Pulverized Coal Technology

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Pulverized Coal Combustion System

- Radiant section
- Burners
- Air
- Pulverizers
- Water drums
- Bottom ash
- Superheated steam to turbine
- Steam drums
- Convective section
- Economizer
- Water feed
- Wet scrubber
- Electrostatic precipitator
- Induced draft fan
- To stack
Pulverized Coal Burner Nozzle
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Supercritical Steam Boiler</th>
<th>Ultra-supercritical Steam Boiler</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steam pressure(^a) (MPa)</td>
<td>24.4</td>
<td>27.9</td>
</tr>
<tr>
<td>Steam temperature(^a) (°C)</td>
<td>593</td>
<td>732</td>
</tr>
<tr>
<td>Steam flow rate (kg/h)</td>
<td>1,618,000</td>
<td>1,388,000</td>
</tr>
<tr>
<td>Coal input (kg/h)</td>
<td>185,000</td>
<td>164,000</td>
</tr>
<tr>
<td>Primary combustion air (kg/h)</td>
<td>427,000</td>
<td>377,000</td>
</tr>
<tr>
<td>Over-fire combustion air (kg/h)</td>
<td>1,390,000</td>
<td>1,228,000</td>
</tr>
<tr>
<td>Ammonia injection(^*) (L/h)</td>
<td>480</td>
<td>420</td>
</tr>
<tr>
<td>Limestone slurry (kg/h)</td>
<td>61,000</td>
<td>53,000</td>
</tr>
<tr>
<td>Gross electrical power generated (MW)</td>
<td>580</td>
<td>577</td>
</tr>
<tr>
<td>Net electrical power generated (MW)</td>
<td>550</td>
<td>550</td>
</tr>
<tr>
<td>Net power plant efficiency(^b) (%)</td>
<td>39.4</td>
<td>44.6</td>
</tr>
</tbody>
</table>
Swirl Vanes
Location of Fuel and Air Nozzles

Schematic of a cross section of a corner-fired boiler with tangential injection. Burners are tilting and there are several burner levels.
- Dry bottom furnaces
- Wet bottom furnaces
Coal Combustion Products (CCPs) is the term used to describe fly ash, bottom ash, boiler slags, cenospheres and flue gas desulfurization materials, being by-products from the production of power within coal-fired power stations. Today, significant industry revenues are generated for use of these materials.
When coal is used as fuel in coal-fired power stations, it is crushed, pulverised, and blown into a combustion chamber where it immediately ignites and burns to heat boiler tubes. The inorganic components, known commonly as **coal ash**, either remain in the combustion chamber or are carried away by the flue gas stream.

Larger ash particles that accumulate at the bottom of the boiler are defined as furnace **bottom ash** (Boiler slag).

**Fly ash** is the fine fraction that remains suspended in the flue gas stream and carried out of the boiler by the flue gases. Fly ash comprises of up to 90% of the total CCPs produced. Prior to the flue gas leaving the stack, the fly ash is removed by electrostatic precipitators or other scrubbing systems such as a mechanical dust collector.
Fly Ash & Bottom Ash Management

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FAX: 502-245-7398

What can we do for you?
We can tailor solutions to your needs. Contact Us.
CCP Utilization

Cement and Concrete

• The use of CCPs in the manufacture of cement and concrete products represents the largest sector for utilization.

• As FA is a source of silica and alumina, it can be used in the manufacture of Portland cement.
**Pavements**

The construction of ultra-high volume FA pavements, containing more than 90% FA

**Advantages**

- Increases pavement performance
- Is a technically viable alternative to conventional road building materials,
- May have cost advantages compared to natural road building materials for sites close to power stations
Geopolymers are a class of inorganic polymer formed by the reaction between a strong alkaline solution and an amorphous aluminosilicate source or feedstock.
Zeolite Production

A range of Zeolite minerals may be produced by reacting silica, alumina and cations under hydrothermal conditions, and the abundant aluminosilicate glass component in FA provides a potential raw material for Zeolite synthesis.
Environmental Benefits of CCPs

The recovery and use of CCPs in the identified applications can have substantial environmental benefits. Waste stream reduction and associated reductions in requirements for landfill:

• The conservation of resources such as gypsum, limestone and natural gas when FA is used as a replacement in cement production

• The reduction of greenhouse gas emissions when used as a cement replacement (saving up to one tonne of carbon dioxide per tonne of cement.)

Since 1975, some 16 million tonnes of greenhouse gas emissions have been abated by the use of FA in the manufacture of cement and concrete.