

CLRTPG meeting notes  
Tuesday, February 05, 2008

1. Introductions - 5 minutes - Mark Graham:  
Attendees: Tom Green, Jerry Vaninetti, Brent Vossler, David Gustad, Shane Guitierrez, Morey Wolfson, Mike Mendelson, Mark Graham, Andy Leoni. Via phone - Ron Lehr, Bob Easton, John Collins, Bill Pascoe, Jared Griffiths, TJ Deora, Chuck Sisk, Dan Lyons, Eric Egge, Shawn Carlson, Wes Wingen, Matthew Stoltz. (missed several names of folks on phone)
2. Review Agenda - 5 minutes - Andy Leoni

Goal for meeting is to come away with consensus for resource levels and locations. Brainstorm some of the sensitivities for higher-penetration renewables, and set agenda for next week.

3. Temperature Constraints for Wind - 5 minutes - Matt Stoltz

Last Weds - it was -20 degrees and BEPC set all-time peak and some transmission problems occurred in Iowa, WAPA declared emergency, MISO had Square Butte reverse-inject on DC line and avoided shedding firm load.

It was very cold and very little wind. GE turbines have low-voltage temp alarms set at -22 degrees F so much of wind was not available, even if the wind had been blowing. High temperature limit is 104 degrees F.

This was new information and very informative. People need to be aware of this during mapping out these resource injections in the cases we put together.

Matt requested Xcel check their wind fleet to verify whether this is true. Matt suggests that we do not consider any wind on-line for peak summer, if this is the case.

Structural vs. Operational temperature limits may be different.

Ron Lehr - Do you have information regarding the temperature extremes as to when they occur? Matt can get.

They were not relying on wind when they had their temperature extremes last week, and they would not because they would plan their resources in a prudent manner to rely on dispatchable resource. PSCo is utilizing 12.5% resource capacity credit for wind over the entire year.

4. CSP Storage - 10 minutes - Eric John

Review of white paper on three methods to store energy from CSP plants. Mention given that could be used to firm wind. Three methods:

- Solar/thermal has a thermal mass (oil) that inherently has some stored energy (Nevada Solar I, Vegas area – large array south of city - has 30-60 minutes due to expansion vessel).

- Gas-Hybridization - SEGS plant in Southern California. Gas boilers augment the solar field. Project is bid into CAISO as firm.

- Molten salt - tanks store heated K/NA mixture. Example cited - project in Spain - can store 1020 MWh, which is 7 hours full load.

Summary - If we're looking out ten years - it makes sense that this sort of storage will be available, so it would be a reasonable assumption to model some of this type storage in the ten-year case.

Bill Pascoe asked question related to efficiency of Molten Salt Storage versus pumped storage Hydro. Eric did not have exact number(s) at fingertips, but noted two energy conversion cycles and associated losses required in pumped Hydro. Molten Salt Storage stores the heat collected from the array and losses are due to storage and heat exchange losses.

Ron Lehr - Made point that total loads need to meet total resources. Xcel uses 12.5% capacity credit for wind in their plan. Need to look at as additional resources in order to meet loads.

Bill Pascoe – Purpose of this study is to determine transmission adequacy and we should use 0 and 100% for wind in the study. Other credit factors could be used for Resource Plans. Group tended to agree, in principle, as study approach. PSCo did a study that looked at all resources on summer peak period and associated a 12.5% capacity credit for wind at summer peak. Do get a slight diversity factor - 12.5% of 2300 MW = 290 MW. They have 16% other planning reserve incorporated (approx. 1000 MW), so even if 0 MW wind was on at peak - have covered their reserve requirement with 16%.

5. Action Items from previous meeting:

- a. Define "Benchmark" - Tom Green: Complete – No comments or changes.
- b. Review RPS ratings spreadsheet, compiled by Xcel, and comment / change – All:

Numbers and technique appear acceptable. Shown later, but TSGT resource planners moved numbers around in order to better reflect anticipated renewable mix to meet 1281  
John Collins sent his numbers to T. State and Xcel.

- c. Suggest ratings and locations for "RPS" level renewable resources- Joe Taylor – Complete: PSCo submitted to group. Some levels, consistent with 5.b. above, and injection locations were changed by resource planners.
- d. Provide input on "Major Infrastructure" List to Dave Gustad - Received some feedback.
- e. Light load - determine generation level for wind. Use 0% for summer peak; 100% for off-peak case.

6. Major Infrastructure List - 20 minutes - Dave Gustad - Need comments from WAPA...

7. 2018 Resource Review - Ratings and Locations - 60 minutes - Dave Gustad

- a. Began discussion of what resource ratings and locations would be used in the “Benchmark” case. An example was shown with resource nameplate ratings and possible injection points. Several stakeholders expressed concern / dislike for resource distribution. No consensus reached on using single benchmark and two other alternatives discussed.
- b. Abandon “Benchmark” term and develop for discussion three different resource distribution allocations. Began developing other resource allocations. In summary:

- Scenario A – “Resource Planning” scenario to meet minimum requirements at high and low wind
- Scenario B – Wyoming Wind replace Colorado Wind – Bill Pascoe to submit
- Scenario C – Distributed based on GDA potential

Does David have enough information to try and plug in the resources agreed upon to get a case to solve? Yes – start with the 2018 case.

What about full gas and wind at Pawnee? Would not be on at full-output in same scenario.

- c. High Wind – Need to address this scenario in order to propose enough transmission to accommodate full output of proposed wind installations. How much are we putting in an aggressive demand-response load scenario? 2018 load forecasts have taken into account some amount of demand reduction.
- d. Export – Morey W. – need to have an export strategy at some point. The group should not just study minimum requirements. Possibility of placing high export scenario with HPX or as economic study proposed. Vaninetti stated this is a Rocky Mountain area study for folks to develop transmission plans to serve loads. Some export was studied already in HPX.

If there is a stakeholder request here – shouldn’t there be a response? What is the cross-over between CLRTPG and HPX? Where is the coordination?

We need to get started on transmission alternatives to meet 2018 loads here – first – it’s not “no” – let’s address at some point. Define a minimum transmission system to meet load and keep those folks out of regulatory trouble. Jerry - these folks are being very responsive, perhaps there is a political agenda that doesn’t belong here. This group is being very open to all suggestions and trying to optimize the transmission additions - thinks that’s fair. TG – There could be a section of the final report to address how the plans developed in this study fit into the larger HPX picture.

- e. Alternatives – High Solar, 30% penetration, need to be established -

## 8. Action Item Review:

- a. Develop three scenarios:
  1. Resource Planning – David G.
  2. Wyoming Wind replace CO Wind – Bill P.
  3. Distributed based on GDA potential – David G.
- b. Put together Utility summary L&R sheets to be distributed by next week. – Andy L. Need to establish some baseline first and make sure the L&R deficits addressed. “Use L&R to determine what we have to work with”
- c. Someone has to look at the high-renewable scenario (Joe, Ron, Morey working on?).

## 9. Next Meeting Agenda Items:

- Review L&R’s
- Review Scenarios
- Start on Transmission Alternatives