Rachel Johnson (00:00):

<silence>

Rachel Johnson (00:24):

Welcome to Co-Op Energy Talk. I'm Rachel Johnson, the CEO here at Cherry Land Electric Cooperative. And I talk about it a lot so you already know. But I am justso wildly proud of our electric reliability here at Cherry Land because it's really best in class, it's best in the state of Michigan. It's something we work really hard at and we're really, really proud of. And this year we are preparing to make some significant investments, uh, in system reliability. And so I wanted to just kind of take some time this month on the podcast to talk about and preview that. And there is no one better to join me in discussing that than our ever popular COO Frank Siper. Thanks for joining us, Frank. Thanks

Frank Siepker (01:00):

For having me over today.

Rachel Johnson (01:01):

Every time you turn your lights on and they work, you should send a little spirited thank you out into the universe for Frank and his team, because they're the, they're the people behind the power there. So, Frank, I thought maybe to kick us off, you could just kind of talk about the sheer amount of infrastructure we own and maintain on our members' behalf and how electricity flows through the system to get to a member's home.

Frank Siepker (01:22):

Sure. You know, we're the distribution co-op, so we're, we deal with a distribution system that gets energy from the bigger grid, the transmission grid, where the, all the generation happens and where energy is transmitted along distance across, uh, across our country to get to the areas, the regional areas where cherry land is, for example, we have 16 points of interconnection with the big grid. We call 'em substations, electrical substations. And that's where we take the transmission voltage, which is a very high voltage, which is very efficient for transmitting energy over a long distance. We step it down to a distribution voltage, often called medium voltage, 12,470 volts in cherry land's case. And that's very high compared to what's in your home at 120 or 240 volts. But compared to a transmission voltage at 345,000 volts or 138,000 volts, 12,000 volts is, is a, is a much smaller voltage. It's much easier to manage in short distances and much more cost effective to install equipment, to connect things to,

Rachel Johnson (02:18):

And you're kind of have different line loss things that you're trying to manage. Right? So when you're moving it over long distances, you're more worried about line loss. So that higher voltage is, is better. But then once we get onto our system, we're kind of expecting a little bit of line loss at that lower voltage, but it's okay. 'cause it's not quite as long of a distance.

Frank Siepker (02:31):

Exactly. It's all about accumulating impedance. The farther you go, the higher that impedance accumulates and therefore you have to combat that with higher voltages to reduce those losses. The problem with the higher voltages is the connections and the equipment you use to connect to that is very expensive. Mm-hmm <affirmative>. So when you go a long distance with very few interconnections, you use a very high voltage. When you go a shorter distance with lots of connections, you use a lower voltage and you get in your home where you have a lot of connections in a very confined space, you use a lower voltage jet. So utilization voltage, but we use in a home or a service voltage, a hundred twenty, two hundred forty volts, um, very cost effective and very safe to work with, uh, compared to a 12,000 volt system or 138,000 volt system, or a 345,000 volt system.

Rachel Johnson (03:13):

So when that distribution voltage power leaves the substation, kind of just talk us through like what happens next?

Frank Siepker (03:21):

Right. So you, the poles and wires, you know, we see the sea run down the side of the road and through the fields and that those are, those are the power lines that bring power out to our, to our customers. Most of our system is actually trending towards underground now. Um, you know, we have about 12,000 pole mount transformers, but we have over 7,300 pad mount transformers. So not quite, not quite. Um, a third of our system is on pad mount transformers, but we look at miles of line, um, more than more than 46% of our system is underground, the wires that feed through the area. But ultimately, again, we're using poles and wires or underground cables to transmit that energy around our distribution system to get it closer to the homes. And then we use transformers, which I was just talking about that change the voltage. They transform it from a higher voltage to a lower voltage. We call those step down transformers to get that voltage down to something that's usable at the service point. So we've got 12,000 pole mount transformers, 7,300 pad mount transformers, so nearly 20,000 transformers scattered through our system serving 39,000 meters. So we have about about two meters for every transformer. Um, that's crazy. A little over that two meters per transformer is kind of our average. Mm-hmm <affirmative>.

