Company: East Kentucky Power Cooperative

Cost Function:

UnitDispatchCost =

{[UnitHeatRate(mmbtu/mwh)*(fuel cost + Fuel Delivery cost)(\$/mmbtu)] +

[UnitHeatRate(mmbtu/mwh)*Unit NOx emissions rate(lbs/mmbtu)* Cost of NOx (\$/lb)] +

[UnitHeatRate(mmbtu/mwh)*Unit SO₂ emissions rate(lbs/mmbtu)* Cost of SO₂ (\$/lb)] +

Maintenance Adder (\$/mwh) + StartCost(\$/Start) + OpportunityCostAdder(\$/MWh if applicable) Fuel Costs:

Natural Gas:

Units: Smith CT1, Smith CT2, Smith CT3, Smith CT4, Smith CT5, Smith CT6, Smith CT7, Smith CT9, Smith CT10

Source Cost: TGP 500 L (Gas Daily for comparison purposes)

Source of Basis cost: NYMEX and/or supplier quotes

Methodology for converting fuel basis cost to \$/mmbtu: Fuel Basis Cost is presented in \$/mmbtu. No conversion necessary.

Estimated Average BTU content of fuel: 1,030 btu/cf

Additional Charges: Contract fee, transportation costs and/or Daily Imbalance Charge (DIC) and/or OBA Transportation Service (OTS) charge

Formulaic pricing: TGP 500 leg price + fuel (500 leg price X .0208) +

Transportation .07 + market premium .05 + Intra-day cost (.10 to .25) + OTS charge .37 = Intra-day cost

*Intra-day cost adder could be as high as \$3.00/MMBtu. This fluctuation is due to supply, demand, and storage on any given day but will usually be prevalent during high peak days in the winter months.

Specific Example: 4/1/15 - 2.62 (500 leg price) + .05 (2.89 X .0208) +.07 (transportation) + .05 (market premium) + .10 (intra-day cost) + .37 (OTS charge) = \$3.26 intra-day price for 4/1/15

Additional Charges Definitions:

Contract Fee – a fee charged by a natural gas marketer, if used, that may be included in the quoted price or priced separately.

Transportation Costs – Cost of transporting natural gas to the receipt point. This may be included in the price quoted, if quoted as a delivered price.

Daily Imbalance Charge (DIC) – a charge that may be assessed by the pipeline carrier based on the variance that usage exceeds purchases in a given month based on predefined percentages and whether your variance is over/under the same direction as the pipeline.

OBA transportation service (OTS) charge -a charge assessed by the pipeline carrier based on the quantity that usage exceeds purchases on each day of the month.

Additional information: *Example: Fuel is interruptible, gas purchased combination of Day Ahead, Intra-Day1, and Intra-Day2 spot markets. Starts and run hour limitations are included on the final page.*

When costs are updated: Daily

Fuel Oil

Units: Smith CT1, Smith CT2, Smith CT3, Smith CT4, Smith CT5, Smith CT6, Smith CT7
Source Cost: #2 Heating Oil
Source of Basis cost: Local dealer/distributor quote
Methodology for converting fuel basis cost to \$/mmbtu: (\$/gal)/(MMBtu/gal)
Estimated Average BTU content of fuel: 138,600 btu/gal
Additional information: Fuel oil is used as a back-up supply to natural gas and is purchased in varying quantities as required by needs and inventory.
Capacity of on-site storage is 3,500,000 gallons. Units 1 – 3 use approximately 12,500 gallons per hour and units 4 – 7 use approximately 7,500 gallons per hour. 3,500,000 gallons capacity / 67,500 gallons max use all combustion turbines = 51 hours. Purchases are made to maintain approximately 50 hours run time based on all units operating at the same time.
When costs are updated: Weekly

Coal

Units: Spurlock 1, Spurlock 2, Spurlock 3 (Gilbert), Spurlock 4, Dale 1, Dale 2, Dale 3, Dale 4, Cooper 1, Cooper 2

Source Cost: Central Appalachia, Northern Appalachia, and Illinois Basin Coal **Source of Basis cost:** Average inventory cost, adjusted NYMEX,

supplier/broker quotes/proposals, and industry publications/databases

Methodology for converting fuel basis cost to \$/mmbtu: (\$/ton) / (MMBtu/ton)

Estimated Average BTU content of fuel: 12,000 Btu/pound for Dale 1, 2, 3, 4 and Cooper 1 and 2. 11,200 Btu/pound for Spurlock 1 and 2.

