Georgia Pacific Hog Fuel Optimization

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Background:

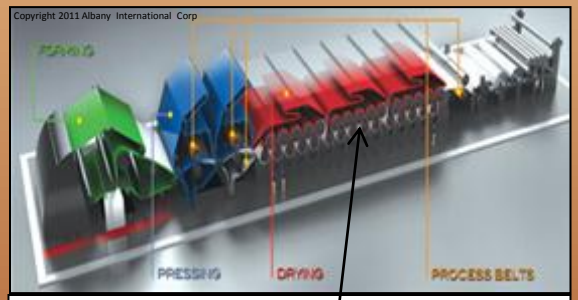
- A hog boiler is a large recovery furnace that generates high pressure steam for use around a paper mill. It helps dispose of on-site waste in an economic manner.
- Called a 'Hog Boiler' because it 'eats' anything.
- Hog fuel is a solid mixture of wood scraps and plastic (OCC Rejects).
- A hog boiler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

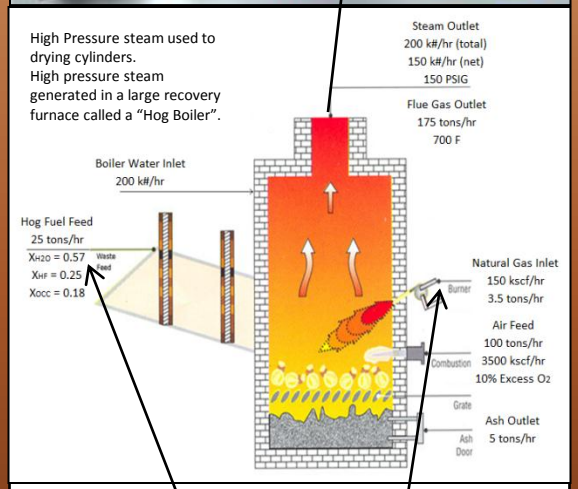
The Problem:

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

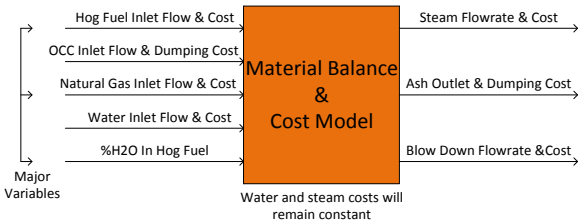
The Twist:

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

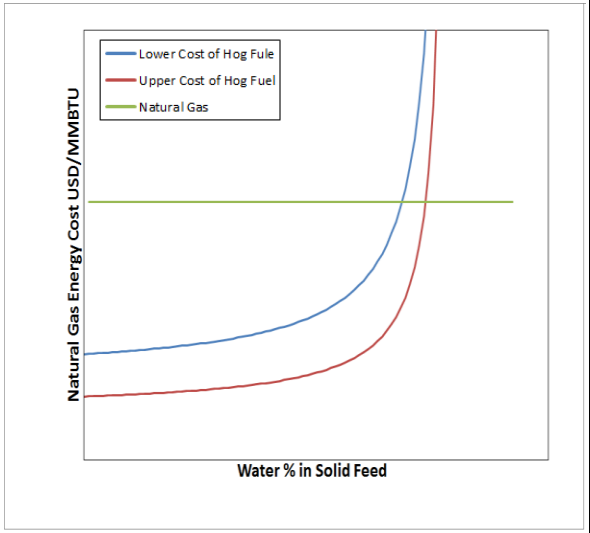




Modeling:



Data Analysis:

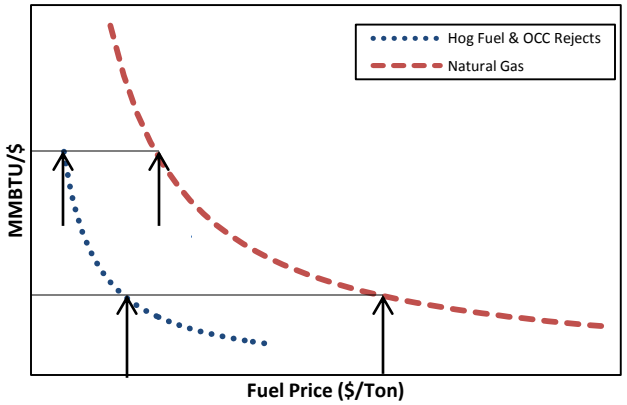


- Fuel reaches an asymptote when it takes more energy to vaporize the water than the fuel contains.

Economic Model:

HOG FUEL	
Cost of Hog Fuel ($/ton)	**16**
Wet Hog Fuel Feed Rate (tons/hr)	**10.0**
Estimate Water % in Hog Fuel (0-1)	**0.46**
Percent Hog Fuel in Solid Feed	**0.66**
Energy of the Hog Fuel Wood(Dry) in (MMBTU)/ton	15.4
Boilers Efficiency Running Pure Hog Fuel (0-1)	0.075
OCC REJECTS	
Wet OCC Rejects (tons /hr)	**5**
Percent OCC Rejects in Solid Feed	0.66
Energy of the OCC rejects (MMBTU)/ton (dry)	18.6
NATURAL GAS	
The Cost of Buying Natural Gas in $/MMBTU	**3.00**
Boilers Efficiency Running Pure Natural Gas (0-1)	0.85
Energy of Natural Gas (MMBTU/ton)	6.71
FINAL COSTS OF RUNNING FUEL AT PARAMETERS ABOVE	
MMBTU/($) Hog Fuel and OCC Rejects	0.879
MMBTU/$ Natural Gas	0.283

- Excel spread sheet that allows operator to calculate the energy per dollar content of each fuel based on the 4 key bolded variables.
- Whichever fuel has a higher MMBTU/$ should be run most.



- Allows quick energy per dollar comparison between fuels. At equal price Hog Fuel should be run to reduce OCC dumping costs.

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.