Rachel Johnson (04:27):

Um, you talk about underground and overhead, and I, one thing that's been interesting to me, just even in the whatever, 12 years I've been at cherry land now, is a real transition away or toward more and more undergrounding. It's more expensive, it's more reliable. It has a slightly shorter life cycle. It takes longer to restore outages when they happen, but you have less frequent outages. So it's kind of like an interesting dynamic, but I'm seeing us just move more and more towards underground. Like you and I were talking earlier about the percentage of our next, of our 2025 work plan that's all underground. Yeah.

Frank Siepker (04:57):

87% of our work next year will all be underground construction on the work plan side and nearly a hundred percent of our new extension service to new members, new loads that is entirely underground with a very few exceptions, where the ground is just not right for burying cable for one reason or another.

Rachel Johnson (05:14):

So it's, it's interesting because you talk about that kind of about 50 50 dynamic, but if you look at where we're headed, we're certainly headed towards more underground and less overhead over time as we make investments. Yeah. We've,

Frank Siepker (05:25):

We've trended about 10% of our system from overhead to underground in the last 20 years. That's good. And it, it certainly, it's a huge reliability benefit in most situations. Again, the duration of outages on underground are usually significantly longer. So you have to have very, you have to have less of them. Mm-hmm <affirmative>. Right. To have an equal comparison, but typically do, will have less outages on underground in the first 50 years or so of the cable life. And, um, as that cable ages it can become a, a reliability problem. So you gotta kind of stay up with that.

Rachel Johnson (05:52):

So the, um, we kind of, and actually we already started talking about some of the work we're gonna do this year, but one of the big exciting things that we're gonna be doing this year is replacing our SCADA system. And most people outside our industry wouldn't really understand what that is. So can you just talk for a second about what the SCADA system does?

Frank Siepker (06:09):

Sure. SCADA actually, an industrial control system is very popular too. So manufacturing and things of that nature, SCADA systems are very common as well, but s SCADA is supervisory control and data acquisition. So it's, it's a big remote control for our system, but it's also a big data collector. So we, you know, we, we have um, distribution, electronic distribution control devices scattered through our service territory. Probably 250 of these things scattered. They control voltage on the line, the line, you know, the voltage that the line operates at. They control reactive power flow by switching capacitors on and off. They control all of our protective devices, circuit reclosers, um, breakers, things of that nature, that clear faults when they occur in our distribution system to interrupt that flow of current in order to allow an arc to clear or a, uh, a momentary contact of some variety to clear from the system to remove that fault.

Frank Siepker (06:56):

So we can try to restore power quickly. But again, 250 of these devices scattered across our system. There's about 15,000 data points we bring back every two seconds from our distribution system. So if, you know, we're filling databases with data that we use for all sorts of different things, we're also pulling back even greater detail when we do have faults on our system. The current that flows through our line is a function of load, but when we create a fault that's a short circuit and that basically tries to draw an infinite amount of current and we can actually pull the, the wave forms that we look at when on the AC power line current and we can look at those wave forms and we're trying to build a database that in the future to use for, uh, predicting the causes of the outages before we get there. So by historically archiving all of these waveforms that we capture and outages and tying that back to our outage management system that says, oh hey, we did find a squirrel on this outage, or we did find a lightning strike that cause this outage. We did find, uh, electrical conductors that got got pushed together that caused this outage. Um, but in the future we hope to be able to tie those causes with those wave forms together and be able to predict the source of those outages in advance.