10,500 Btu/pound for Spurlock 3 (Gilbert) and Spurlock 4.

Additional Charges: Transportation related costs, processing/loading costs, stockpiling costs, carrying costs, governmental impositions, inventory transfer costs, and fuel additives cost will be added based on the situation.

Additional Charges Definitions:

Transportation related costs – costs associated with the transportation of coal from the mine to the power generating site.

Processing/loading costs – costs associated with loading the coal into the transportation mode and/or crushing/blending costs.

Stockpiling costs – costs associated with stockpiling coal due to lower usage than projected or planned/unplanned generating unit outages that results in stockpiling more coal than typical.

Carrying costs – costs associated with large stockpiles held due to lower usage than projected or planned/unplanned generating unit outages.

Governmental impositions – increased costs associated with the coal supply contract pass-through of governmental impositions.

Additional information: Source Cost can be an individual basin or a combination of different basins. Coal purchased through a combination of monthly, quarterly, yearly, and multi-year agreements.

When Costs are updated: Weekly

Other Fuel Related Costs:

SO2 Emissions Allowance Cost:

Units: Spurlock 1, Spurlock 2, Spurlock 3 (Gilbert), Spurlock 4, Dale 1, Dale 2, Dale 3, Dale 4, Cooper 1, Cooper 2, Smith CT1, Smith CT2, Smith CT3, Smith CT4, Smith CT5, Smith CT6, Smith CT7, Smith CT9, Smith CT10
How emissions data collected: Continuous emissions monitoring system (CEMS) for Spurlock 1, Spurlock 2, Spurlock 3 (Gilbert), Spurlock 4, Dale 1, Dale 2, Dale 3, Dale 4, Cooper 1, and Cooper 2. No SO2 data collected for Smith CT1, Smith CT2, Smith CT3, Smith CT4, Smith CT5, Smith CT6, Smith CT7, Smith CT9, and Smith CT10.
How emissions allowance is calculated in \$/mmbtu: see cost function

Source of emissions cost: broker / publications **When costs are updated:** Monthly

NOx Emissions Allowance Cost:

Units: Spurlock 1, Spurlock 2, Spurlock 3 (Gilbert), Spurlock 4, Dale 1, Dale 2, Dale 3, Dale 4, Cooper 1, Cooper 2, Smith CT1, Smith CT2, Smith CT3, Smith CT4, Smith CT5, Smith CT6, Smith CT7, Smith CT9, Smith CT10 **How emissions data collected:** Continuous emissions monitoring system (CEMS) for Spurlock 1, Spurlock 2, Spurlock 3 (Gilbert), Spurlock 4, Dale 1, Dale 2, Dale 3, Dale 4, Cooper 1, and Cooper 2, Smith CT3, Smith CT5, Smith CT6, Smith CT7, Smith CT9, Smith CT10. Parametric monitoring for Smith CT1, Smith CT2, and Smith CT4.

How emissions allowance is calculated in \$/mmbtu: see cost function Source of emissions cost: broker / publications When costs are updated: Monthly

Unit	Fuel Type			
	Coal	Natural Gas	#2 Heating Oil	
Spurlock Plant	Х			
Units 1-4				
Cooper Station	Х			
Units 1&2				
Dale Station	Х			
Units 1-4				
Smith Station		X	X	
Units 1-7				
Smith Station		X		
Units 9&10				

<u>UNIT</u>	Title V Permit Total Number of Starts Annual Limit	Title V Permit 12 Month Rolling Total Hours Limit	Title V Permit 12 Month Rolling Limit for the number of hours the Unit Operated on Oil
1	200	2500	250
2	200	2500	250
3	200	2500	250
4	200	2500	250
5	200	N/A	876
6	200	N/A	876
7	200	N/A	876
9	365	4000	N/A
10	365	4000	N/A