RPG Meeting
August 19, 2014

Agenda

- Welcome and Antitrust Admonition
- Miscellaneous Updates
- POI to MIS Website Transition Overview
- Phoenix Project (Panhandle) ERCOT Independent Review Update
- Valley Import Update
- 2014 LTSA Update

Misc. Updates—Jeff Billo

- RTP: Reliability analysis at end of phase of study, G-1 N-1 , X-1 N-1 analysis, team wrapping up, hope to have posted soon. Next stage economic transmission planning analysis.
- Jeff Billo informed the group that ERCOT is hosting Powerworld training in October. More info can be found on the Powerworld website.
- Bradley Bell provided an update on PLWG activities.
- Q&A: What is the status of the West Texas Export Capability study that ERCOT presented the scope in July?
    - ERCOT Planning and Operations are working on the study and expect to have the results in September.

POI to MIS Overview—Jamie Lavas

- Decommissioning POI and moving all information identified to keep over to MIS
    - October 16, everything should be accessible on MIS
    - November 1-14, redirect to MIS from POI
    - November 15, POI no longer accessible
- Digital certificate is required to access MIS
    - Obtain digital certificate through User Security Administrator (USA)
    - Contact ERCOT Client Services if you do not know your USA
- Mapping document provides list of current POI products with information on whether the product transitions to the MIS, is deleted or archived, the new name of the MIS product and the posting information. NOTE: This list will not be maintained.
    - http://www.ercot.com/services/mdt/index.html

DATC ERCOT IR Update: Panhandle—Fred Huang

- DATC Project Status
  - End of ERCOT Independent Review: November 11, 2014
- Panhandle Renewable Energy Zone Study
  - ERCOT completed PREZ study in April 2014
  - Identified challenges and needs to integrate large wind generation capacity in the Panhandle region
  - The results provide a roadmap to both ERCOT and TSPs that includes the upgrade needs and the associated triggers in terms of wind generation capacity in the Panhandle
  - 2 key main constraints: stability challenges & system strength: panhandle export, in terms of weak grid
  - Requires several system strength enhancements: trigger point for us to understand what can happen, (slide 8), what can go wrong, what does the system need to be reliable
  - Upgrades considered economic projects
    - Identified to provide most effective system enhancement for stability and system strength
  - Stage 1 upgrades were identified in the PREZ to increase the Panhandle export to 3500 MW
- Constraints and Needs
  - Panhandle Export Constraint = 2965 MW
    - 2400 MW used for CREZ and PREZ
  - Based on PREZ results, following upgrades needs to reliably accommodate 3155 MW wind generation capacity
    - Add second circuit on the existing Panhandle grid
    - Synchronous condenser
    - Reactors
- Economic Analysis
  - Assumed all west Texas series capacitors are in service
  - In the Operations horizon, the Panhandle export limit is assumed to be enforced at 90% of the limit (90% of 2965 MW)

- Q&A: On next slide showing with signed IA, whole bunch of people signing up at 5,000 MW level. What was the original design intent for the Panhandle when we were doing the CREZ?
  - Originally CREZ design in 2008 was to accommodate ~5,500 MW for Panhandle region. The current implementation in Panhandle is based on the reactive support in the initial build case recommended in the CREZ Reactive Study done in 2010 to accommodate 2400 MW in Panhandle.
- Q&A: in slide 8, you have a pre and post wind control, system strength, what's the 3rd color mean?
  - The plots include the actual unstable responses from a wind power plant connect to a weak grid in ERCOT. Other two plots show the improved response by adjusting the wind plant controller or enhancing the system strength.
  - The system enhancement includes some options, like add new transmission circuit or synchronous condenser.
- Q&A: How many thousands are we observing here? (slide 9)
  - It is in the range of 5000-6000 MW
- Q&A: When you say they're considered economic projects, does that mean there was an actual production cost savings test performed?

- As stated in the PREZ study report that the Panhandle upgrade is considered as economic project since we can re-dispatch wind generation in Panhandle to meet the reliability requirements. We also performed an economic cost analysis for this project to compare the cost saving and capital cost of the entire upgrade needs that are included in this DATC update presentation.