Rachel Johnson (08:00):

It's kinda interesting because I feel like what you're describing is something that a lot of industries are seeing right now where we're looking and saying, we have all of this data and now how do we turn that data into actionable insights that help us improve our service model? Right. Right. And obviously the nature of that for Amazon is, I, I look outside and there's snow and suddenly get delivered a snow shovel ad. Right. But here at Cherryland it's data about what causes service interruptions that we can then use to better not just predict the cause when it happens, but potentially even predict something that allows us to prevent it from happening. Right? Yeah.

Frank Siepker (08:32):

And absolutely we use 'em for preventative causes today or preventive measures today. All of our maintenance that we do on our system as far as going pole to pole inspecting poles or installing wildlife protection or replacing age material and equipment on our overhead system, a lot of the, the scheduling of that maintenance program is based upon the data we get from our system, right. So we can look at areas where we know we're having repetitive breaker operations or maybe we don't know the cause yet or we look at, we're having repetitive outages where we do know what the causes are and we use that data to drive the, how we prioritize what areas we do that as maintenance projects in first or next.

Rachel Johnson (09:04):

Yeah, sure. 'cause the data's saying, Hey, something's going on here, this, this line keeps having blinks. Mm-hmm <affirmative>. And then we can go and look and say, oh well that maybe it's a tree trimming issue. Maybe there's a uh, some sort of an equipment on that that is, you know, close to dying or whatever that looks like. So we talked a little bit about the data side of S scada. Can you talk a little bit about the controls side of S SCADA and what that gives us the capability to do?

Frank Siepker (09:25):

Yeah, sure. So back to those 250 devices, we don't just gather data from them. We have the ability to actually make actionable controls on those devices that may be raising or lowering voltage and may be changing the set points at which activity occurs on maybe like a capacitor device that's out there to either help boost voltage or to help reduce losses. Right? I think when we lose energy as we move to distribution lines, so we do do some things to try and control those losses. We have ability to control a lot of those devices now directly from our SCADA system back here through the control function of that. But also on the switching side and the outage restoration side, we have control of actually operating switches or reclosers in the field to change the direction. Power flow allows us to isolate maybe a section of line where there's a fault, open a recloser before it, which probably happened from the protected device, but then also open something downline from that.

Frank Siepker (10:12):

And then you have the ability to use the loop feed nature of our system and back feeded power to customers that are down line of where the problem is. So the people upline are, are staying on 'cause the recloser cleared the fault from the system that occurred down line from it, but now we're actually able to open something up down line from that fault location and then back feed power up. Today we do that manually. So that's manual physical control. Um, we're looking with the new SCADA system you're talking about at actually having what's more of a distribution management system component of that which allows us to do, uh, fault isolation detection and service restoration in an automated fashion. So it'll actually be able to take all of that data that's coming in, make that decision, run the engineering model and say, Hey, I have a switch that I can open and then I can close in this other circuit switch and connect the tail end of circuit number one to the tail end of circuit number two and I can re-energize the people at the end of the line, get their power back on before anybody even gets out there to solve the actual problem that occurred.

Rachel Johnson (11:09):

So to kind of put that in language of like, what does this mean for the average member? What I'm hearing you say is, if we think of like 15 houses hung from a, a power line, right? Sure. And a fault happens right in the middle, right at house number seven. Yep. Okay. We will now have potentially through a more automated process the ability for the system to say, well I've got a fuse at house five and I've got a hu fuse at house eight and I'm gonna go ahead and reclose in both sides of that line. So houses one through five have power and houses eight through 15 have power and I've now isolated the outage to those houses right around house seven. Exactly.

Frank Siepker (11:44):

Right.

Rachel Johnson (11:44):

Yeah, that's

Frank Siepker (11:44):

Really cool. And we know we're not to the point where we can change every fuse, right? We have thousands and thousands of fuses on it, and I lost my statistic on that. I think there's like 20 some thousand fuses on our system. But back to those controllable devices, those circuit reclosers and such, we have, you know, 200 or so of those things scattered around our system. We have control of those and we add another 10 or 15 or those every year. So we continue to break our system in the smaller section. So today, you know, in the old days, right, like there was this, there was this, there was the recloser at the substation pull zero, and then it went to poll 15 and if anything happened between one and 15, everybody went out mm-hmm <affirmative>. And nobody came back on until the problem was found fixed and then the power was turned back on from the substation.

