Finance 513 - Spring 2018
UIUC - College of Business

Professor Johnson
tcj@illinois.edu

Model for Revenue Put Case

Your powerplant has capacity 200 megawatts and its heat index is $h = 0.40$.

Suppose that power can be generated 20 hours per day. The spark spread is in units of dollars per megawatt-hour. So in these units your capacity is $Y = 200 * 20$ and the daily revenue is $Y \cdot S$. Assume that the plant can be run 365 days per year.

Do your analysis using simulations with $\Delta t = 1$ day. You will need to simulate at least several thousand paths to get accurate answers. If this is slow on your computer, you should first debug your procedure with just a few paths.

Assume the riskless rate is zero.

Use the following stochastic laws for P^E and P^G for your analysis.

$$dP_t^E = \kappa^E(\bar{P}^E - P_t^E)\ dt + \sigma^E\ P_t^E\ dW^E$$

$$dP_t^G = \kappa^G(\bar{P}^G - P_t^G)\ dt + \sigma^G\ P_t^G\ dW^G$$

where $\kappa^E = 0.75, \bar{P}^E = 32, \sigma^E = 0.50$ and $\kappa^G = 0.15, \bar{P}^G = 40, \sigma^G = 0.60$. Also, $\rho_{E,G} = 0.50$.

Today's spot prices are $P_0^E = 20.00$ and $P_0^G = 24.00$. One-year forward contracts on natural gas trading for a price of $F^G = 23.50$, and one-year forward contracts on electricity trading for a price of $F^E = 26.30$. There are no transactions costs.