Ridderbusch Testimony – Battery Storage Connexus Progress (*the Swiss Army Knife*)
Thursday, March 3rd, 2022, 10:30am

Good morning, I am Greg Ridderbusch, President and CEO of Connexus Energy; a consumer owned cooperative utility serving over 141,000 consumer accounts. Our service area includes all or portions of 8 counties, and currently 12 state senators and 20 representatives' serve constituents who are Connexus members.

Today we share progress and learnings on our first commercial MW class battery storage installation in Minnesota. I also will make our first public comments on a potential application of batteries as a grid tool we are designing for integration into a substation, primarily justified by capital deferral economics. It is important to say that battery storage applications are still in their infancy on the MN grid and that net economic benefits are still generally constrained by capital costs. We should also think about battery storage as differentiated by size, technology, and target economics among three very different grid locations; namely, the high voltage grid (think MISO, MRES, GRE), the distribution grid (think cooperatives, municipals, Xcel of course), and behind the meter (think your basement, commercial or industrial sites). My remarks this morning focus on distribution grid integrated battery storage.

While much development is underway to advance battery storage technologies, *and the prior discussion by Form Energy is a good example*, the key to understanding and unlocking the technologies' potential is by demonstrating their integration into the grid through relatively small-scale projects that allow operational observation and assessment. It is too deceptively simple to think battery storage is just banging solar electricity into a battery and then discharging it to help green the grid. The technologies are cool, but the real action is, <u>how to use them</u> and create economic benefits. Understanding and optimizing their use requires the knowledge and lessons learned from real-world applications.

To help understand the potential for battery storage, I'll offer my Swiss Army Knife as a mental image. It has many tools and uses, not just the <u>one</u> primary blade. Batteries are similar to my swiss army knife in that they are grid tools with multiple uses. It could include managing load to

reduce energy costs or deferring the need for more costly system upgrades. And in a given project several benefits might work together, or stack, to a total value stream for the investment.

This real-world assessment is something we've been doing at Connexus since 2019 through our 15MW, 30MWh, battery project split between the City of Ramsey and Athens Township. The project couples solar generation in a microgrid with the batteries and is focused on demand response and peak shaving. Substantial net savings contribute to keeping our electricity affordable for our members. We are pleased to report that our member savings from this project have been as expected. But importantly, we have also learned from this project how to use the batteries in concert with all of our load management solutions.

And we have figured out how to manage the seasons, including winter operations with snow removal from solar panels when the solar energy to be stored has high grid value. We use data analytics to optimize our choices and overall load management across our 1000 square mile grid. Our Distribution System Operations team manages the start, the ramp up and down, the on and off of all our load management solutions including the batteries over high-cost time periods; just like a conductor directing a symphony.

There is much we are still learning from our current solar-storage project, but along the way we began exploring the potential for batteries in what is termed a non-wires alternative use case. At the edge of our distribution system, we have a substation with slow growth that after many years is hitting its capacity limit over some summer peaks. Conventionally, we would simply build more wires, double the substation transformer, or both. But because the growth at this substation is so slow, that standard historical approach would be like building a whole new apartment building for a few families.

Installing a MW class battery at that substation can address the need that would otherwise require more wires or a larger transformer. This non-wires alternative is a different tool pulled out of our Swiss Army Knife to bridge substation capacity over the three hottest months and defer more substantial investments to a significantly later date. Stacked onto that base use case can also be load management, resiliency, and some day, perhaps even time shifting

renewable grid energy to fill gaps during other hours, or even arbitraging low-cost to high-cost time periods. In this way, modern substations that integrate battery storage with the transformer and controls, can economically strengthen resilience and overall preparedness. When we are ready to proceed, we are happy to share progress updates and learnings.

In closing, let me briefly offer an idea how MN energy policy can enable applications of the storage "*Swiss Army Knife*" to benefit consumers. In my observation, R&D investment into the storage solutions themselves is already robustly served by investors. The need that can really use resources is demonstrating battery applications across the grid. There is a portfolio of solutions that need to be demonstrated and *cannot be forced* until real experience is gained. And progress has been slow just due to the challenge of creating economics while storage costs continue to ramp down, and of course the outright risks of something new.

Connexus is convinced that the energy transition will need a variety of resources and tools, and that storage applications are important to MN's success. We are all aware of potential federal infrastructure funds that are grid targeted and we are appreciative of the Department of Commerce and Legislatures' work to bring federal funding opportunities home to MN. Our utility will continue to carefully and thoroughly proceed with economic grid innovation to serve our MN member consumers.

Thank you for the opportunity to speak on storage today.