Frank Siepker (12:21):

So we started by breaking those line sections in half. So now at polls say seven, there's a recloser. So everybody from one to seven would stay on if something happened from seven to 15 mm-hmm <affirmative>. And as we move through this technology phase of things where we have more control, more ability to make these things work together, now we're gonna break that maybe into four sections. So like one through four are on a one recloser and then four through eight are on one recloser, an eight through 12 or another recloser and 12 through 15 are just the end of the line. But now we can drop four houses somewhere and keep all the other customers back on as opposed to having to drop all 15 as a result of a fault.

Rachel Johnson (12:57):

And it's, it's one of those, I, you know, I talk a little bit in my column this month about the system almost being like magic. It's like one of those things where we take like, nobody sees it. Nobody knows. They have no idea the power went out, it was out for, you know, let's say 15 minutes and now it's back on. They have no idea of how much planning and work and whether it's new system control devices or this new SCADA system that we're gonna get to communicate with those devices. All of that went into getting us to that point where what might have historically been a thousand people out for five hours is now 50 people out for two hours. Right. Which is really cool

Frank Siepker (13:31):

Because by not by sexualizing that line into smaller pieces, it all, not only does it reduce the number of people that are out, but reduces the amount of line that we have to look at in order to find the problem. Right? So now we have four poles we need to go look at instead of 15 poles we have to go look at, so we can accomplish that restoration task quicker. We know where to go. And you know, with the data that we're bringing back, sometimes we can refine that even closer. I mean we, we can oftentimes refine that with this fault data that comes back in through the SCADA system. We can say, Hey, we run that through our engineering model. That fault would occur of that magnitude. We're measuring the magnitude of this. We could say that fault occurred probably around poll 12, right?

Frank Siepker (14:07):

So even if we don't have the sectionalizing into four span sections, we now have, you know, so poll seven to 15 is out right? But we know that the fault of round poll 12, we can start at 12 if it's not right. There we go a poll either way. And we've probably found the problem instead of starting at seven, going 8, 9, 10, 11, 12, and you know, now we're, now we're finally down to looking at the pole where the problem is. So we, instead of looking at half a dozen poles, maybe we're looking at one or two or three poles before we find the problem.

Rachel Johnson (14:32):

So the crews can be more efficient when they get on site too. Yeah. So I wanna do a little bit of speculation about the future, but before I do that, I wanna make sure, is there anything else about the SCADA system in terms of thinking how it's gonna improve our members experience, a reliability that you wanna make sure we talk about? Um, or do we just wanna end it on it's magic and it's really cool and we're very excited about it.

Frank Siepker (14:49):

It's magic. You know, <laugh>, when when I, when I, when you sit back and you're, you're sitting in front of all these SCADA councils, you know, in a storm event where things are coming in, I I, I think a lot like, a lot like Ironman, right? When Tony Stark is sitting there and he is, he is talking to Jarvis, we don't have this AI engine in here, but it all that intelligent information is now presented to you in a manner that you can react to mm-hmm <affirmative>. Right? So it's, it's not making decisions for us, it's not thinking outside of the box, but it's presenting all of this information from all across the seven counties that we serve in our service territory. Back to one display screen where one operator can look at that and make informed decisions and prioritize and react the situation as opposed to just kind of wondering, yeah, I wonder what's going on out there.

