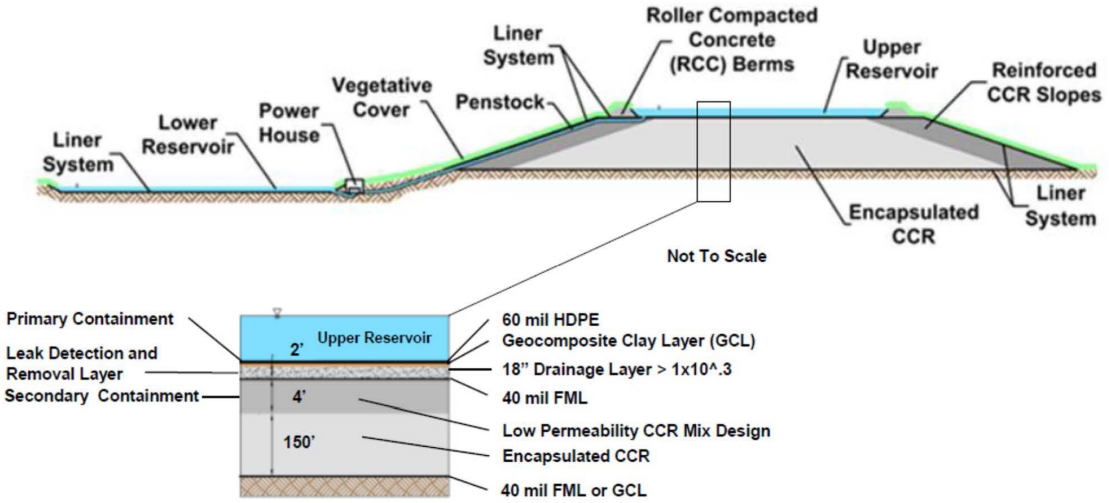

Our Solution

We propose a new patented use case for CCR to be used in the construction of low-profile pumped-storage hydroelectric facilities. Such facilities offer a novel means for converting your CCR from a liability to an asset. The benefits of our system include:

- Meets the specifications for "beneficial use"
- Low construction costs
- Proven pumped-storage hydropower
- Small geographic footprint
- Able to be constructed practically anywhere
- Can be built using water in a closed loop for an added level of environmental precaution and ease of permitting
- Results in regional distribution of energy storage capacity

In many cases, it is possible to construct a low-profile pumped-storage hydroelectric facility on premises right next to the coal ash pond in need of excavation. This provides a few more major benefits, such as:

- Elimination of transportation costs
- Ease of access to the electrical grid
- Maintain ownership over the pumped-storage hydroelectric facility produced

Value of Pumped-Storage Hydroelectricity

Pumped-storage hydroelectricity is one of the oldest methods of energy storage and still comprises 92% of grid-scale energy storage in the United States. This is due to the many reasons why pumped-storage hydroelectricity is considered superior to alternative means of energy storage, including:

- High round-trip energy efficiency, often above 80%
- Unparalleled storage capacity, even at the low-profile scale
- Extremely long operational lifespan
- Minimal maintenance and simplicity of operation

There is good reason to believe that pumped-storage hydroelectricity will be increasingly valuable in the coming decades due to the impending rise of renewable energy generation. Renewable energy generation varies quite significantly resulting in correspondingly varied energy prices. Given that the spread of energy prices is what allows energy storage facilities to earn revenue, its easy to see how grid-scale energy storage facilities will be even more profitable.

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