

Ponded Bottom Ash, One Man's Treasure

William L. Barnwell, PE¹ and Kenny Tapp²

¹Charah Environmental, Inc., PO Box 813, Madisonville, KY 42341, ² Louisville Gas and Electric Co., Louisville, KY

We've probably all heard the old adage or similar - "One man's trash is another man's treasure." It is more evident today in a multiplicity of garage and yard sales. Coal ash is globally becoming a waste product that has very good and worthy uses. Coal fired electric power generation and coal gasification processes have an abundance of materials in the United States that have been literally taking up space.

As some of you know many industrialized countries have moved in the direction of total ash use. Where we, in the U.S., have seemingly been more driven by investment capital expense, opt more directly to land filling and burying a waste product. The abundant wealth of material resources and open land for coal by-product storage has made life simpler in the past than in present day.

Environmental concerns that lead to laws and monitoring requirements start nibbling away at operating money and in turn lessen available capital for expansion of generating capacities. Let's recall the "Sanford and Sons" across town and wonder if they would be interested in buying our used stuff. Let us not overlook the reality of coal ash being potentially hazardous by classification. We should not want someone else to deal with the creation of our potentially hazardous material.

This is where we come in. Members of the industrial community looking for every avenue to either replace current mineral or manufactured materials or seeking innovations that will have high affinity to what has been created by coal usage. Can this be done by someone coming in and taking it off the hands of the generating company? Yes, to some extent particular commodities lend themselves to additives in Portland cement or the manufacture of building materials. Yet landfills are still being filled and expense is being incurred at an ever-increasing rate to bury this material.

It's all a question of marketing you say. No, it is not a question at all it is research. Research is getting down in the dirt, mud and water, taking samples from ash ponds and storage areas, analyzing this material to see what it is. Next we take it to the paint store and match it against the color chart, only in a sense. If we have a match or close, then we see what processes are necessary and available to get the coal by-products in line with already marketed materials.

The mining industry processes materials to match consumption. We are taking a mined material that is chemically and thermodynamically altered to the next step of processing to meet our needs and objectives.

Utility companies have some choices as to how they go about getting their coal by-products processed.

1. They can buy equipment and do it themselves.
2. They can solicit someone to take the materials and make something out of it.
3. They can change the fuel and or how it is burned to make the by-product match an existing market.
4. They can partner with a reputable company that will research and design processes that will work on a given product.

Item 1 is typically not chosen because utility companies have not traditionally had people, equipment, or expertise in processing materials. To say this should be their direction to march would be very ambitious compared to the past and would have risk when compared to the future.

Item 2 is done quite often. There are many fine companies that can come to a utility and put in the standard equipment and deliver a product. Will this product be marketable? Will the product be consistent in quality? Is this the best use for this raw material? These are tough questions to always have the correct answer. Who is ultimately responsible? - The generator of the material.

Item 3 is being done in some strict environmental jurisdictions. It is actually a good strategy if the achievable results are adequately priced and compared to the ultimate efficiency of the plant plus incurred cost to process sub-par by-products.

Item 4 could be considered a combination of the first 3. However, the key to this one is the commitment of the utility to making it work. Materials in ponds of age that have to be moved versus new space or new fuels or burn ratios are unique in every sense. The coal's physical and chemical properties as well as the type of boiler or processor affect the ash. By comparison to some of the uses for coal by-products can it:

- a) Be a lightweight sand?
- b) Be a hard grit sand?
- c) Be an asphalt sand or coarse aggregate?
- d) Be a source of iron?
- e) Be a source of pyrite?

By teaming with a company or group of ash people, the right process and right market can be developed. Yes, it might cost the utility money to process the material. Weigh this against land filling. It might generate income that offsets the cost of processing thus turning into a profit. There are markets in the aggregate industry that actually are greatly suited to the processed bottom ash, modified fly

ash and FGD materials. The beneficiation process of bottom ash also yields a very nice carbon product.

These opinions are based upon months of research and examination of materials and listening to the ash generating people. Their goal is to make space not at any cost but what would be reasonable. When people are reasonable about one thing they tend to listen and evaluate. This is ideal for teamwork in taking ash from dump to market, and from trash to treasure.

Nineteen coal-powered plants, in seven states, in 10 months, with questions and looking to you for answers, can give one some insight. Will information move from the doers to the planners to the approvers? It does in some companies. The team concept of problem solving where everyone is a participant and has bought into the team with some risk will help make the goal attainable. The risk is who is paying the bills. Remember the product has to be marketable. To be marketable it needs to be a value to the customer. Can he get the same or better product at the same or cheaper price? Then what is the cost of processing and selling versus the realization of the ash product? Then compare this to the cost of the landfill. Even in the lowest denominator of ash product use, this has proven to be cost effective.

Then the next step is going to market. Technology is available to make good useable materials from coal ash. People in the “user industries” know coal ash can be used. However, in times past either the wrong type or no processing was used. The end result was not acceptable in today’s market. These prejudices are hard to overcome. In most cases the end user wants to see the actual product he is going to buy because he wants to keep his market share with a better bottom line and expand to new ones. This makes matters complicated unless you have a portable processing plant assembled for all possibilities of coals that make the ash different from one site to the other. If not, you should have a similar plant that has the flexibility to be adapted to different processes for various raw ashes to process enough material for a test run. With this hurdle done you will next have to run various test, trials and site visits.

Quality assurance – can you guarantee the material will be the same day in and day out? You will need to have the right sampling techniques to insure your processing plant is doing what it is designed to do and to make the necessary adjustments immediately. At this point the processing partner has his utility to satisfy with storage space and the end user with a reliable product. This is not much different than any aggregate supplier but you have to be good at it to overcome the past.

When the day is done you need to have satisfied the following,

- a) Did I do the best I could?
- b) Was I honest and truthful?
- c) Did I treat everyone the way I want to be treated?

When this is accomplished the world will be using coal by-products and we will be enjoying a well-deserved rest.