Rachel Johnson (15:30):

Yeah. I've always thought that when we talk about technological advancement, it, you know, people will say, oh, is it gonna replace this job or replace that job? I don't think so at all. I think people who are good at using technology replace people who are bad at using technology. And what we're seeing here with things like the, the Tony Stark examples, perfect. But like that data coming in, in that way makes our operators better. Mm-hmm <affirmative>. Right? Which is really, really cool and fun. And I'm glad there are people like you who can understand it. 'cause I look at it and see squiggles, but I don't think that's ac I mean I don't think that's the, we trying much

Frank Siepker (15:57):

Good. We make it really pretty squiggles,

Rachel Johnson (15:58):

<laugh>. Um, so let's, um, let's take just our last couple minutes on the podcast and I just, I love, I love your brain. So I want to give our listeners the opportunity to hear you reflect, like kind of think about as we look forward to the future and all of the ways that technology is changing what we do and providing opportunities for us to rethink how we do what we do. Like what are you most excited about to watch? Kind of see where it goes. We may not know yet where it's going, but it's kind of something exciting and interesting to be watching.

Frank Siepker (16:25):

I mean, that's the exciting thing 'cause we don't, we don't know where this ends 'cause it doesn't, it never really ends. It's an evolving world. Um, but I I think a lot of this predictive analytics is gonna be hugely impactful in, in our world here of these distribution operations. Um, being able to use data from the past along with current data and, and, and come up with more detailed analysis and more detailed information, uh, kind of earlier on in the development of storms and outages and things of that nature that allow us to react more efficiently, more effectively and more precisely, you know, pinpoint activities as opposed to trying to use like the shotgun effect and throw in a bunch of people in a bunch of places. Honing that all in. The other thing that I think is really exciting makes me nervous, but it's really exciting is, you know, our, our distribution system and our generation systems are becoming more and more diverse and more and more intermittent in nature, right?

Frank Siepker (17:14):

More solar, more, more wind, less base load, more uh, short duration, uh, gas fire generation resources. And those things have only a certain amount of energy available at certain times, right? It's not like we have all the energy we want all the time and today we have enough volume of, of old resources combined with a bunch of new resources that that hasn't really become a challenge yet. But as we continue to shut down and retire more larger older assets and we mix it in with lots of smaller assets, we're gonna have to figure out how to make the operation of our system more dynamic. Like make more faster reactions. We're gonna have to connect more information from farther down line. You know, getting, you know, meter meter data coming back into us is great, but we're gonna eventually have to start reaching beyond the meters and reaching into the com, into the HUS customer's homes, understanding how they're using loads, understanding what loads they have are maybe controllable or maybe are able to be, uh, scheduled maybe so to speak, so that we can try to make the load match the generation. Historically, we've always made generation match load. I mean that, that's what we do. We're here to provide all the power everybody wants whenever they want it. And that's gonna become a struggle in on the trends we're on today with the type of generation that's coming to the grid. So I think it's gonna be really exciting to see how this plays out and how it develops. And I mean technology is gonna be a huge component of making the grid stable in the future, kind of reacting, making loads, react to available generation.

Rachel Johnson (18:41):

So many things packed up in that. And I wanna talk a little bit more about that piece. But before we do, you and I were having a conversation the other day when we were talking about predictive analytics. One of the hardest things in a storm is predicting restoration times, right? And, and, and so can we, I just wanna revisit that 'cause I think it's really fascinating to think about how we might use predictive analytics to get better at that particular problem. Yeah,

Frank Siepker (19:01):

This is something we're really excited about, ideas on. We know no one's really gotten this actionable yet, but we've worked with several different third party vendors out there and software providers talking through possible opportunities where we can do that. We can take past storms, like we can take outage data, we can take weather data, we can take restoration time, we can take the number of crews we had. We take all of that information and then start comparing it to realtime data. So if we know we've got 45 mile an hour winds coming out of the west today and we know that they're gonna cover the two counties of our service territory, let's look at all of the outages that occurred in those areas in the past. Let's look at the weather patterns that we had. Let's look at the number of crews we had. Let's look at the number of outages that occurred and now, and let's start trying to estimate slash predict what's gonna happen today so we can make sure that we have the number of crews available, we make sure we have them positioned and, and and allocated to the right areas of the system based on what those predictions are.

