

Opportunity Cost Calculator

CDTF
October 2009



Monitoring Analytics

Primary Differences Between Monitoring Analytics and PJM

	<u>MMU</u>
Simple and User Friendly Interface	√
Ability to Handle Rolling Time Period Restrictions	√
Minimum Run Time & Start Up Costs	√
Adjustment for Negative Margins	√
Dual Fuel Inputs	√
Spot vs. Contract Monthly Fuel Flexibility	√
Automatic Updates	√
MMU Reviewable	√



Simple and User Friendly Interface

- **Inputs gathered by web portal**
- **Login with eFuel account**
- **Easy to use**
- **Historical / futures data gathered from PJM and MMU databases**
 - **No need for users to input**
- **Changes to calculator can be implemented and tested with no impact on users**
 - **No requirement for additional data entry**



Sample Input Screen

Monitoring Analytics Opportunity Cost Calculator Inputs

Unit Characteristics

Data Field Name	Input Value	Units
Unit_ID	11111111	
Does this Unit have a 12-Month Rolling Run-Hour Restriction?	Yes	Yes or No
Minimum Run Time (Default is 1 Hour)	8	hours
Startup Costs	\$500.00	dollars
Summer Average Heat Rate	12.3	mmbtu/mwh
Winter Average Heat Rate	12.1	mmbtu/mwh
NOx Emission Rate (annual)	0.328	lbs/mmbtu
NOx Emission Rate (seasonal)	0.328	lbs/mmbtu
SO2 Emission Rate	1.24	lbs/mmbtu
CO2 Emission Rate	160.56	lbs/mmbtu
VOM	2.22	\$/mwh
FMU	5	\$/mwh
Scaling Factor	10%	percent

Spot vs. Contract Monthly Fuel Prices

Month	Percent of Fuel type A	Percent of Fuel type B	Percent Fuel type A is Contract	Percent Fuel type B is Contract	Percent Fuel type A is Spot	Percent Fuel type B is Spot	Contract Price for Fuel type A	Contract Price for Fuel type B
Jan	75%	25%	0%	100%	100%	0%	N/A	\$4.0 per mmBtu
Feb	75%	25%	0%	100%	100%	0%	N/A	\$4.0 per mmBtu
Mar	75%	25%	0%	100%	100%	0%	N/A	\$4.0 per mmBtu
Apr	75%	25%	0%	100%	100%	0%	N/A	\$4.0 per mmBtu
May	75%	25%	0%	100%	100%	0%	N/A	\$4.0 per mmBtu
Jun	75%	25%	0%	100%	100%	0%	N/A	\$4.0 per mmBtu
Jul	75%	25%	0%	100%	100%	0%	N/A	\$4.0 per mmBtu
Aug	75%	25%	0%	100%	100%	0%	N/A	\$4.0 per mmBtu
Sep	75%	25%	0%	100%	100%	0%	N/A	\$4.0 per mmBtu
Oct	75%	25%	0%	100%	100%	0%	N/A	\$4.0 per mmBtu
Nov	75%	25%	0%	100%	100%	0%	N/A	\$4.0 per mmBtu
Dec	75%	25%	0%	100%	100%	0%	N/A	\$4.0 per mmBtu

Fuel Inputs

Platt's Forward Fuel Index for Fuel Type A

Platt's Forward Fuel Index for Fuel Type B (if dual fuel type unit)

Scheduled Outages

Start:

End:

Outages Saved

Start	End
05JAN2009:05:00:00	25JAN2009:10:00:00
01FEB2009:05:00:00	02FEB2009:00:00:00
05DEC2009:05:00:00	09DEC2009:10:00:00

Run Hour Limitation: hours

Run Hours Used to Date: hours



Sample Output Screen

Monitoring Analytics Opportunity Cost Calculator Output

Unit Characteristics

Data Field Name	Input Value	Units
Unit_ID	11111111	
Does this Unit have a 12-Month Rolling Run-Hour Restriction?	Yes	Yes or No
Minimum Run Time (Default is 1 Hour)	8	hours
Startup Costs	\$500.00	dollars
Summer Average Heat Rate	12.3	mmbtu/mwh
Winter Average Heat Rate	12.1	mmbtu/mwh
NOx Emission Rate (annual)	0.328	lbs/mmbtu
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Spot vs. Contract Monthly Fuel Prices

