

Recommended Changes to the ERCOT Reserve Margin Calculation Methodology

March 7, 2007

Generation Adequacy Task Force
Report to TAC
March 7, 2007

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Background

In May, 2006, the ERCOT Technical Advisory Committee (TAC) requested that the Generation Adequacy Task Force (GATF), an existing joint task force of the Wholesale Market Subcommittee (WMS) and the Reliability and Operations Subcommittee (ROS), meet to discuss a request from ERCOT staff to clarify the treatment of new generating units in the preparation of the ERCOT Capacity, Demand and Reserve (CDR) analysis that is typically prepared, reported to the North American Electric Corporation (NERC), and released annually to the general public in May or June. The CDR analysis is a forecast of future demands and resources for the summer and winter peak load periods for the current year and five (5) future years. TAC further requested the GATF to review all components of the ERCOT reserve margin methodology.

The GATF met on May 25, 2006 to discuss the issue of new generation and made a recommendation to ERCOT staff to create a separate set of annual reserve margin calculations based on inclusion of all publicly-announced fossil generating units. ERCOT staff then issued the ERCOT CDR for the years 2006-2011 as shown below in Figure 1:

2006 Report on the Capacity, Demand, and Reserves in the ERCOT Region						
Summer Summary						
Load Forecast:	2006	2007	2008	2009	2010	2011
Total Summer Peak Demand, MW	61,656	63,222	64,318	65,950	67,548	69,034
less LAARs Serving as Responsive Reserve, MW	1,112	1,112	1,112	1,112	1,112	1,112
less LAARs Serving as Non-Spinning Reserve, MW	0	0	0	0	0	0
less BULs, MW	0	0	0	0	0	0
Firm Load Forecast, MW	60,544	62,110	63,206	64,838	66,436	67,922
Resources:	2006	2007	2008	2009	2010	2011
Installed Capacity, MW	58,831	58,831	58,831	58,831	58,831	58,831
Capacity from Private Networks, MW	6,419	6,575	6,279	6,279	6,279	6,279
Wind Generation, MW	2,383	2,383	2,383	2,383	2,383	2,383
RMR Units under Contract, MW	267	170	170	170	0	0
Operational Generation, MW	67,900	67,959	67,663	67,663	67,493	67,493
Asynchronous Ties, MW	856	1,106	1,106	1,106	1,106	1,106
Switchable Units, MW	2,810	2,810	2,810	2,810	2,810	2,810
Mothballed Units, MW	8,833	8,930	8,930	8,930	9,100	9,100
Planned Units (not wind) with Signed IA, MW	0	550	550	550	1,300	1,300
Planned Wind Units with Signed IA, MW	0	1,085	1,576	1,576	1,576	1,576
Total Resources, MW	80,399	82,440	82,635	82,635	83,385	83,385
less 97.4% Existing Wind Generation, MW	2,321	2,321	2,321	2,321	2,321	2,321
less 50% of Asynchronous Ties, MW	428	553	553	553	553	553
less Switchable Units Unavailable to ERCOT, MW	165	0	0	0	0	0
less Mothballed Units Unavailable, MW	6,729	6,933	7,140	7,144	7,317	7,280
less 97.4% Planned Wind Generation, MW	0	1,057	1,535	1,535	1,535	1,535
less Retiring Units, MW	0	0	393	451	451	451
Resources, MW	70,756	71,577	70,693	70,632	71,208	71,245
Reserve Margin (Resources - Firm Load Forecast)/Firm Load Forecast	16.9%	15.2%	11.8%	8.9%	7.2%	4.9%
"High" Reserve Margin (all Mothballed Units return)	16.9%	26.4%	23.1%	20.0%	18.2%	15.6%
"Low" Reserve Margin (no Mothballed Units return)	16.9%	12.0%	9.0%	6.2%	4.5%	2.2%
Reserve Margin w/ Publicly Announced Thermal Units (net)*	16.9%	15.4%	12.0%	20.0%	24.9%	23.9%

* Air Permit either requested or issued, but no IA signed

Figure 1 – ERCOT CDR

The last line of this CDR summary page shows the new separate reserve margin calculation recommended by the GATF that includes publicly announced thermal generating units.

The GATF held additional meetings in July, September, and November of 2006 and January and February of 2007 to review and discuss each of the other components of the ERCOT reserve margin calculation methodology as directed by TAC. The remainder of this report discusses the proposed changes in the ERCOT reserve margin calculation methodology recommended by the GATF to TAC.