Frank Siepker (19:55):

And then you can go a step farther too, and you can validate those predictions, right? So as this storm front starts to come through, we can take real time actual weather data from the field and adjust that prediction and come up with those restoration time. So if we know we had 45 mile hour winds, we know it was in these two counties, we know that affects four of our feeders, we know there's 2000 people impacted by that in within that region, we can try and say, okay, we're gonna have four different outages in that, in that event and that's gonna affect 500 people and we know that each one of those outages is gonna take four man crews. And we can start saying, well we only have three crews available today, or four, let's just say mm-hmm <affirmative> So we say, okay, so if we have three crews, how long is it gonna take us to get through the system, get those things taken care of? What's that restoration time for each of those outages Now on another day, let's say I have five crews available today, so now, now what would that restoration time be? And be able to able to try to predict that and do more detailed, more accurate estimates and predictions on those

Rachel Johnson (20:51):

Using real historic data. One of the things that we are doing this year as well, which is not a system investment, it's a human investment, but we are going to add a data scientist to our team. And I think that's a really important part of helping us to start tackling some of those problems. And you know, it's, it's interesting being a smaller utility, I think it's really easy to assume that we, that the big utilities are the ones who are gonna invest in and develop the innovations that we eventually adopt. But I actually think cherry land's the opposite. We're so nimble and innovative and have so much passion and talent here and I think that maybe we'll be the ones who develop the thing in other people. Yeah.

Frank Siepker (21:26):

We definitely get out ahead of a lot of these things, <laugh> some, some things are better to weigh, right? But a lot of things when we can do them with, with a controlled amount of resources and be real innovative with that and do things fast, it, we do have the strength to do that. I mean, our distribution SCADA system in 2009, we put in, we've had tremendous repo result as a result of that restoration. Time control and pinpointing outages and the other, other co-ops are still in the phases of deciding what they're gonna do about that for their first, I mean, for their first system, right? Yeah. We're putting our second one in to make that better and and be more, more productive with that.

Rachel Johnson (21:59):

Yeah. It's, it's cool and exciting and um, again, I think it's, it's easy for people who aren't inside our industry to look at it and think, well that looks like it should be easy, but it's so complex. So e even something as simple as estimating a restoration time is really hard to do. And anything we can do to get better at that gives our members a better experience, which is the, that's the goal, right? That's the thing we wanna do. The last uh, piece that I wanted to touch on that you talked about was this thing where we're going to need to be more dynamic and have more interaction, not just with devices inside our members' homes, but really just think, if you kind of go back and think of the historical model, it was all this idea of one way flow, right? Like you, you have centralized generation, you move things we talked about at the beginning, right across the big G grid, step it down into the small G grid and then it goes out to end points and it all has this kind of unidirectional assumption.

Rachel Johnson (22:48):

And now I think we need to really start thinking more bi-directionally than we have historically. And to your point about how we will utilize the tools available to us and the relationship we built with our members to do what we need to do on the load side in order to avoid blackouts because of issues on the generation side. Right. Which is to your point, terrifying. Yeah. But if anybody can do it, I think it's gonna be us. I continue to be optimistic and I think for our listeners who just started the podcast and then jumped to the end, here is your big takeaway. Cherryland is continuing to push the envelope and invest in cutting edge forward-looking technologies that help us adapt to the expectations of our members for service, but also the new challenges we have in delivering reliable electricity. And we have the right team in place to, to get good results. So thank you Frank, for taking the time to hop on the podcast today and talk through some of the stuff we're gonna do this year.

Frank Siepker (23:41):

Absolutely. Thanks for having me here.

Rachel Johnson (23:42):

Uh, thank you all for listening in and I hope you'll join us next time

Rachel Johnson (23:44):
For, for co-op Energy Talk.