Month	Percent of Fuel type A	Percent of Fuel type B	Percent Fuel type A is Contract	Percent Fuel type B is Contract	Percent Fuel type A is Spot	Percent Fuel type B is Spot	Contract Price for Fuel type A	Contract Price for Fuel type B
Jan	75%	25%	0%	100%	100%	0%	N/A	\$4.0 per mmbtu
Feb	75%	25%	0%	100%	100%	0%	N/A	\$4.0 per mmbtu
Mar	75%	25%	0%	100%	100%	0%	N/A	\$4.0 per mmbtu
Apr	75%	25%	0%	100%	100%	0%	N/A	\$4.0 per mmbtu
May	75%	25%	0%	100%	100%	0%	N/A	\$4.0 per mmbtu
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Jul	75%	25%	0%	100%	100%	0%	N/A	\$4.0 per mmbtu
Aug	75%	25%	0%	100%	100%	0%	N/A	\$4.0 per mmbtu
Sep	75%	25%	0%	100%	100%	0%	N/A	\$4.0 per mmbtu
Oct	75%	25%	0%	100%	100%	0%	N/A	\$4.0 per mmbtu
Nov	75%	25%	0%	100%	100%	0%	N/A	\$4.0 per mmbtu
Dec	75%	25%	0%	100%	100%	0%	N/A	\$4.0 per mmbtu

Fuel Inputs

Platt's Forward Fuel Index for Fuel Type A	CTL APP 12500B 1.2S CSX
Platt's Forward Fuel Index for Fuel Type B (if dual fuel type unit)	PRB 8800B .35S RAIL

Outages Saved

Start	End
05JAN2009:05:00:00	25JAN2009:10:00:00
01FEB2009:05:00:00	02FEB2009:00:00:00
05DEC2009:05:00:00	09DEC2009:10:00:00

Run Hour Limitation:	1000	hours
Run Hours Used to Date:	400	hours

Data Field Name	Input Value	Units
Opportunity Cost Component	20.55	\$/mwh
Run Hours Used to Date	400	hours



Ability to Handle Rolling Time Period Restrictions

- **Proposed change to manual:**
 - **Accounts for restrictions based on calendar year, rolling 12 months, or rolling N days**



Minimum Run Time & Start Up Costs

- **Proposed change to manual:**
 - **Accounts for parameter limits of various unit types**
 - **Improves accuracy of calculation substantially and gives accurate opportunity cost adders based on actual unit performance**
 - **For minimum run time, the adder is the average of a block of hours, rather than the minimum of hours**
 - **Models units as they operate in real-time or offer in day-ahead**



Negative Margins

- **Proposed change to manual:**
 - **Negative margins reflect actual margins from prior years**
 - **Accurately accounts for yearly volatility**
 - **Reflects actual values of hours in that year**
 - **Example:**

700th Margin (2006) = -\$100

700th Margin (2007) = -\$100

700th Margin (2008) = \$75

Maximum Opportunity Cost Component

MMU Method = $\text{Max}(0, -\$41.67) = \0

PJM Method = \$25



Dual Fuel Inputs

- **Proposed change to manual:**
 - **Permits use of dual fuels**
 - **Necessary for units that may burn multiple fuels**
 - **For units with restrictions on consumption of specific fuels, this method allows accounting for both fuels in the same calculation.**
 - **Example:**
 - **Run hour restriction of combined gas and oil output**
 - **Unit has restriction only when burning secondary fuel**



Spot vs. Contract Monthly Fuel Flexibility

- **Proposed change to manual:**
 - **Flexibility to choose spot price for one fuel and contract price for another fuel**
 - **Allows members to identify when a contract will end**
 - **If contract ends in the middle of a compliance period, permits use of spot prices or new contract prices**
 - **No need for participants to input fuel spot prices**



Automatic Updates

- **Calculator saves inputs from previous days, including outages**
- **Automatically updates hours run, without inputs from participants**
- **Recalculates opportunity cost adder daily, without inputs from participants**
- **No need for changes unless units change fuel or outage schedule**
- **Daily automatic updates posted overnight**



MMU Reviewable

- **Using the MMU calculator makes all opportunity cost adders derived from the calculator faster and easier for the MMU to review and approve**
- **Smaller chance of error given fewer user inputs**