Existing ERCOT Reserve Margin Calculation Methodology

In May of 2005, TAC approved the following ERCOT reserve margin calculation methodology:

Firm Load = Forecasted total summer peak demand – Demand-side resources

Available Resources = Summer net dependable capacity (excluding wind generation)
+ 50% of DC Tie Capacity
+ 100% - X of “Switchable” Capacity (X to be based on information provided to ERCOT by Switchable Capacity owners)
+ 2.9% of Wind Generation (based on ERCOT analysis of historical data)
+ 100% of Planned Generation with signed Interconnect Agreement or letter to ERCOT from resource owner (letter applies to NOIEs only)
+ 2.9% of Planned Wind Generation with signed Interconnection Agreement or letter to ERCOT from owner (letter applies to NOIEs only)
+ Y of “Mothballed” Units (Y to be based on ERCOT analysis of information provided by mothballed unit owners)
- 100% of Retiring Units (all forecast years)

Reserve Margin = (Available Resources – Firm Load)/Firm Load

Additional GATF Review

Upon completion of its initial task regarding reporting of new generation in the June 2006 ERCOT CDR, the GATF reviewed each remaining component of the ERCOT reserve margin calculation methodology. After the review, the GATF determined that each of the following components of the ERCOT generating reserve margin calculation methodology did not need to be changed at this time:

- ERCOT summer peak load forecast
- Firm Load forecast (i.e., impact of demand-side resources, LaaRs and BULs)
- Capacity associated with private use networks

- DC tie capacity
- “switchable” capacity
- Treatment of “mothballed” generation
- Retired capacity

However, the GATF did recognize a need to make changes to the following components of the ERCOT generation reserve margin calculation methodology:

- Treatment of wind generation
- Treatment of “new” generation

These two topics were discussed at length over the course of the remaining GATF meetings.

Treatment of Wind Generation

The current ERCOT generation reserve margin calculation methodology for wind generation is based on actual historical performance of existing wind generation during hours ending 1600 through 1800 DST for weekdays during the months of July and August adjusted by Equivalent Forced Outage Rate (EFOR) for a combustion turbine that was used in the last ERCOT loss-of-load-probability (LOLP) study (2002). ERCOT staff collects the appropriate data and annually determines the percentage factor of installed wind capacity (the value used for the 2006 ERCOT CDR reserve margin calculation was 2.6%) to include as the amount of wind capacity available to serve summer peak load in the calculation of the ERCOT reserve margin.

Many members of the GATF were concerned about applying an EFOR for a combustion turbine to the actual performance data of wind generation, since use of actual performance data already includes whatever EFOR wind generation would experience. Thus, it was felt that the methodology for wind generation tended to understate the actual contribution from wind generation during the very short number of hours under consideration. In addition, the GATF was concerned that the existing methodology relied on a relatively few number of data points and that recent actual data indicated that the capacity value of wind generation was much higher in individual years than the 2.6% determined by the existing methodology. GATF members also noted that the geographic dispersion of wind generators is continuing to change, which is likely to improve the capacity value of wind in future years.

To address these concerns and establish a more realistic percentage of capacity value provided by wind generation in the ERCOT market, several alternatives were considered by the GATF, including:

- Keep current methodology, updated with more recent information;
- Base capacity value on historical data without adjustment for EFOR (16.3% by Total or 16.1% by Interconnect);

- Base capacity value on historical data less standard deviation (5.3% by Total or 11.7% by Interconnect);
- Use the Effective Load Carrying Capability (ELCC) value of wind as described in the ERCOT Loss-of-Load Probability (LOLP) study dated January 18, 2007. Applying this method to wind generation yielded an equivalent capacity for CDR purposes of approximately 8.7%.

This recent ERCOT LOLP study, which includes a determination of the ELCC of wind in its analysis, also takes into account the volatility of wind using AWS Truewind wind generation patterns from the recently completed ERCOT study, Transmission Alternatives for Competitive Renewable Energy Zones in Texas (and which was filed with the PUCT on December 4, 2006). Hourly aggregate wind generation patterns were selected in 24-hour increments. Random selections were made only from the energy patterns developed by AWS Truewind for each month during the study period. The LOLP model was run with the base set of generating units and a generic thermal generator (550 MW) and determined the expected unserved energy. Then the model was re-run with the generic thermal generator removed and new wind generation added until the same expected unserved energy was achieved. This amount of new wind generation will then have the same ELCC as the 550-MW generic thermal generator. Therefore, 6,300 MW of wind had the same load carrying capacity as 550 MW of thermal generation (i.e., 8.7% capacity value).

Based on its review and associated concerns related to the existing methodology used to determine the capacity value of wind for the ERCOT CDR calculation, GATF recommends that a change in methodology is warranted and that the ELCC methodology should be used until better (i.e., more) actual performance data becomes available to make an accurate determination of the true capacity value of wind in ERCOT.

Treatment of “New” Generation

The existing treatment of “new” generation in the ERCOT reserve margin calculation is to include only those new units that have a signed Generation Interconnect Agreement (SGIA) with the appropriate transmission service provider (TSP). Otherwise, any other “new” generating units, regardless of status of its transmission service request, are not included in the new capacity category in the ERCOT reserve margin calculation.

