# Stakeholder Comments Template

# Subject: Multi-Stage Generating Unit Modeling

| Submitted by | Company | Date Submitted |
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| *Mark J. Smith* | *Calpine* | *Nov 20, 2008* |

This template has been created for submission of stakeholder comments on the following topics covered in the November 14 Stakeholder Conference Call regarding Multi-Stage Generating Unit Modeling and the CAISO Issue Paper on this topic. Upon completion of this template please submit (in MS Word) to gbiedler@caiso.com. Submissions are requested by close of business on Friday November 21, 2008.

Please submit your comments to the following questions for each topic in the spaces indicated.

1. Please describe the operational issues that you believe modeling of multi-stage units can alleviate.

   Please refer to the attached document titled "Combined Cycle Modeling in MRTU – The Challenges."

   The fundamental difficulties in modeling CCGTs rest with the fact that the current MRTU mechanisms presumes that each resource ID has but one generator behind it. Indeed, not only are there several generation units behind one single ID, but the output of each unit is interdependent upon production levels of the others.  As reflected in the attached:

   > The implicit assumption that a single resource ID represents a single generator is antithetical to the bidding, design and structure of combined cycle plants.
   >
   > 1. Operating Characteristics: It is not possible with one set of Master File characteristics to reflect multiple generators behind one resource ID (embedded generators). It is difficult, or not possible to:
   >    a. Enforce warranty, insurance or physical limitations on minimum start, minimum run and minimum down times.
   >    b. Protect forbidden dispatch regions (particularly when combined with limitations on ramp rates.)
   > 2. Bid Structure:  It is difficult and substantially misleading to create a continuous, monotonically non-decreasing bid curve that represents the full range of configurations the embedded generators of a CCGT.

     3.   Bid Cost Recovery:  It is not possible to ensure bid cost recovery for embedded generators.

In addition, generation configurations other than CCGTs can present similar problems. Specifically, CPN suggests that the same modeling, bidding and operational difficulties are present when you have multiple peaker plants behind a single Resource ID.  While the solution to these facilities is much simpler (because there is normally little or no interdependence of output,) there are nonetheless a variety of physical configurations and constraints that cannot be modeled in a single monotonically non-decreasing bid curve.

2.  If you participate in other ISO/RTO markets where multi-stage units are modeled, please provide any insights you have gained from that experience.

Every other organized market has addressed this modeling difficulty with differing degrees of success.  CPN will seek to provide the CAISO with contact information in each relevant market.  We will seek to provide both market design contacts and where possible, vendor contacts.

However, CPN believes that the most similarly-situated market is ERCOT. Approximately 70 percent of the installed capacity in ERCOT is said to be combined-cycle, or resources with embedded generators.  They are planning to implement configuration-based modeling concurrent with Nodal Go-Live, which has now been suspended.  The trade-offs of various modeling approaches have been vetted and decided and production software has been developed.

3.  What issues do you anticipate arising due to modeling of multi-stage units?  Please provide detail and/or examples.

Please refer to the attached document titled "Combined Cycle Modeling in MRTU – The Challenges".  In significant part, it reports the issues as:

The inability to model CCGT complexities into MRTU results in several distinct and unfortunate results.

    1.  <u>Avoidance of CAISO Dispatch</u>:  The overarching goal of the MRTU design -- security constrained economic dispatch -- will be frustrated as CCGT owners avoid CAISO infeasible and risk-laden dispatch.  The risks of infeasible dispatch – imbalances, unrecovered costs, etc. – will encourage CCGT owners to self-dispatch their units (e.g. by bidding very low to their preferred configuration.)

    2.  <u>Lack of flexibility</u>:  Once in the preferred and stable configuration, a CCGT owner will be encouraged to manually adjust the CASIO dispatch range (raise Pmin, or SLIC down Pmax) in order to eliminate the possibility that the CAISO would unfeasibly dispatch between configurations.

3. <u>Distraction from Reliability Function</u>:  In order to prevent the CAISO from infeasible dispatch, real-time operators at both the generator and at the CASIO will be distracted from their primary reliability function while they manually adjust dispatch ranges, as in 2, above.

4. <u>Increased Costs to the Market</u>:  The sub-optimal dispatch results will result in higher market prices than would be available if CCGTs could be modeled and dispatched by the CASIO.

5. <u>Increased Bids From the Generator</u>:  The exposure to infeasible dispatch, the likely costs of imbalance charges and continuous disputes all must logically be built into risk-adjusted generator bid curves.

6. <u>Absence of Solutions</u>:  The CAISO has already experienced – in market simulations – an inability for the optimization to find a solution causing pricing lock-outs.  These problems may be resolved by the application of the 10:1 ramp limitation rule.  However, this ramp rate limitation will further aggravate items 1-4 above.

7. <u>Unfounded Curiosity by Market Monitors</u>:  The inability of the CCGT owner to respond to infeasible dispatches may bring the unnecessary and unfounded attention of the market monitors.

4. Which of the two models – pseudo-plant or pseudo-unit – discussed in the conference call would you prefer to see implemented and why?

Based on the limited description of the two approaches, CPN would have a very strong preference for the pseudo-plant model, which we refer to as a configuration-based approach. With this approach, we believe that the operational control of the asset could be entirely turned to the CAISO discretion and virtually all of the issues shown above would be eliminated.

In this approach, a single physical plant would have multiple configurations that it could bid in.  Each configuration would have as its base, a physical combination of generators. A single 2X1 combined-cycle plant could have 6 or more configurations. Each configuration (such as 2X1, 1X1, CT-alone) could represent the aggregate cost and time of starting and attaining stable operation in the prescribed configuration along with a representation of all of the interdependencies and respective operational limitations.

The pseudo-unit model might be a simplification that would be reasonable for some subset of the targeted resources – particularly those with independent (rather than *inter*dependent) embedded generators such as multiple peaker sites. However, modeling CCGT individual generators, without also modeling, for instance the relationship between Combustion turbine HRSG steam production and steam generator output will fail to meet the design objectives.

5. Other comments.

   Calpine greatly appreciates the CASIO's attention to this very important matter and looks forward to implementation early in the first year after Go Live.