OPPORTUNITY COST COMPONENT

The following methodology is approved for computing opportunity costs for an externally imposed environmental regulation based run-hour restriction on a generation unit. Examples would include a limit on emissions for the unit imposed by a regulatory agency or legislation or a direct run hour restriction in the operating permit. Requests for recovery of opportunity costs using other methods, or not defined in the Operating Agreement of PJM Interconnection, L.L.C. should be submitted to the PJM MMU for approval per Manual 15 Section 8.

Opportunity costs are a distinct component of the cost-based offer. As is the case with any computation of the cost-based offer in Manual M-15, market participants may elect to enter their cost-based offer at a value less than the computed cost-based offer. However, they may not exceed the computed value.

Opportunity costs calculated with this method may change frequently as electricity and fuel futures may change daily. Generation owners who include opportunity costs in their cost-based offers must recalculate their opportunity cost no less frequently than once per week.

Web Portal:

Unit participants will submit their input data for the Monitoring Analytics' opportunity cost calculator through a web portal. That information will be stored in a database, and once a day, it will be processed by a SAS program in order to determine unit-specific opportunity costs. Those calculations for opportunity cost can be explained in nine steps.

STEP 1:
CREATE THREE SETS OF MONTHLY LMP FORECASTS AT THE GENERATION BUS

Inputs to Step 1:
Three years of historical hourly real-time LMPs at the generation bus
Three years of historical hourly real-time PJM Western Hub LMPs
Platts-ICE Forward Curve for "PJM west" for the recent trading day

Platts-ICE Forward Curve for "PJM west" (PJM Western Hub) must be collected for this first step (http://www.platts.com/). These PJM Western Hub Forwards are multiplied by a historical basis adjustment ratio for delivery to the generator's bus to calculate monthly delivered bus prices. The three prior calendar year's historical data is used to make this calculation. For units without a 12-month run-hour restriction, use historical LMP data, beginning on today's date to the end of the year from the previous three calendar years. For example, when computing opportunity costs on July 1, 2009 for a unit without a rolling 12-month run-hour restriction, use historical LMP data from July 1st (2006, 2007 and 2008) to December 31st (2006, 2007, and 2008). For units with a rolling 12-month run-hour restriction, use historical LMP data from the previous three years, beginning on the date calculated three years prior, ending on the previous day. For example, when computing opportunity costs on July 1, 2009 for a unit with a rolling 12-month run-hour restriction, use historical LMP data from July 1st (2006, 2007 and 2008) to June 30th (2007, 2008, and 2009). Begin by taking the hourly bus prices for the three prior years at the generator's bus, and for every hour, divide that hour's price by the corresponding price at PJM Western Hub.

$$\text{HourlyBasisRatio}_{\text{y,m,d,h}}^{\text{base year}} = \frac{\text{BUSLMP}_{\text{y,m,d,h}}^{\text{baseyear}}}{\text{PJMWHLMP}_{\text{y,m,d,h}}^{\text{baseyear}}}$$

Example 1.1: Three hourly bus ratios values for one hour of the year:

$$HourlyBasisRatio_{June\ 3,2006\ H11} = \frac{BUSLMP_{June\ 3,2006\ H11}}{PJMWHLMP_{June\ 3,2006\ H11}}$$

$$HourlyBasisRatio_{June\ 3,2007\ H11} = \frac{BUSLMP_{June\ 3,2007\ H11}}{PJMWHLMP_{June\ 3,2007\ H11}}$$

$$HourlyBasisRatio_{June\ 3,2008\ H11} = \frac{BUSLMP_{June\ 3,2008\ H11}}{PJMWHLMP_{June\ 3,2008\ H11}}$$

Once the hourly basis ratios are calculated for every hour during the three year history, take the on-peak hours in a month, sum the ratios, and divide by the number of observations. In addition, for every month, sum the off-peak hourly basis ratios, and then divide by the number of off-peak hours within that month.

$$\text{MonthlyPeakBasisRatio}_{\text{y,m}}^{\text{peak}} = \frac{\sum_{\text{n=1}}^{\text{N}} \left(\text{HourlyBasisRatios}_{\text{y,m,d,h}}^{\text{peak}}\right)}{\sum \text{N}_{\text{y,m}}^{\text{peak}}}$$

