

REsurety Solutions Showcase Webinar Recording Transcript

Hannah Gollan: So all call materials as well as any other events or resources mentioned during this call will be available on Interconnect, which is our member portal. If you are a non-member, you will be receiving an email with some of those links outside of Interconnect so you can view them. But everyone will be getting a post-event email with links and resources and contact information for our wonderful speakers today. Now, without further ado, on to our presentation. Just to note that we do have some time at the end for that Q&A, as I mentioned, so as you have questions go ahead and drop them in the Q&A panel, and our speakers will address them. There will not be a chat function as this is a webinar. So again, everything is recorded, you'll get a post-event email with the presentation materials, and please drop your questions in the chat. So today, we have our speakers Irina Gumennik, the Director of Analytics Services at REsurety and Carl Ostridge, SVP of Analytics Services at REsurety. And I am going to go ahead and stop sharing and pass it to them.

Carl Ostridge: Thanks, Hannah. Sorry for the echo there. Okay, I think that's all sorted. Right. Thanks, Hannah. And, yeah, thank you for the introduction. So hi everyone, my name is Carl Ostridge. I'm going to start us off with a brief introduction for REsurety for anyone on the call that isn't familiar with us already, and what we do. I'm going to give a quick overview of the content and the agenda that we're going to cover today. And then, I'm going to hand off to Irina to guide us through the first part of the presentation. So REsurety is a solutions provider that serves the financial and sustainability needs of the clean energy industry. Our core customers today are clean energy buyers, sellers and investors. And we have in house expertise in renewable energy, atmospheric science, power markets, and data science. And particularly relevant to today's webinar, we provide settlement auditing and tracking services to more than 10 gigawatts of active renewable energy contracts each month. So REsurety also has a software platform, and that provides our customers with insights along different stages of the clean energy procurement lifecycle. So on the left, we have our Project Explorer, and that supports workflows related to initial prospecting and market discovery. In the middle, we have the Project Evaluator, and that supports workflows related to RFPs with project and contract-specific analyses. And then on the right, we have Portfolio Tracker, and that's aimed at tracking and understanding the performance of existing projects and contracts, and we'll touch on that a little bit later. So with the background and introduction out of the way, there are three primary points and topics that we want to address in the presentation today. The first is to highlight the invoicing and settlement challenges that we see clean energy buyers facing today, especially in the face of growing portfolios, and also growing contractual complexity. We want to demonstrate through some of the examples we've encountered through our work with our customers and highlight why we believe it's important to have a robust auditing process in place for these monthly settlements. And why it's also necessary to dig deeper than just the standard invoicing data to really understand the drivers of certain outcomes. Finally, we'll wrap up with some proposed actions and best practices that we think everyone can adopt in terms of avoiding the types of errors we do regularly see, streamline this monthly settlement process, and also hopefully inform and improve future procurement decisions as well. So as Hannah

said, we'll save some time at the end for Q&A, so please do keep those questions coming through throughout the presentation. And with that, I'll hand off to Irina to get us started.

