Reliability Working Group Meeting Notes - February 6, 2013

Draft dated February 7, 2013

Attendees:

City –	**Consultants –**	**Community –**
• Bob Harberg	• Tom Ghidossi	• Jim Look
• Kathy Haddock	• Bob Lachenmeyer	• Burrell Eveland
• Heather Bailey	• Warren Wendling	• Pete Baston
• Andrew Barth	• Darcy Swaney	• Puneet Pasrich

Meeting Overview:

Packet dated February 6 handed out by Bob Harberg – updated from the packet posted to Basecamp on February 5.

- Overview and responses to questions and answers in packet provided by BH
    - What are the strengths and weaknesses of Xcel's System infrastructure in Boulder
        - Documentation of what has been seen in and around Boulder
        - Pete – There are different requirements for microgrid systems if you're going to analyze those in the future – the future may be very different than what we're currently mapping.
        - Bob – SmartGrid is unknown – we're not sure of what its capabilities are.
        - Pete – SmartGrid is not what Xcel has promised or what they said it was going to be. It's a project that went wrong, but nobody knows what or why it went wrong. City will need to start over.
        - Puneet – Xcel went through three full teams of project managers during three years of projects. PMs were fired for having too high of an energy decrease in homes. The wanted a load reduction of a certain percent and they were seeing higher than that. We could see too high of a load reduction if fixed. Wouldn't be financially feasible. City needs to look at a scenario with no load growth to not fall into the death spiral.
        - Jim – SGC here is unique. It may or may not have future value to the city. Fiber optic could be useful, but we're not sure because we don't know what it is.
        - Pete – When you look at the goal from the end it appears something has changed from the beginning.
        - Puneet – Xcel learned things they don't want to replicate, but there are other things they learned that they shouldn't replicate. Anecdotal.

- Bob – Communications system over power line – Broadband over power line.
- Tom – There does not appear to be data or manufacturer support for the equipment they installed. It will work as long as it will work but we don't know how long that will be.
- Pete – Siemens should have been in the lead because they have developed functional equipment that has been deployed in other areas. This looks like a marketing piece instead of an engineering piece. Xcel hasn't provided info on what went wrong.
- Tom – Fiber system seems to be of use and can be built upon. Can be used for other purposes. It appears that sectionalizing of a few circuits was deployed.
- Pete – It would have to be an abandoned sale. It is rare that you see that form of system. Ethernet and BPL merged. What else is involved?
- Puneet – First filing with PUC indicated they wouldn't pass to much of the charge onto customers. I investigated what it would cost to install fiber and it was very much less.
- Tom – There are some interim things that can be done to improve reliability, but I've been working to understand SmartGrid and what it means. If the city moves on the muni, the new picture of SmartGrid needs to be carefully determined. Really, the overarching goals must be created, limitations, payoffs. At this point, we're looking at the reliability in a system at day 1 and day 2. We're not going to solve reliabililty with SmartGrid until we can really dig into the system. Bob Lachenmeyer is working on this now. We must investigate further. What can we do in the initial stages to improve reliability in first couple years. Within first 5-10 years, we ask where do we go now. We don't know what will be there because it's changing so quickly. I'm looking at what's the immediate. It's what we will live with. We can improve on SmartGrid, we don't want to throw it out.

- How does Xcel provide reliability through on-going administration, operations, maintenance, monitoring, control, dispatch, project management, customer service and response procedures?
  - Bob – We have limited data. Know they have a Boulder Division. Operations. They have local crews and pole testing. Seen line patrols and vegetation management at some level. SCADA at substations. Still struggling to understand what they've dedicated.
- How does Xcel Energy provide power generation and transmission reliability?
  - Bob – We've learned a lot in the last month. We've incorporated understandings into model
  - Burrell – Planning reserve margin – only thing utilized is adequacy reserve margin –
  - Warren – WEC – broke it down into sub-regions. 14.5% for summer and 14.68% for winter.
  - Heather – The fact that we've built in 15% reserve margin makes us adequate