Example 1.2: Monthly Peak Basis for the three historical periods:

$$MonthlyPeakBasisRatio_{June\ 2006}^{ONpeak} = \frac{\sum_{n=1}^{N}(Hourly\ Basis\ Ratios\ of\ ONpeak\ hours\ in\ June\ 2006)}{Number\ of\ ONpeak\ hours\ in\ June\ 2006}$$

$$MonthlyPeakBasisRatio_{June\ 2007}^{ONpeak} = \frac{\sum_{n=1}^{N}(Hourly\ Basis\ Ratios\ of\ ONpeak\ hours\ in\ June\ 2007)}{Number\ of\ ONpeak\ hours\ in\ June\ 2007}$$

$$MonthlyPeakBasisRatio_{June\ 2008}^{ONpeak} = \frac{\sum_{n=1}^{N}(Hourly\ Basis\ Ratios\ of\ ONpeak\ hours\ in\ June\ 2008)}{Number\ of\ ONpeak\ hours\ in\ June\ 2008}$$

These are the ratios that adjust PJM Western Hub forward prices monthly on-peak and off-peak to be delivered to the generator's bus. Multiply these ratios by the PJM Western hub forwards to calculate forecasted monthly bus prices, on-peak and off-peak.

$$\text{Forecasted Monthly Bus Price}_{\text{fy,m}}^{\text{peak}} = \left[(\text{PJMWestern Hub}_{\text{fy,m}}^{\text{peak}}) * (\text{MonthlyPeakBasisRatio}_{\text{fy,m}}^{\text{peak}}) \right]$$

Example 1.3: Forecasted monthly bus prices for three historical periods:

$$Forecasted\ Monthly\ Bus\ Price\ {}^{OFFpeak\ base2006}_{June\ 2009} = \left[(PJMWH\ {}^{OFFpeak}_{for\ delivery\ June\ 2009}) * (MonthlyPeakBasisRatio^{OFFpeak\ 2006}_{June\ 2009}) \right]$$

$$Forecasted\ Monthly\ Bus\ Price\ {}^{OFFpeak\ base2007}_{June\ 2009} = \left[(PJMWH\ {}^{OFFpeak}_{for\ delivery\ June\ 2009}) * (MonthlyPeakBasisRatio^{OFFpeak\ 2007}_{June\ 2009}) \right]$$

$$Forecasted\ Monthly\ Bus\ Price\ {}^{OFFpeak\ base2008}_{June\ 2009} = \left[(PJMWH\ {}^{OFFpeak}_{for\ delivery\ June\ 2009}) * (MonthlyPeakBasisRatio^{OFFpeak\ 2008}_{June\ 2009}) \right]$$

Outputs from Step 1:
Three on-peak and off-peak monthly BUS LMP forecasts per month remaining in the compliance period.

STEP 2: CREATE THREE SETS OF SCALARS TO ADD HOURLY VARIABILITY TO THE MONTHLY FORECASTS:

Inputs to Step 2:
Three years historical hourly real-time LMPs at the generation bus

Step 2 will develop a variability scalar. This scalar will later be multiplied by the *monthly BUS LMP* forecast calculated in step 1 to ultimately forecast a future hourly LMP.

First, calculate the average on-peak and off-peak price at the unit's bus for each remaining month in the compliance period.

$$MonthlyAverageONPeakLmp = \sum_{first\ ONpeak\ hour\ of\ the\ month}^{last\ ONpeak\ hour\ of\ the\ month} (HourlyONpeakLMP) \Big/ numberofONpeakhours$$

$$MonthlyAverageOFFPeakLmp = \sum_{first\ OFFpeak\ hour\ of\ the\ month}^{last\ \ OFFpeak\ hour\ of\ the\ month} (HourlyOFFpeakLMP) \Big/ numberofOFFpeakhours$$

Next, calculate an hourly variability ratio for each hour by taking the hourly bus LMP divided by the monthly average on-peak or off-peak bus LMP calculated above. If the hour is an on-peak hour, divide by the average on-peak LMP for the month. If the hour is off-peak, divide that hour by the average off-peak LMP for the month.

$$\text{HourlyVariabilityRatio}_{\text{y,m,d,h}}^{\text{base year}} = \frac{\text{BUSLMP}_{\text{y,m,d,h}}^{\text{peak}}}{\frac{\sum_{n=1}^{N_{y,m}^{peak}}\left(\text{BUSLMP}_{\text{y,m}}^{\text{peak}}\right)}{N_{y,m}^{peak}}}$$