Irina Gumennik: Alright, great. Thank you, Carl. So I'm going to be talking about some of the common issues that we often find with invoices and my hope is that your takeaway will be a few tips and tricks, things that you can be on the lookout for when reviewing the invoices and also get a sense of what the financial impact of some of these seemingly small issues can be. So at a high level, just starting, first, what are we hearing from the clean energy buyer community that needs to happen? And why is it challenging? So the first thing, as Carl mentioned, just auditing the invoices that are coming in, ensuring that they're accurate, and having confidence that you can release the invoice for payment. Challenges to that: it's a lot of data, the best practice right now is still to share Excel files, they're often going to be in different formats from different projects. It's just a lot of data. And increasingly, it's also starting to get more complex. The days of having a power purchase agreement that's a fairly simple contract for difference with a fixed and a floating price at times generation, we've seen increasingly a lot of different ways to address different risks that result in basis sharing clauses, non settlement clauses, price floors, and they're all going to be a little bit different from project to project. And so that's going to be appearing in these invoices as well. And the turnaround time is typically short, the power purchase agreements are going to have a term in there around when the invoices are due. And it's going to be like that every month, rinse and repeat. So a lot of data to get through pretty quickly. The other piece of that is even if when you get to that point, you feel confident on the numbers, being able to explain if someone comes to you and says, "What happened this month? What were the drivers of the financial performance? What's been going on the past quarter, the past year?" Being able to have ready information to answer that question can be challenging. The drivers can be complex, a lot of interaction weather, what's going on in wholesale markets across the country, maybe across the globe, what's going on with project operations at each project. And in some cases, particularly as a clean energy buyer, you might have limited access to the type of data that you would really want to have to understand the drivers. And then on top of all of that, every month, also the workflow around trying to get a forecast. So the forecast could be just an accrual estimate for what invoice values you can expect next month. It could be budgeting for the next month or the next year. We're not going to cover that particular topic here on this webinar today, but it's something that will be on your mind. And so this is just a visual of that. I like to, as a reminder, just see that this is really the experience, you just get that influx of invoices, different schedules in the month, different formats, different granularity, and there's just hundreds of rows of hourly and sometimes sub-hourly data and calculations. So that's why it's challenging. And so the next thing I'm going to go through are three different examples that I would say account for a majority of the common issues that we find. So the first one is when settlement is using an incorrect floating price index. So for example, if a contract is supposed to settle using hub prices, but is actually settling at the node in the invoice. So in this graph here, the green lines are the hub prices that should be the contract settlement. But the gray line is what was actually invoiced. And you can see that what happens a lot is that the nodal prices tend to be less than the hub prices. And so that difference in project value between the hub and the node, which we call the hub node basis, really resulted in a \$0.52 a megawatt hour overpayment by the buyer, which in aggregate was over \$100,000.

And it also shows an example that tees up the next example where you can see sometimes prices can even go negative. And so that's something that there are various ways to address and can lead to one of the next common errors where the easiest way to address negative prices, which are shown in this top graph, the gray bars that are below the zero line, those are hours where prices went negative. Those correspond to hours where there's a lot of generation - that's actually a typical pattern we see. And in this particular case, the settlement was supposed to just be \$0 anytime prices went negative. But if that doesn't happen, and the entire month of hourly price data is included, combined with the generation, that can also mean a potential overpayment, in this particular case, for just one month of about \$95,000. And I say "would have overpaid" because in this case, the buyer was able to find the issue, something that we worked with them on and they went to the seller and were able to correct the invoice pretty quickly. I mean, it was a fairly small change to make in the Excel file, and they were able to correct it before the final payment was due, and so the invoice was actually corrected before it was due.

So the third topic, that is one of my favorites, because there's different flavors. But before I get into the different flavors of this topic, and what it can mean in the financial performance sense, is when there's a misalignment between price and generation time series. So what I'm showing here is on the top, just the average hourly generation for a solar project in Texas. You can see that at nighttime, there's no generation, then there's a little bit as the sun comes up, a lot of generation during the sunny afternoons, and then a pretty quick decline during the sunset, and again, no generation at night. And then on the bottom graph, we have the prices at ERCOT North Hub I picked for this example, from July of this year. And you can see that in this plot, we have what's labeled as hour beginning 19, which is really 7-8pm local time. That's sunset, and that's when the solar generation is rapidly declining, when you capture a little bit, and then as soon as the sun goes down you're not going to be generating anymore. And not a coincidence, this is actually a pattern we see that happens to be when the prices are the highest on average for the month. And so that little bit of generation you're able to capture as the sun goes down is really going to be worth a lot. So what happens if there's an issue and the time series is offset? Well, now you basically have that hour beginning 19, that's 7-8pm. It's labeled as 7pm, but really, it's measuring already nighttime after sunset. And so basically, there's no generation there, you're missing out on all of that value. And if you look at July in particular, to put some numbers around this, to go from \$52 a megawatt hour value for that project for the month to \$40. So it's a \$12 difference from just a one hour offset that seems maybe like a small difference, but can have a big impact. So that's really what I'm showing here, I'll go through four flavors of this. So this particular example, it's something that can happen when daylight savings time is incorrectly applied. I know at REsurety, every March and November were kind of up in arms and ready for when daylight savings time is flipping, because that causes so many challenges to these hourly time series. So here what I'm showing, again, that gold line, now I'm just showing basically two days every hour. So the first day, nice sunny day, the second day, some clouds roll through, and the golden line is still representing the physical reality on the ground and how much solar generation is being produced. The gray line is showing what's actually invoiced as I basically showed in the previous slide. And in this case, it would have meant \$400,000 that from the buyers perspective would have overpaid if you assume like a \$30 a megawatt hour PPA. And another flavor of this is a one hour offset in the other direction which flips the settlement where now the buyer is being overpaid by the seller by half a million dollars.

