Combined Cycle Model Cost Benefit Update

Operating Committee

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Combined cycle units have a unique incremental heat input curve as a result of the different operating mode capabilities these units provide. Currently, combined cycles are modeled similarly to other unit types in PJM, but may not be the same in terms of physical parameters. Combined cycle units must be entered into eMKT as either a combustion turbine or steam unit. Due to different unit setups (various combustion turbine combinations, CT power augmentation methods, duct burners, etc.) and eMKT limitations, combined cycle units may be offered inconsistently by various participants.

- Implementation is on Hold pending results of cost benefit
  - PJM and IMM are working together on cost benefit
    - Evaluating cost savings for peaking steps
    - Evaluating cost savings from increased offer flexibility

- Potential cost savings evaluated
  - Evaluating cost savings for more efficient peaking step operation (Duct Burners)
  - Evaluating cost savings from increased offer flexibility
  - Evaluating start cost savings for partial block operation
- Have not been able to accurately quantify savings from implementation of the CC Model

- Some Combined Cycle with duct burners operate them in the Real Time Energy Market at PJM direction or concurrence
  - In 2013 there were127 total dispatch requests
    - 65 requests by PJM
    - 62 requests by the generator
    - 1082 total operating hours (average duration of 8 hours)
    - Total Cost = $2,860,000 (Estimated from RT LMP * Emergency MWh)

- If peaking segment offered in Day Ahead Market potential cost savings from:
  - Less hours run in real time
    - Use Estimated % of $2,680,000?
    - Non-emergency MWh are not included
  - Reduction in real time prices
    - Unable to estimate magnitude

- ## Combined Cycles are offering flexibility in their 2013 Day Ahead and Real Time Offers

Average MW all CC Offers	Emerg Min	Eco Min	Eco Max	Emerg Max	Dispatch Range
DA Cost Offer	230	243	417	430	40%
DA Price Offer	235	249	412	417	39%
RT Cost Offer	222	240	423	431	42%
RT Price Offer	227	239	414	419	42%

- In 2013 there were 291 instances where a Combined Cycle operated at minimum load for its entire operating interval during a day.
  - Max Savings = (2013 Average Start Cost * 291) / 2

    = $2,397,000
    - Assumes start offer includes more than one CT start
    - Assumes minimum load was not with more than one CT operating

- Have not been able to accurately quantify savings to justify implementation of the CC Model

- Suggestions from CC Owners on other cost savings approaches?

- PJM could provide education on existing ways to model Combined Cycles in eMKT
  - Segmented ramp rates for duct burner/peak step operation
  - Splitting CC into CT/ST combinations

- Other Paths Forward