City of Boulder – Xcel Energy Partnership

100% Renewable Energy Working Group - Meeting

Date	March 31, 2022
Location	Zoom Virtual Workshop
Participants	Renewable Electricity Working Group Pat Hillmeyer, Peter Lilienthal, Ramesh Bhatt, Wayne Seltzer, George Craft *left at 12:30, Stephanie Hsiung Boulder Xcel Team Iffie Jennings, Xcel Energy; Zach Pollock, Xcel Energy; Carlos Hill, Xcel Energy; Carolyn Elam, City of Boulder; Matt Lehrman, City of Boulder Institute for the Built Environment Josie Plaut, Facilitator; Tom Hootman, Technical Consultant; Monica O'Reilly, Recorder

Workshop Objectives: Discuss the relationship between portfolio mix and zero emissions communities; Explore 3 different scenarios to reach Boulder's goal.

Workshop Summary

Topic	Notes
Welcome, Introductions, + Agenda Overview	*The group began with brief introductions including two new members from Xcel (Zach Pollock and Carlos Hill). The group reviewed the agenda and Josie spoke to the complicated and complex nature of the work – work that is pushing the frontier of energy and where there are not clearly defined paths forward. Boulder and Xcel are forging the way for these large-scale energy transformations locally and with communities across the country.*
Boulder Emissions Gap	*Matt acknowledges the technicality of these issues before presenting on "What is Boulder electricity CO2 emissions gap for 2030?".*
Understanding Capacity vs. Energy	*Matt explained the difference between capacity and energy. The key takeaway was that the proportionately smaller capacity for renewable energy is producing a proportionately higher quantity of renewable energy*

	and that both capacity and produced energy need to be addressed. In other words, in the short and mid-term there will be a need for some carbon-based resources to operate a reliable and affordable grid. Next, he poses the question of, "what is the resource portfolio that achieves 100% renewable capacity and energy?".
	• If storage is added to the capacity and manages to match storage against peak usage, you could then reduce the fossil fuel capacity, would that or would that not add to the energy on the right?
	  ○ *Assumes storage is connected to renewables and that this depends on many factors.*
	  ○ *Theoretically, this could occur.*
	• Are people familiar with Xcel Energy's Certified Renewable Percent, which goes above & beyond the Renewable Energy Standard?
	  ○ *The CPUC currently requires Xcel to be 30% renewable, but we go above & beyond with the Certified Renewable Percent. For example, Xcel was around 31% renewable for 2020 and will be around 35% for 2021.*
	• If my attachment rate with storage to solar goes up, and I put that solar storage behind the meter, what happens? How does that show if it's behind the meter?
	  ○ *It depends, for the purposes of today's concept, we would carve out whatever is happening behind the meter that may be 100% real or emissions free that we need to make up from the portfolio that is not yet 100% renewable.*
	• From a sales point of view, even if I'm self-consuming you still know what my total production is?
	  ○ *More nuanced, but essentially yes.*

Exploratory Scenarios	*The group explored three scenarios. The scenarios were not necessarily representative of vetted options as part of Boulder's pathway to zero emissions electricity but were explored for the purposes of discussion. The scenarios address how to approach grid capacity and energy production.* *Matt shared goals, framing, and definitions that are important to the discussion. Before moving on, the participants are asked if they have any clarifying questions.* • What kinds of assumptions are made regarding the renewable energy needs? ○ *For example, when forecasting Boulder's electricity usage by 2030, assumptions were made regarding electric vehicle adoption.* • Regarding capacity vs. energy, is capacity determined by legacy or are those numbers hypothetical? Is capacity based on our partnership with Xcel?

    - *It is the entire Xcel system estimated capacity by 2030.*
- Peak electricity will shift from cooling in the summer to warming in the winter.
- Are we more concerned with megawatt hours per year or per seasons?
    - *This question concerns nameplate capacity vs. production or energy. The firm capacity would be the reliability of a megawatt, then production or energy would be the kilowatt hours that we could expect to be produced from those assets over the course of a year.*
    - *This question also hits on if the capacity mix changes overtime, and that is not necessarily the case for total renewables and total fossil base because the loads are different. But there is variability in the source of renewable energy depending on the day.*

Potential resource portfolios that could achieve 100% renewable firm capacity + energy:

