Coal Combustion Product Management
Innovative Technology & Regulatory Solutions

Southern States Energy Board

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Coal Combustion Products

Coal Ash: CCW, CCB, CCP, CCR
- Fly Ash, Bottom Ash, Slag, FGD & Gypsum
- High Volume Co-Product Stream
- 2010: 130MM tons generated
- 2010: 55 MM tons utilized - 42%
- 2010: 11.7 MM tons replaced cement
Coal Ash Regulation - History

- 1980 - Bevill Amendment to RCRA – Exempted CCBs
  - EPA to "conduct a detailed and comprehensive study and submit a report" to Congress on the "adverse effects on human health and the environment, if any, of the disposal and utilization" of coal combustion products
- 1988 and 1999 EPA Reports to Congress
  - Recommended CCPs should not be regulated as hazardous waste
- 1993 EPA Regulatory Determination
  - Found regulation as a hazardous waste “unwarranted”
- 2000 EPA Final Regulatory Determination
  - Concluded CCPs “do not warrant regulation [as hazardous waste]” and that “the regulatory infrastructure is generally in place at the state level to ensure adequate management of these wastes”
Coal Ash Regulation - History

- 2008 – December – TVA Failure Releases CCR
  - EPA States that it will regulate coal ash to prevent similar accidents
- 2010-June 21 – EPA CCR Proposed Rules
  - Regulate disposal as either “C” or “D”
  - Landfill protective features are essentially the same
  - 450K+ comments filed - Utilization industry focus on “Stigma”
  - Economic Justification-Flawed Assumption – “C” drives recycling
- Activist Groups & Industry - Lawsuit to force deadline on EPA
  - Likely to be heard in early 2013
- HR 4348 Transportation Bill - CCP Rider
  - Mandate state control as non-hazardous
Coal Ash Co-Products Industry

• Production – 130+ MM TPY
• Utilized – 55+MM TPY - 42.5% - Value Driven
  – Ready Mixed Concrete -
  – Wallboard
  – Roofing Shingles
  – Carpet Backing
  – Lightweight Plastics
  – Lightweight Aggregates
  – Agriculture Sulfur Source
  – Oil & Gas Drilling
• Utilizing ash avoids raw material extraction
• Ash applications reduces CO2 emissions
# CCP Concrete Summary

<table>
<thead>
<tr>
<th>Year</th>
<th>Production</th>
<th>Utilization</th>
<th>% Utilization</th>
<th>CCPs Concrete</th>
<th>% in Concrete</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>128,703,572</td>
<td>45,523,256</td>
<td>35.4%</td>
<td>13,090,433</td>
<td>29%</td>
</tr>
<tr>
<td>2003</td>
<td>121,744,571</td>
<td>46,384,405</td>
<td>38.1%</td>
<td>12,679,134</td>
<td>27%</td>
</tr>
<tr>
<td>2004</td>
<td>122,465,119</td>
<td>49,089,818</td>
<td>40.1%</td>
<td>15,239,721</td>
<td>31%</td>
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<tr>
<td>2005</td>
<td>123,126,093</td>
<td>49,612,541</td>
<td>40.3%</td>
<td>16,353,334</td>
<td>33%</td>
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<tr>
<td>2006</td>
<td>124,795,124</td>
<td>54,203,170</td>
<td>43.4%</td>
<td>17,194,883</td>
<td>32%</td>
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<tr>
<td>2007</td>
<td>126,307,998</td>
<td>51,219,310</td>
<td>40.6%</td>
<td>14,515,690</td>
<td>28%</td>
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<td>2008</td>
<td>136,073,107</td>
<td>60,593,660</td>
<td>44.5%</td>
<td>14,015,616</td>
<td>23%</td>
</tr>
<tr>
<td>2009</td>
<td>125,482,586</td>
<td>55,642,011</td>
<td>44.3%</td>
<td>10,610,410</td>
<td>19%</td>
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<td>2010</td>
<td>130,181,364</td>
<td>55,337,426</td>
<td>42.5%</td>
<td>11,669,321</td>
<td>21%</td>
</tr>
</tbody>
</table>

Data retrieved from ACAA: American Coal Ash Association
Cement Shipments

US Total Cement Shipments

Data retrieved from USGS: United States Geological Survey
Economic Impacts

- CCP Resource value - $6-$11B/yr
- CCPs – 3% of new home construction costs - <½ $$ of replaced products
- Cement-$80-$100/t
- Fly Ash- $20-$40/t
- Life-cycle costs decrease w/ fly ash

- Fuel value recycled – IGCC
- Fly Ash replaces cement
- Lightweight Aggregates
- Gypsum used in wallboard – 45% of US wallboard production
Bottom Ash Lightweight Aggregates

Bottom Ash LWA

- Processed to replace LWA
- Typical Block -35 – 38 lb
- Bottom Ash LWA Block – 28-32 lb
- Product priced in $15-$30/t
- Replaced product - $30-$50/t
- Avoids Mine Operation
- Avoids Kiln Operation
- Avoids Disposal

Charah®
Agriculture Products

SO$_2$ Reduction - S reduced
FGD Gypsum - Nutrients
• Health Risk-Based Evaluation of USGS Coal Ash Data
  – Study assumed house built on top of ash landfill and all exposure is to ash instead of dirt
  – Results indicate that with few exceptions, constituent concentrations in coal ash are below levels for residential soils and similar to US background soils
  – Coal ash qualify as a “hazardous substance” and would not be classified as hazardous on a human health risk basis
  – Exposure to coal ash in beneficial use applications will be much lower than a residential scenario
  – CCP uses do not pose direct contact risk to human health

Summary

- Coal Ash is a valuable resource
- Coal ash is non-hazardous – EPA
- Health Risks do not warrant “Toxic Label” nor RCRA “C” classification
- “C” label will not improve landfill design protection features but will harm Co-Products industry
- States can & should maintain regulatory control over coal ash
- Regulate disposal under “D” w/Federal guidelines
- Utilization of CCPs is the best economic and regulatory policy approach
Reference & Contact Info

- American Coal Ash Association
- Utility Solid Waste Activities Group
  - http://www.uswag.org/ccbc.htm
- Veritas Jobs Impact Study
- ARTBA Roads & Bridges Impact Study
- EPRI Technical Reports
  - www.epri.com
    - Comparison of Coal Combustion Products to Other Common Materials – Chemical Characteristics. Technical Report 1020556
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