- Q&A: Can you tell us what slightly means? (slide 12)
  - Slight increase, less than 100 MW.
- Q&A: Can you comment on dynamic load model used for study?
  - We do not include for this assessment, zero load in Panhandle, don't anticipate load model will affect the result. This is consistent with pervious panhandle studies.
- Q&A: Are you saying that the exemption of LVRT requirements for the old wind plants is being checked again for the system reliability?
  - Yes
- Q&A: Do the models you're using for new facilities meet all the ERCOT requirements?
  - So far we try to get a model provided by the resource entities and some of the models show they have better capability than others.
- Q&A: Do we have an idea if this could this reverse where we have less fortunate interconnection sites for new wind plants connecting to the system?
  - For this one, I think we have a good data set and the reason is the 3,155 has been there for months and we don't have an additional one so there's no update.
- Q&A: Are we going to have a different export limit if the next new wind plant connects to different location?
  - That's correct and that's why you see this difference.
- Q&A: With the upgrades, something greater than 3155, we were looking at 3500 earlier. Do you know what that new limit would be?
  - Good question. Go back to PREZ comments earlier, depends on location and size of next project.
- Q&A: Explain what the savings numbers mean.
  - Base case: no upgrade, constraint of 2669 MW, we perform production cost analysis to get that cost.
  - 2nd case: With upgrade, no limit, another analysis, comparison if the cost difference is bigger than criteria,
  - $7.4 M and $21 M are the actual cost savings you calculated from the analysis?
  - $7.4 M is calculated savings, $21 M is what would be needed to meet the economic project criteria for justification.
- Q&A: Did you take a look at what would the value or improvement if you only put in something like the synchronous condensers. If you just did that, did that get some value?
  - What we learned from panhandle studies is only partial upgrade as identified here will help, but with very marginal incremental benefit. The entire upgrade provides the most benefit to the area.
- Q&A: It seems like the actual number will be something less than 2965 because you don't actually use that as operating limit.
  - We use 90% just to be consistent with PREZ study. In real time operations, the margin can be changed based on the system condition, but 90% is still a good projection.
- Q&A: What's going to be the thing that triggers next review?
  - Jeff: We'll continue to monitor interconnection status; we have a good enough feel for when we think the next round of studies will need to take place. I'm hesitant to put a number out right now, we know some people are concerned that the number has changed

since PREZ. It's sort of a sliding scale by area. We have some comfort with what the capabilities are and we're going to monitor that and keep an eye on that.

- Q&A: In economic analysis, you assume that all series capacitors are in service. Is this assumed 90% limit, does that change if we decide relative to other discussions that are going on, that the series capacitors are all going to remain bypassed for a while? Does that change that 90% number? When you do economic analysis does that change the number?
    - Jeff Billo: Yes, that would change the answer. We did not perform a full blown economic analysis for that scenario. Assuming all the capacitors were out that wouldn't make enough of a difference in this case to change the answer, though. Our assumption right now is that long-term, all capacitors would be in service. If this changes, we'll want to rethink that, but if they'll only be out a year or two, economic transmission planning theory would tell us to consider the long term condition of our study. If long-term thinking changes and those might not be in service, we would want to redo analysis.
- Q&A: Continue monitoring the Panhandle. Going forward—SSWG, DWG, moving into version 33, will you also move or will you continue in 33?
    - Moving forward we will use the best base case we have available.
- Q&A: What is the total Panhandle wind generation capacity required to consider the upgrade needs meet the economic project criteria?
    - ERCOT will continue to monitor the generation interconnection activities in Panhandle. If any new projects meet requirements in planning guide, we'll put that into the case to check the system response.
- Q&A: Transfer study. Some series caps can be put into service…would we update this review if we had some kind of intermediate level of series caps put into service.
    - Work closely with resource integration to understand the status of all series caps when we perform the analysis. Will update the case once the decisions are made for series capacitors in west Texas.

Valley Import Update—F. Huang

- Based on the Frontera announcement, total gas capacity in area will be reduced to 1245 MW (slide 2)
- 2020 low forecast for valley is 3205 MW
- Summary: the valley load that can be served reduced a lot. Working on dynamic stability analysis to address the needs, including the impact of the new generation. We will closely revise the dc tie assumptions moving forward in our analysis.
- Study case: 2016 summer peak (SSWG, March 2014)
- Base Case condition:
    - All Valley Gas generation at Pmax
    - Lobo-North Edinburg 345 kV in service (with series capacitor)
    - North Edinburg—Loma Alta (Cross Valley) 345 kV in service
    - Valley Wind Output=10% dispatch
    - Railroad DC-Tie no import/export
    - Turn off entire Frontera facility
- All identified contingencies indicate limitation to serve projected 2016 Valley load
- ERCOT working on dynamic stability analysis
- ERCOT working with TSPs and RPG to evaluate project alternatives to address reliability need