1. ***Portfolio A: Wind + Solar:***
    - Surprised by the much lower firm capacity for wind vs. solar. Does this consider when the wind doesn't blow? Is that why the firm capacity is lower than the nameplate?
        - *Yes.*
    - How do you account for behind the meter attached storage on the residential or commercial, if Xcel can't it?
        - *These numbers are assumptions.*
    - Does the 210MW of new resources close the gap or is this what we would need in total?
        - *This would be additional on top of Xcel's existing portfolio.*
        - *Generally, tend to model storage as not being constrained by only being charged by renewables.*
    - If more battery was attached to add to the wind, would that bring those firm numbers up to a higher nameplate percentage?
        - *If its directly attaches, yes, but a little bit irrelevant from a planning perspective.*
    - Are batteries used first to prevent curtailment of renewables, and then for storage and reuse when renewable production isn't happening?
        - *This is being done now with pump hydro.*
    - If we are optimizing the use of the battery, would we optimize it for lowest carbon emissions or for maximum profit?
        - *We do not know the answer to this question right now.*
    - To the extent that there is a trade-off between reducing emissions and reducing cost, how much are you willing to spend to increase

your costs to reduce your emissions? Does Xcel have a price of carbon they use for planning purposes?
    - *Yes, Xcel models in the social cost of carbon. In 2030, it is $68 a short ton.*

2. ***Portfolio B: Solar Only***
    - *Similar to the option with wind, but capacity and production met through utility scale solar.*

3. ***Portfolio C: Long-Duration Storage***
    - Do you have baseline numbers for each of these resources in terms of where we are at and how much each of these portfolios would add on? What level of change, in terms of utility scale resources and demand response, would need to happen to achieve these different portfolios?
    - Given that Portfolio C relies strictly on storage and demand response for the emission free generation, how does it meet goals?
        - *The primary benefit would be looking at Xcel's existing and future solar and wind, and adding storage so that the expected curtailment can be significantly avoided.*
        - *Leads to system level emission reduction by better utilizing the resources available.*
    - This assumes that Xcel wouldn't do something on their own to deal with the curtailment issue. It is hard to believe Xcel would continue to install renewables when the curtailment ratio gets high and not do storage on their own
        - *Depends on the price.*
    - There is a larger challenge of separating Boulder from the larger system. If Xcel is producing 80% or more of its energy from renewable sources, it's unclear how this or any of the plans gets at removing the remaining 20% of fossil fuels from the mix.
        - *Acknowledgement of the importance and difficulty of the questions. What is important is not the total percentage of renewables it's the total emissions to tons of CO2.*
    - Participant expresses confusion between Boulder's two goals: reduction in CO2 and increasing percentage of renewables
        - *Clarification that these goals are not separate, the goal of getting to 100% renewables is to reduce emissions.*
        - *This comment gets at the complexity of separating Boulder from the larger system.*
    - Is the idea that Boulder will develop these projects and own them?
        - *It's going to depend on what is built and where. There will be opportunities for both Boulder and Xcel to own part of the projects. There are many different business models and ways to finance.*

	• Project ownership will also depend on what strategies the City and Xcel pursue. We should be pushing for residential and commercial folks to get solar and attached battery to take advantage of the 21 months left of federal tax credits. • Another participant seconds the above point that local generation should be promoted from a resilience perspective. *Carolyn raises the following question to the group: what attributes must come with the plan to feel we have achieved success through our partnership with Xcel towards this goal?* • There are two intertwined goals of Boulder to get to 100% renewable energy and Xcel to get as clean as possible, the cleaner the Xcel's energy's sources the easier it is for Boulder to reach their goal. We can only succeed if Boulder goes beyond what Xcel is willing to do, which is 85%. • The goal and end metric is to reduce emissions. The 24/7 scenario is not realistic currently. • There is the issue of other Xcel customers benefiting from Boulder's initiative. • Success means that Boulder's energy use is really 100% renewable zero emissions but without shifting the emissions somewhere else in Xcel's network.
Closing Remarks, Next Steps & Action Items	*Josie acknowledges the difficulty in defining success in these scenarios and asks the group to reach out with further details, comments, and questions regarding criteria and strategies that meet their definition of success.*
Resources	*https://www.xcelenergy.com/staticfiles/xe-responsive/CO%20CRP%20Info%20Sheet.pdf*