- Warren – Yes. Weather abnormality. Unit size and build up – If you have 200 MW load and 4 – 50 MW purchases – you need to have a 25% reserve margin
- Burrell – Boulder problem – What you can count on for solar – we know what we have by looking at the system on a peak day. Wind is the same. My experience – their actual on the hottest day, they got half of 1%. There are ways of dealing with resource adequacy.
- Heather – Our plan is to look at those methods. Look at ERCOT. Sophisticated demand program. It's hard when you're a small load. We model it by resource type. Under that scenario is 15% adequate reserve margin.
- Burrell – 15% is very safe. 13.5% is what people hang their hat on.
- Warren – Page 8 – middle – summary of 2012 PRPA integrated resource plan. They use 15% in general but have additional criteria. See page for additional criteria. PSCo gives a 10 and 12 for solar. It's negative load. They don't capture that and they don't have a big plan for demand response.
- Jim – Diversity of supply is a bigger issue for us to look at.
- Heather – There are entities waiting to come help. They need contracts and transmission. And Xcel has constrained transmission.
- Tom – Additional sectionalization of the transmission system should be considered, there may be a benefit of installing additional breakers at Sunshine and Leggett substations.
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- What is the existing level of Xcel Energy reliability as measured by the SAIDI and SAIFI?
  - Bob – Included attachment on QSP report they filed on April 1, 2011. Average over past few years was calculated by Jonathan and is 85 and .85 which were adopted by council as metrics. Other reports on file with PUC.
- Are there other reliability aspects of the existing Xcel system that should be considered?
  - Bob – Smart Grid fiber optic network. Broadband equipment. BOB will expand on. Tom thinks existing feeder network is adequate for what it is supposed to do. We could consider additional protection in control devices. Interconnected generators.
  - Puneet – Does Xcel have a documented map of their distribution grid? IS that ad hoc and not documented?
  - Tom – We have one from 2012 – AutoCAD. Lots of data but limited in it's areas. Some not accurate, there was some guessing. Map compared well what we looked at and what we've been able to do in the field. Difficulty is understanding underground components. We have entered items into GIS and it's easier to use and understand. Transformer model. GIS modeling is detailed with poles, capictors, feeders, regulators – there is some things missing. Had to go do detective work to see what was actually there. The map was for SmartGrid which was for fiber optic installation. It is a good 85 to 90 percent accurate. It's quite accurate in core areas of town, but mountains and other outskirts are a little tougher to discern

        - Warren – This is not PSCo operational GIS.
        - Tom – We could do more detective work but it would have marginal improvement on existing information. 30 to 40 percent is underground in Boulder
- How and to what extent has Xcel Energy incorporated and considered redundancy, firm capacity, power quality controls, reserve margins, common-mode failure scenarios?
    - Tom – Redundancy I feel good about. Although they load their transformers higher than Ft. Collins, They have their system set up in such a way that a substation could pick up the outage and not overload the system. A utility the size of Xcel has mobile units they can bring in and help in an outage. It's going to be difficult to replace mountain system (transformer) at Boulder Canyon Hydro and there is no backup onsite. It's important when looking at reliability, it's different from concerns of large company looking at large territory. Distribution system is set up and is looking good. I've seen more regulators and capacitors in the system than are on the map. There is application of equipment that is designed to maintain voltage and bandwidth and customer quality. Have seen lightning arrestors. Looks good. A bit concerned on grounding on poles and underground. In general, Xcel's practice is good, but how well has it been maintained is unknown. Grounding is critical and can be measured and checked. Pole may stand, but downlead is gone. Should be investigated and assessed. In general – the system, on its basis, looks good. But is it being maintained adequately? Concerned about part of SMartGrid – BPL bridges. We can't find data. Equipment is unknown. Installed "creatively." There are 4,000 of those. Not sure if they're usable or not, or if they need to be taken down if they're detrimental to the system.
    - Bob – We also don't know about asset management and construction documentation/inspection. These are important aspects that affect the reliability of the system.
- Are there other reliability elements of the existing Xcel infrastructure that should be factored into the reliability analysis?
- What are the reliability requirements based on NERC?
- What are the reliability requirements based on WECC?
    - Warren provided info on handout. For both previous questions.
    - Warren summarized.
    - If the city had a transmission system, the requirements would be raised and additional reqs would be involved.
    - Warren – These things sound daunting, but there are specialized people who can do this.
    - Burrell – There are scheduling companies that do this for many munis.
    - Bob – Financial model considers items for scheduling. Personnel funding incorporated.
- Are there other reliability regulations that should be considered?

- Warren – Adequate Level of Reliability – see handout. Keep system under control. When something happens, you fix it and others aren't affected. Not cascading across whole system. It's keeping the lights on all the time and supplying the power you want when you want to.
- Tom – It's reactive, not prescriptive. You can't ask what they would suggest. You just do what they say. Don't screw up. Key with NERC is follow through on what you say you are going to do or pay the consequences. Vague definitions. Make sure you document it.
- Burrell – City of Bellview Document – Puget Sound – see Burrell's handout. They spell out their requirement and the parameters for franchisee. That's an option for franchise agreement if Boulder doesn't form muni.
- Heather – It holds them accountable.
- Pete – They set incident areas. They know what to do in specific areas.
- Burrell – Do a risk assessment. Identify risks and have costs associated. When you talk preventative maintenance budget, you go as far as you can down the risk list. Use largest users to help identify grid risks. Work together. Customer-centric
- Tom – What drives this is that Boulder has a set of community goals and desires related to the environment and customer service. Boulder could do things that are more of interest that are aligned to its community's goals. Don't have to look at large service area.
- Burrell – Look at City of Burbank in CA. They've paired with large customers and have had them front the money for new tech and renewable energy ideas. Might not be practical for the small muni, but big users with deep pockets can. Studios are leading the way. Studio sets targets and pays more when they're reached by local utility.
- Pete – Local labs are getting paid. Go ask them about where the money is going

o What methods do other communities and utilities use to assure reliability?