- Q&A: When you said all Valley generation Pmax, does that include mothball?
    - No.
- Q&A: Slide 6, Slide 4, it appears that under N-1 you'd be unable to serve 2016 summer loads
    - It is based on N-1/N-1 or N-1/G-1, not just N-1
- Q&A: Austin Energy: in assumptions you said no import/export from the RR DC tie. If Frontera is available, where is output going?
    - They'll be generating into Mexico system.
- Your assumption was Railroad DC tie, no import or export.
    - Zero import/export through DC Tie in this PV analysis
- Q&A: In 2016, will the Cross Valley project be in service?
    - We assume.
- Comment: Slide 3, available capacity in Starr county, we have a wind farm that's going to be operational in October of this year. I don't see it on the list. 200 MW. I assume it'd be in the base case.
    - All generation projects that meet the planning guide requirements were included in analysis.
- Q&A: sensitivity to this study: presumably Frontera is leaving for CFE, would it make sense to model the DC Tie as an export as well?
    - Recent history DC tie exporting particularly over summer, the conditions that we're talking about here are first contingency system adjust, second contingency. I think it's a question should we plan that a valid system adjustment is to cut the DC tie. By protocol ERCOT can declare a system emergency to cut the tie export. If you look at the Valley, 300 mw, that's about 3 years of load growth….if you're serving that (exporting). Interested in hearing thoughts.

LTSA—D. Murray/H. Xiao

- An issue was found in how energy efficiency was accounted for in the load forecast of the High EE / DG scenario
- Working to redo the forecast adding the correct amount of energy efficiency and will rerun generation expansion for the scenario
- Comparison of Load Forecasts
- 2029 Retirements and Additions
    - Retired wind capacity set at 8.7% of nominal
    - Solar capacity shown at 70% of nominal
        - Based on solar profiles at 13 weather stations
    - Retirement decisions based on unit age

- Q&A: Energy efficiency was not properly accounted for in the scenarios. The High EE/DG scenario will be rerun after the forecast is adjusted.
    - It was not done properly in any of the scenarios but it will certainly have the largest impact in this scenario.
- Is this the only scenario you're going to re-do the generation expansion?
    - Will take a look and see if the impact is large, we'll likely go back and do a couple of the others.
- Q&A: What are you including in the energy efficiency bucket? Price response demand as well?
    - In this case, price response demand was done as a resource in the generation mix. So this would be what was considered energy efficient (like changing windows in a house). In this scenario also some DG.
- Q&A: Is most of this DG coming from residential solar?
    - Utility scale solar is done as resource, residential solar is not.
- Q&A: What's the criteria for retired wind?
    - In the Current Trends scenario, all retirements are based on fixed ages.
- What is that for wind?
    - For wind, it is 25 years.

- Q&A: Do you plan to revise the study to reflect the different level of generation expectation or how are you going to deal with that in the planning cases?
    - Wind is accounted for 8.7% in this presentation for information only. We're going to use the same criteria as used in 2014 RTP analysis. The capability of wind will be accounted for with the proper factors, based on the analysis or the report.
- Q&A: How much of coast generation retirement will be in Houston area?
    - Our plan is to post that information. The retired generators will be shown in the case.

- Q&A: What's the timing of the postings?
    - Currently we're building the cases. We'll post the cases, once they're ready. It shouldn't take too long.
- Q&A: Why are the new builds and retirements presented for North Central and South Central weather zones combined?
    - The breakdowns for all the 8 weather zones are on the next slide. The map will be too busy, showing all numbers for 8 weather zones. The next slide shows information for 2024 as well (map only shows 2029).

- Q&A: The net addition of generation is only about 6,000 MW is that correct? That doesn't seem like enough resources added between now and 2029.
    - The retirements include the capacity of the generators that are currently mothballed. In addition to the new builds that came out of the generation expansion process, the generation projects that meet the Planning Guide Section 6.9 requirements will be added.

- Q&A: Are you assuming that these are in addition to anything that has an IA or in addition to anything that has met Section 6.9 of the Planning Guide?
    - In addition to what has met Section 6.9. There might be some exceptions if projects are under construction. Same criteria we use for RTP.
- Q&A: Why did you decide not to add additional wind in these?
    - In the Current Trends scenario, wind credit (PTC) is not included in the generation expansion process and no new wind is built according to the economics.

- Q&A: Who should we send comments to and when do you want them in by?
    - Send to Jeff Billo and Sandeep Borkar.
    - No deadline, but the sooner the better.