Example 2.1: Creating one hour's variability ratio for the each of the three historical base years:

$$HourlyVariabilityRatio_{June3,2006\ H23}^{base2006} = \frac{BUSLMP_{June\ 3,2006\ H23}}{Average\ OFFpeak\ June\ 2006\ BUSLMP}$$

$$HourlyVariabilityRatio_{June3,2007\ H23}^{base2007} = \frac{BUSLMP_{June\ 3,2007\ H23}}{Average\ OFFpeak\ June\ 2007\ BUSLMP}$$

$$HourlyVariabilityRatio_{June3,2008\ H23}^{base2008} = \frac{BUSLMP_{June\ 3,2008\ H23}}{Average\ OFFpeak\ June\ 2008\ BUSLMP}$$

Outputs from Step 2:
Three ratio values per hour for each of the historical years used for variability

STEP 3: CREATE THREE SETS OF HOURLY FORECASTED LMP VALUES

Inputs to Step 3:
Output from Step 1: On-peak/off-peak monthly bus LMP Forecasts
Output from Step 2: Hourly variability scalars

Step 3 creates three hourly forecasts from the variability scalars developed in step 2 and the monthly bus LMP forecasts developed in Step 1. Multiply the three hourly variability scalars developed in step 2 by the corresponding forecasted monthly bus price calculated in step 1.

$$\text{ForecastedBUSLMP}_{\text{y,m,d,h}}^{\text{peak}} = \text{HourlyVariabilityRatio}_{\text{y,m,d,h}} * \text{ForecastedMonthlyBusPrice}_{\text{fy,m}}^{\text{peak}}$$

Example 3.1: Forecasted bus LMPs for one hour for each of the three historical base years:
Assume that it is April 5, 2009. To create the set of three forecasted prices for each hour of June 3, 2009:

$$ForecastedBUSLMP_{June\ 3,2009\ H00}^{baseyear2006} = HourlyVariabilityRatio_{June\ 3,2006\ H00} * ForecastedMonthlyBusPrice_{June\ 2009}^{OFFpeak}$$

$$ForecastedBUSLMP_{June\ 3,2009\ H00}^{baseyear2007} = HourlyVariabilityRatio_{June\ 3,2007\ H00} * ForecastedMonthlyBusPrice_{June\ 2009}^{OFFpeak}$$

$$ForecastedBUSLMP^{baseyear2008}_{June\ 3,2009\ H00} = HourlyVariabilityRatio_{June\ 3,2008\ H00} * ForecastedMonthlyBusPrice^{OFFpeak}_{June\ 2009}$$

Outputs from Step 3:
Three hourly bus LMP forecasts for each hour remaining in the compliance period

STEP 4: CREATE THREE SETS OF DAILY FUEL SCALARS

Inputs to Step 4:
Three years historical delivered daily fuel prices at the generator bus ($/mmBtu)

Step 4 creates a daily fuel variability scalar using historical daily delivered fuel prices from the previous three calendar years. Take each daily delivered fuel price and divide it by the monthly average delivered fuel price to create a ratio for every day in the three year history. For units that have dual fuel types; the daily delivered fuel prices need to be multiplied by their respective weights and then added together:

Units with Single Fuel Type:

$$DailyFuelVariabilityRatio_{y,m,d} = \frac{DeliveredFuelPrice_{y,m,d}}{\frac{\left(\sum_{n=1}^{N_m}\left(DeliveredFuelPrice_{y,m,d=n}\right)\ \right)}{N_m}}$$

Where N_m is the number of days in month m.