Previously, when new generating capacity was being added to ERCOT, most of that generation was either natural gas combined-cycle combustion turbines or wind. Generally, the acquisition of an Air Permit from the Texas Commission on Environmental Quality (TCEQ) was relatively easy and not a limiting issue to the construction schedule of these types of generating capacity. However, today, many of the new units planned for ERCOT are solid-fueled and acquisition of an Air Permit from the TCEQ is critical to ultimate construction and operation of the unit. GATF was concerned that using a SGIA alone would not ensure that a new planned fossil capacity addition

would actually be built, and thus would tend to overstate the capacity that might be available to ERCOT in future years. In order to provide a reasonable likelihood that a new fossil-fueled generating project will be built (and thus appropriately be included in the calculation of the ERCOT generating reserve margin), GATF recommends adding the requirement for a project to have a SGIA and a TCEQ-approved air permit.

Changes to the ERCOT CDR format

The GATF was concerned that there was some confusion by various parties related to the “official” ERCOT reserve margin since multiple reserve margin percentages were shown on the ERCOT CDR summary page. Specifically, there are four different reserve margins shown for each year of the study period:

- The “official” ERCOT reserve margin
- The “high” ERCOT reserve margin (with all “mothballed units returned to service)
- The “low” ERCOT reserve margin (with no “mothballed” units returned to service)
- The ERCOT reserve margin based on the “publicly announced” new capacity

To eliminate possible confusion while at the same time provide additional information to the market to reflect new generation that could enter the ERCOT market but was not included in the “official” reserve margin calculation, the GATF recommends the removal of the “high”, “low” and “publicly announced” reserve margin percentages to be replaced by the addition of one line item designated as “Uncommitted” resources expressed in megawatts (MW). “Uncommitted” resources would include:

- Remaining “mothballed” capacity not included in the “official” reserve margin calculation,
- Remaining DC tie capacity not included in the “official” reserve margin calculation, and
- New generating units that have initiated transmission interconnection studies through the ERCOT generation interconnection process (note that new wind generating units would be included based on the appropriate discounted capacity value applied to existing wind generating units).

This “Uncommitted” capacity value (expressed in MW) will be shown on the CDR and will allow market participants to make their own projections of ERCOT reserve margins based on a more “optimistic” view of future capacity additions. In addition, the GATF believes that the concept of “Uncommitted” capacity may also align future ERCOT reserve margin calculations with concepts currently used by NERC to measure system reliability. Specifically, NERC defines “Uncommitted” capacity resources as resources that include one or more of the following:

- Generating resources that have not been contracted nor have legal or regulatory obligation to deliver at time of peak.

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- Generating resources that do not have or do not plan to have firm transmission service reserved or are constrained.
- Generating resources that have not had a transmission study conducted to determine the level of deliverability.
- Generating resources that are designated as energy-only resources

While the NERC definition is not exactly the same as that being proposed for ERCOT, it does begin to move ERCOT closer to the NERC definition, which may become mandatory at some point in the future.

Figure 2 below shows the GATF-recommended changes in the CDR format:

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Resources, MW	70,756	71,577	70,693	70,632	71,208	71,245
Reserve Margin (Resources - Firm Load Forecast)/Firm Load Forecast	16.9%	15.2%	11.8%	8.9%	7.2%	4.9%
Uncommitted Resources*, MW	0	6,575	8,300	10,535	14,000	12,302
Total Potential Resources (including Uncommitted), MW	70,756	78,152	78,993	81,167	85,208	83,547
* Uncommitted Resources includes: "Mothballed" capacity designated as unavailable to ERCOT, 50% of Asynchronous Ties and new fossil and wind generating units with transmission interconnection requests in process (but not with a Signed IA). Wind generating units are discounted by the same factor as applied to existing wind generation.						

Figure 2 – Proposed CDR Format

Endorsement of GATF Recommendations

The two changes recommended by GATF (as well as the recommended format changes to the CDR summary page) were recently reviewed and endorsed by both the ROS and

the WMS. The ROS, at its February 15, 2007 meeting, reviewed the changes in the reserve margin calculation methodology recommended by the GATF and had no objections to those changes.

GATF Recommendations to TAC

Based on the above discussion, the GATF (after due consideration by both ROS and WMS) makes the following recommendations to TAC related to changes in the existing ERCOT reserve margin calculation methodology:

1. Use the ELCC for wind generating units as determined in the ERCOT January 2007 LOLP study (8.7%) and update the ELCC value every two years.
2. Include any future fossil-fueled generating project in the ERCOT reserve margin calculation only if the project has both an SGIA and an air permit from the TCEQ.

In addition, the GATF recommends that the format of the ERCOT CDR summary page be modified to:

1. Delete the calculation of:
 - the “high” ERCOT reserve margin (with all “mothballed units returned to service),
 - the “low” ERCOT reserve margin (with no “mothballed” units returned to service) and
 - the ERCOT reserve margin based on the “publicly announced” new capacity.
2. Add a line item entitled “Uncommitted” resources, which would include:
 - Remaining “mothballed” capacity not included in the “official” reserve margin calculation,
 - Remaining DC tie capacity not included in the “official” reserve margin calculation, and
 - New generating units that have initiated transmission interconnection studies through the ERCOT generation interconnection process (note that new wind generating units would be included based on the appropriate discounted capacity value applied to existing wind generating units).