Operating Parameter Impacts on PJM Opportunity Cost Calculator Results

MIC Special Session: Opportunity Cost Calculator

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Parameter Differences

Differences between the PJM and IMM Opportunity Cost Calculators include the addition of the following operating parameters to the IMM calculator:

- Notification Time
- Minimum Down Time
- Economic Minimum
- Start Emissions
- Maximum Daily Starts
- Maximum Weekly Starts

PJM Acceptance Testing Calculator

- As part of the acceptance testing of the PJM calculator, PJM developed a partial calculator that operated outside of Markets Gateway using EXCEL and Visual Basic that independently followed the opportunity cost calculation rules of M15.
- It is not a full Opportunity Cost Calculator. Inputs are the forecasted hourly LMPS and daily fuel forecasts. The outputs are generating unit costs, block margins and the opportunity cost adder for one year (M15 Section 12.5 Steps 6, 7, & 8).

Modifications

The testing calculator was modified to include

- Minimum Down Time
- Economic Minimum
- Start Emission (hourly based)

- For simplicity, Minimum Down will be used to estimate the impact of Notification Time, Maximum Daily Starts and Maximum Weekly Starts.

Units Types

Three different unit types were analyzed:

- **Simple Cycle CT**
  - MW = 77 MW Start cost = $2,116
  - HR = 11.7 MMBtu/MWh Min Run Time = 4 hours
- **Steam Unit**
  - MW = 500 MW Start cost = $15,000
  - HR = 9.5 MMBtu/MWh Min Run Time = 12 hours
- **Combined Cycle**
  - MW = 500 MW Start Cost = $5,000
  - HR = 7.5 MMBtu/MWh Min Run Time = 6 hours
- All units are gas fired, have a VOM of $2.4/MWH and use the 10% Adder

Simple Cycle CT Cases

- Simple Cycle CT – 500 hour annual limit
  - Base Case - $14.72 MWh
  - Min Down Time = 4 hours - $11.60 MWh
  - Eco Min = 45 MW - $16.82 MWh
  - Start Emissions = 1 hour - $15.36 MWh
  - All of the Above - $16.82 MWH

- Impact was a range of $-3.12 MWh to $2.10 MWh on the Opportunity Cost Adder

Steam Unit Cases

- Steam Unit– 2000 hour annual limit
  - Base Case - $-5.08 MWh
  - Min Down Time = 10 hours - $-5.14 MWh
  - Eco Min = 150 MW - $-1.94 MWh
  - Start Emissions = 4 hour - $-1.39 MWh
  - All of the Above - $ 0.75 MWH

- Impact was a range of $-0.06 MWh to $5.83 MWh on the Opportunity Cost Adder

Combined Cycle Cases

- Simple Cycle CT – 2000 hour annual limit
  - Base Case - $ 3.12 MWh
  - Min Down Time = 4 hours - $ 2.71 MWh
  - Eco Min = 350 MW - $ 3.18 MWh
  - Start Emissions = 2 hour - $ 5.70 MWh
  - All of the Above - $ 4.73 MWH

- Impact was a range of $-0.41 MWh to $2.58 MWh on the Opportunity Cost Adder

Conclusions

- Adding additional operating parameters to the PJM calculator could result in a larger Opportunity Cost Adder by approximately $2 to $6/MWh.
- Additional operating parameters do not explain all the differences between the PJM and IMM calculators.