Units with Dual Fuel Types:

$$DailyFuelVariabilityRatio_{y,m,d} = \frac{(DeliveredFuelPriceFuelTypeA_{y,m,d} * WeightFuelTypeA) + (DeliveredFuelPriceFuelTypeB_{y,m,d} * WeightFuelTypeB)}{\frac{\left(\sum_{n=1}^{N_m}\left((DeliveredFuelPriceFuelTypeA_{y,m} * WeightFuelTypeA) + (DeliveredFuelPriceFuelTypeB_{y,m} * WeightFuelTypeB)\right)\ \right)}{N_m}}$$

Example 4.1: Three daily fuel variability scalar values developed for June 3, 2009 for a unit with a single fuel type:

$$DailyFuelVariabilityRatio_{June,3,2006} = \frac{DeliveredFuelPrice_{June\ 3,2006}}{Average\ June\ 2006\ DeliveredFuelPrice}$$

$$DailyFuelVariabilityRatio_{June,3,2007} = \frac{DeliveredFuelPrice_{June\ 3,2007}}{Average\ June\ 2007\ DeliveredFuelPrice}$$

$$DailyFuelVariabilityRatio_{June,3,2008} = \frac{DeliveredFuelPrice_{June\ 3,2008}}{Average\ June\ 2008\ DeliveredFuelPrice}$$

Outputs from Step 4:

Three historical daily fuel scalars for each day remaining in the compliance period

STEP 5: CREATE THREE SETS OF DAILY DELIVERED FUEL FORECASTS

Inputs to Step 5:
Output from Step 4: Three years historical daily fuel scalars for each day remaining in the compliance period
Platts forward curve for fuel from the most recent trading day, for delivery in the compliance period ($/mmBtu) with a daily delivery charge adjustment

Step 5 takes fuel forwards based on a unit's fuel policy (as approved by the MMU) and the daily delivered fuel scalars from step 4 and multiplies them together to calculate a fuel forecast. The selected fuel forward price should be from the most recent trading day, for delivery in the compliance period. Once determined, a fuel forward index must be used for the duration of the compliance period. For units that have multiple fuel types; the daily delivered fuel scalar will be multiplied by the fuel forward price and their respective weights per fuel type and added together. For units with some or all of their fuel coming from monthly contracts, the daily delivered fuel term will properly weight the monthly contract price and the daily delivered fuel forecast price for each day in a given month:

Units with Single Fuel Type:

$$Daily\ DeliveredFuel_{fy,m,d} = DailyFuelVariabilityRatio_{y,m,d} * (WeightSpot_m * FuelForward_{fy,m} + WeightContract_m * ContractPrice_m)$$

Units with Dual Fuel Types:

$$DailyDeliveredFuel_{fy,m,d} = DailyFuelVariabilityRatio_{y,m,d} * \left(WeightSpot_m * \left(FuelForwardFuelTypeA_{fy,m} * WeightFuelTypeA + FuelForwardFuelTypeB_{fy,m} * WeightFuelTypeB\right) + WeightContract_m * ContractPrice_m\right)$$

Example 5.1: Create three daily delivered fuel forecasts from the variability of three historic years:

$$DailyDeliveredFuelForecast_{June\ 3,2009}^{baseyear2006} = DailyFuelVariabilityRatio_{June\ 3,2006} * FuelForward_{June\ 2009}$$

$$DailyDeliveredFuelForecast_{June\ 3,2009}^{baseyear2007} = DailyFuelVariabilityRatio_{June\ 3,2007} * FuelForward_{June\ 2009}$$

$$DailyDeliveredFuelForecast_{June\ 3,2009}^{baseyear2008} = DailyFuelVariabilityRatio_{June\ 3,2008} * FuelForward_{June\ 2009}$$

Outputs from Step 5:
Daily delivered fuel forecast

STEP 6: CREATE THREE SETS OF GENERATING UNITS DISPATCH COSTS

Inputs to Step 6:
Output from Step 5: Daily delivered fuel forecast
Average Unit Heat Rate for the May-September period and October-April period of the previous available year
Unit SO2, CO2, and NOx Emission Rates
Futures prices for SO2, CO2 and NOx from Evolution Markets
VOM/Maintenance Adder as defined in M-15

In step 6, take the unit characteristics, future emission allowance prices, the three daily fuel forecasts and create a daily unit dispatch cost for the three forecasts using the appropriate heat rate for the forecast day. Either the FMU adder or the 10% scaling factor may be used but not both. For each day in the three fuel forecasts, a unit dispatch cost is calculated as follows:

