Background:
- A hog boiler is a large recovery furnace that generates high pressure steam for use around a paper mill. It helps dispose of on-site waste in an economic manner.
- Called a ‘Hog Boiler’ because it ‘eats’ anything.
- Hog fuel is a solid mixture of wood scraps and plastic (OCC Rejects).
- A hog boiler can also be fueled by natural gas.
- The fuel feed ratio changes based on energy economics.

The Problem:
- NW very wet most of the year.
- The continuous rainfall adds moisture to solid feed lowering its energy efficiency.

The Twist:
- Natural gas prices are at record lows for the past decade. GP is curious if running more gas would be more cost effective.

Economic Model:

<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>Cost of Hog Fuel ($/ton)</th>
<th>Wet Hog Fuel Feed Rate (tons/hr)</th>
<th>Estimate Water % in Hog Fuel (0-1)</th>
<th>Percent Hog Fuel in Solid Feed</th>
<th>Energy of the Hog Fuel Wood (Dry) in (MMBTU)/ton</th>
<th>Boilers Efficiency Running Pure Hog Fuel (0-1)</th>
<th>Energy of the OCC rejects (MMBTU)/ton (dry)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hog Fuel</td>
<td>16</td>
<td>10.0</td>
<td>0.46</td>
<td>0.66</td>
<td>15.4</td>
<td>0.075</td>
<td>18.6</td>
</tr>
<tr>
<td>OCC Rejects</td>
<td>5</td>
<td></td>
<td></td>
<td>0.66</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natural Gas</td>
<td>3.00</td>
<td></td>
<td></td>
<td>0.85</td>
<td>6.71</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

MODELING:

- Material Balance & Cost Model
  - Hog Fuel Inlet Flow & Cost
  - OCC Inlet Flow & Dumping Cost
  - Natural Gas Inlet Flow & Cost
  - Water Inlet Flow & Cost
  - %H2O in Hog Fuel
  - Ash Outlet & Dumping Cost
  - Steam Flowrate & Cost
  - Blow Down Flowrate & Cost

Data Analysis:

- Fuel reaches an asymptote when it takes more energy to vaporize the water than the fuel contains.

Acknowledgements:
- Casey Kramer
- Rod MacWilliams
- Michael Reed
- Dr. Phil Harding

Announcement:
- All of the information displayed is fictitious and does not represent actual GP processes or data.