- Bob – Have looked at other communities. See spreadsheet. Ft. Collins is city that is most similar – similar load and customer base – larger service area population – similar business area population – Their shooting for less than one with SAIDI. APPA RP3 program – Summarized in document – Benchmarking info as well from Ft. Collins. – APPA Benchmark study in 2012 (handed out) and will be posted to Basecamp.
- Heather – Boulder is considered a large municipal utility. We want to make sure that our total overall dollars for the region looked reasonable. Does this look right?
- Bob – keep in mind – APPA west area is a diverse group. Boulder is compact compared to Ft. Collins and Loveland. Please provide feedback on handout. Burrell said to add safety training and manuals/programs
- Burrell – have that from day one. You risk having issues immediately. Munis are magnets for lawsuits. You will lose some cases.

        - Heather – We're funding self insurance reserve.
        - Kathy – We have governmental immunity that will help with some claims. Must prove negligence and damages are limited.
        - Burrell – Missing line losses from transmission lines. We will pay for what is lost. Depends on sources distance. 3 and 3.5% for every MW generated somewhere else.
        - Heather – I think we have line losses built in somewhere. It's in resourced modeling
        - Puneet – It's in the PPA.
        - Warren – Xcel will hammer you with that. Make sure you analyze that.
        - Puneet – ON handout – This is the cost of running distribution utility but not cost of purchasing power to supply system. $350/year = $30/ month – what is the average load that we're – our rates would have to be high to sustain $30 a month
            - $632 is our average
            - Puneet doing the math – once we know these numbers, we'll see the margin of what we have to buy power for and sell it for. (Match or beat Xcel's rate) – this will inform resource group.
        - Burrell- Capital replacement – concerned that Xcel may have had policy that Boulder will break so we're not spending money and that will doom the system and you will have to spend a lot of money down the road.
        - Tom – I analyzed for that. Looking at 20 years down the road to have the system of the future that we want, so costs are definitely going to be higher.
        - Heather – In first few years, you're trying to figure out the ins and outs of your utility, after that is when you start getting into system improvements.
        - Burrell – you should standardize improvements and growth of system equipment. Less training and better training in the long-run.
        - Heather – Ft. Collins has done that – substation standardization – hard to find. That's good best practice and a great example.
        - Pete – Problem in industry at the moment – utility spends little on R&D and should probably spend 10%. R&D prevents maintenance.
        - BOB – page three is a listing of startup costs. Take a look.
        - BOB – Integrated utility system could be very beneficial – Water – power – telecom- We ask Xcel to tell us each year about their plans for work and they rarely tell us anything.
    - What are the reliability expectations and desires of residential and business customers?
    - Are there other industry reliability indices or standards that should be considered?
    - What procedures and investments should the city consider to increase the level of reliability?
- Bob L – Future distributed generation and demand management – Page 23 – Utility of the future.

    - Comes down to leveraging technology.
    - User-centric point of view to understand what is going on in your system to benefit users.
    - As you make system more complex – leverage tech and users
    - Bob H – Resource model has identified penetration rates for distributed generation
    - Heather – All models have different levels – How fast can we reduce and how much can we do.
    - IT's not about reducing costs its about being more effective
    - Jim – Talk to Ft. Collins about demand reduction – they haven't achieved goals and they've been modest goals.
    - Heather – We have had achievements that are higher than Xcel's system as a whole, but haven't achieved goals completely. If you want to succeed in EE, a model based on generating revenues tied to sales is not a good business models.
    - Tom – We're trying to get as much as we can out of the system, so the good is better and people can use if for more productive items. Lower cost electricity, with reliability allows for more innovation availability.
    - Bob L – What we think of as costs may go away if we make the system better. No need for backups and major redundancies.
    - Pete – New Belgium Brewery example of efficiency.
    - Bob L – Brewers are looking at the whole system. System wide optimization will allow for greater efficiency. Today's utility is looking at pieces of the process, not the whole.
    - Tom – Is there risk that these concepts will not fly by regulatory bodies.
    - Kathy – NO – A muni will not answer to the PUC
- Puneet – New Silicon Valley SEEDZ – Smart Energy Enterprise Development Zone – looking at power quality and not power cost – Voltage frequency – no sags and swells – no blips and spikes – how power flows
- Burrell – So Cal Public Power Agency – They allow other munis to buy into a percentage of their generation and transmission improvements – Combo on projects.
- Pete – Parallel power processing – different procedures – big avenue for that – 240 volt AC
- Bob – Next Wednesday, Feb. 13 – Joint group meeting to share modeling – Deadline on Study Session packet go live – get me updates on existing info by this Friday, Feb. 8.