$$\text{UnitDispatchCost}_{\text{fy,m,d}}^{\text{base year}} =$$
$$\Big\{\Big[UnitHeatRate\left({}^{mmbtu}/_{mwh}\right) * DailyDeliveredFuelForecast(\$/mmbtu)_{fy,m,d}^{base\ year}\Big] +$$
$$\Big[UnitHeatRate\ (mmbtu/mwh) * UnitNOxEmissionRate(lbs/mmbtu) * Cost\ of\ NOx\ \left({}^{\$}/_{lb}\right)\Big] +$$
$$\Big[\ UnitHeatRate\ (mmbtu/mwh) * UnitSO_2EmissionRate(lbs/mmbtu) * Cost\ of\ SO_2\ \left({}^{\$}/_{lb}\right)\Big] +$$
$$\Big[\ UnitHeatRate\ (mmbtu/mwh) * UnitCO_2EmissionRate(lbs/mmbtu) * Cost\ of\ CO_2\ \left({}^{\$}/_{lb}\right)\Big]$$
$$+\ VOM + FMU\ (if\ applicable)\Big\} * \{Up\ to\ 1.1\ scalar\ factor\ (if\ applicable)\}$$

Example 6.1: Daily dispatch cost:

Unit heat rate=10.345 mmBtu/MWh
Unit NOx emission rate =0.328 lbs/mmBtu
Unit SO_2 emission rate=1.2 lbs/mmBtu
Unit CO_2 emission rate=117 lbs/mmBtu
DailyDeliveredFuelForecast=$3.01/mmBtu
Combined NOx Allowance cost=$1375/ton
SO_2 Allowance cost=$200/ton
CO_2 emission cost = $8/ton
VOM=$2.22/MWh
FMU=$0/MWh

$$UnitDispatchCost =$$

$$\left[\left(\frac{10.345mmbtu}{mwh}\right)*\left(\frac{\$3.01}{mmbtu}\right)\right]+$$
$$\left[\left(\frac{10.345mmbtu}{mwh}\right)*\left(\frac{0.328\ lbs}{mmbtu}\right)*\left(\frac{\$1375.00}{ton}\right)*\left(\frac{ton}{2000\ lbs}\right)\right]+$$
$$\left(\left[\left(\frac{10.345\ mmbtu}{mwh}\right)*\left(\frac{1.2\ lbs}{mmbtu}\right)*\left(\frac{\$200}{ton}\right)*\left(\frac{ton}{2000}lbs\right)\right]\right)+$$
$$\left[\left(\frac{10.345mmbtu}{mwh}\right)*\left(\frac{117lbs}{mmbtu}\right)*\left(\frac{\$8}{ton}\right)*\left(\frac{ton}{2000lbs}\right)\right]$$
$$+\left(\frac{\$2.22}{MWh}\right)+\left(\frac{\$0}{MWh}\right)$$

$$\text{UnitDispatchCost}_{\text{fy,m,d}}^{\text{base year}}=\left(\frac{\$31.16}{MWh}\right)+\left(\frac{\$2.34}{MWh}\right)+\left(\frac{\$1.25}{MWh}\right)+\left(\frac{\$4.85}{MWh}\right)+\left(\frac{\$2.22}{MWh}\right)=\$41.82/MWh$$

Outputs from Step 6:
Three forecasts for daily generator dispatch cost

STEP 7: CALCULATE THE RUN HOURS USED TO DATE FOR THE CURRENT CALENDAR OR ROLLING YEAR

Inputs to Step 7:
Generator real-time 5 minute bus MWs

Step 7 calculates the run hours of a generator used in the compliance period to date. Accumulate the running time from the start of the calendar or rolling year to midnight the previous day and round the total run time up to the nearest hour. For example, when computing opportunity costs for a calendar year on July 5, 2009, calculate total run hours from January 1, 2009 to July 4, 2009 11:59:59PM. Confirm the calculated run hour to the run hours input by the generator through the web portal.

Outputs from Step 7:
Generator Run Hours Used to Date

STEP 8: CALCULATE THE MARGIN FOR EACH HOUR IN THE THREE SETS OF HOURLY FORECASTS

Inputs to Step 8:
Output from Step 3: Hourly Generator bus LMP forecast
Output from Step 6: Daily Generator Dispatch Cost
Output from Step 7: Generator Run Hours Used to Date

All future maintenance outage information
Unit-specific minimum run time parameter restriction
Unit-specific start up costs

Step 8 calculates the hourly margins the generator would receive by comparing the cost offer developed in step 6 against the hourly forecasted bus LMPs developed in step 3. To remove planned outages, for any future date that the unit will be offline, set the hours to unavailable for all three forecasts. For units with minimum run time restrictions, this step calculates total margins in blocks of adjacent hours, based on the sum of the margins of each block and the minimum run time parameter restriction of a unit. For units with start-up costs, the value of that start-up cost will be subtracted from the total margin of each block that contains a new start, but not from each subsequent incremental hour added to the block. Calculate the total margins for all blocks of hours in the three forecasts:

$$TotalMarginBlock_{block}^{base\ year} = \sum_{t=block}^{t=block+MinRunTime-1} ForecastedBUSLMP_{y(t),m(t),d(t),h(t)}^{base\ year} - UnitDispatchCost_{y(t),m(t),d(t)}^{baseyear}$$

Where $block$ ranges from 1 to $[totalNumberofHours - MinRunTime + 1]$ and $y(t), m(t), d(t), h(t)$ are the year, month, day and hour corresponding to the tth overall hour of the time period spanning from the date calculated to the end of the compliance period forecasted.

The $totalNumberofHours$ variable represents the output from Step 7: Generator Run Hours used to date. This variable is the number of hours left in the compliance period to be forecasted, and is based on the date calculated and whether or not the unit has a rolling 12 month run-hour restriction.

Example 8.1: Computing total margins with a minimum run time of one hour (i.e. no minimum run time restriction), using historical data from the past three calendar years

$$TotalMarginBlock_{\text{block } 3679}^{base\ 2006} = \sum_{t=block}^{t=block+MinRunTime-1} ForecastedBUSLMP_{y(t),m(t),d(t),h(t)}^{base\ year} - UnitDispatchCost_{y(t),m(t),d(t)}^{baseyear} = \sum_{t=3679}^{t=3679+1-1} ForecastedBUSLMP_{y(t),m(t),d(t),h(t)}^{base\ 2006} - UnitDispatchCost_{y(t),m(t),d(t)}^{base\ 2006} = ForecastedBUSLMP_{y(3679),m(3679),d(3679),h(3679)}^{base\ 2006} - UnitDispatchCost_{y(3679),m(3679),d(3679)}^{base\ 2006} = ForecastedBUSLMP_{June\ 3,2009\ H07}^{base\ 2006} - UnitDispatchCost_{June\ 3,2009}^{base\ 2006} = \$53.23 - \$41.66 = \$11.57$$

- Similarly,

$$TotalMarginBlock_{\text{block } \#3679}^{base\ 2007} = ForecastedBUSLMP_{June\ 3,2009\ H07}^{base\ 2007} - UnitDispatchCost_{June\ 3,2009}^{base\ 2006} = \$55.44 - \$57.88 = -\$2.44$$

$$TotalMarginBlock_{\text{block } \#3679}^{base\ 2008} = ForecastedBUSLMP_{June\ 3,2009\ H07}^{base\ 2008} - UnitDispatchCost_{June\ 3,2009}^{base\ 2006} = \$49.78 - \$49.72 = \$0.06$$

At this point, the blocks of hours would be ranked according to the value of their total margins.

Outputs from Step 8:
Three sets of ranked blocks of total margin forecasts including each hour in the compliance period, adjusted to include start-up costs for each block that contains a new start, with all future outage hours removed

STEP 9: DETERMINE THE OPPORTUNITY COST ADDER

Inputs to Step 9:
Output from Step 8: Three sets of ranked blocks of total margin forecasts

For each of the three years, the opportunity cost for that year will be the average total margin of the lowest value block added before the run hour limit was reached. The three opportunity costs will then be averaged to get the opportunity cost adder available to the generator. If the opportunity cost adder is less than 0, the opportunity cost adder will be set to 0. The opportunity cost adder which may be applied to each point on a unit's bid curve will be entered separately into eMkt by the participant.

Example 9.1: A unit with 700 run hours left:

$$\text{The average value of the block which includes the 700th hour}_{\text{base2006}} = \$2.10/\text{MWh}$$
$$\text{The average value of the block which includes the 700th hour}_{\text{base2007}} = -\$2.14/\text{MWh}$$
$$\text{The average value of the block which includes the 700th hour}_{\text{base2008}} = \$0.06/\text{MWh}$$

700[th] hour opportunity cost adder = $\frac{\$2.10+(-\$2.14)+\$0.06}{3}$ = \$0.01/MWh

Output from Step 9: the opportunity cost adder