So a one hour switch in the opposite direction means you're capturing more of that sunset hour in the settlement. And so it can really go either way with a seemingly small difference. Another example is if you have been correct timezone, so this is one where the offset is going to be more than a few hours. And I think when you visualize it, it can be easy to see. And I particularly chose a solar project because you can see how there shouldn't be any solar generation at night. But again, it's easy to see when you plot it. But when you go back to that visual of all of those Excel files, all of those rows of data, it can be really easy to miss. And we actually had that recently where the data was sorted strangely and never unsorted. And so when we got it, we saw that there was solar generation at night. And that obviously is a flag that there's some sort of issue going on. And that interestingly in this example, was about a similar difference where the buyers actually also would have been overpaid by \$600,000.

The last example is some sort of meter communication malfunction. I picked arbitrarily 10 hours but I've seen all sorts of flavors of this. I saw one where it was 36 hours before daylight savings and then went to 38 hour offset after daylight savings. We had an issue that we saw recently where the offset actually changed each month as the meter kept going on and offline throughout the month. And something like that in this particular example would have been the buyer overpaying by a million dollars, which also probably, in this case is interesting, would have been flagged even before looking into the data because if you are the buyer of solar projects in Texas in the summer in July, you should be expecting to see payments coming your way as part of your PPA. And so if you receive an invoice that suggests otherwise, that's probably an indication to dig in further and hopefully you can see that this can be one of the things you can check for quickly and hopefully get it resolved because something as simple as this can have a pretty big impact. So as much as I would love to keep talking about timezones, I could go on and on all day, I won't. I'm gonna pass the mic back on to Carl for the next section.

Carl: Thanks, Irina. And the thing that I always have to remind myself about is that those examples that Irina was just giving, they're all real. We've sort of anonymized them and made them general for the purposes of this presentation. But those are all issues that we've seen as we've been helping our customers with invoicing and settlement. And so, yeah, they may not happen all that often, but they definitely do happen. So definitely something to be aware of. So in this next section, we're going to continue the theme of showing some examples to help illustrate the points we're trying to make.

I have a couple of different examples that touch upon the Explain workflow. And so we just covered the auditing process, you get these invoices every month, how do you make sure that the calculations that are going into them are correct and accurate? Now we've got a couple of examples that get to the idea and the workflow of needing to explain why certain outcomes happened, understanding why maybe one contract is requiring a payment to the project, while another one you're receiving a payment from the projects. Understanding whether the project is performing in line with expectations, and if not, how big of an impact is that having on your progress towards procurement and sustainability goals?

So the first example that I've got here is for a wind project in SPP. Again, we've sort of picked a general example with some real data. So we're looking at a December month, and I've started here on the left with just the standard aggregated view that you might get in either the statement or the invoices, and each month, it's telling you how many megawatt hours were generated, and the payment that's required, either to or from the project. And just with these aggregated metrics, it sort of raises more questions than it answers when trying to think about how might you understand and explain what's going on here. I look at this and say, "Well, that capacity factor is kind of low for a December, especially in SPP, and we don't have the power prices on here. But in a month, where there's reasonably high power prices, you might expect actually, the payments be moving in the other direction." In order to be able to dig in and really understand what's going on, we have to go a level deeper. So on the next slide, we'll start that process. So here, we're doing the first thing that I always recommend, and which Irina already touched on, which is to plot the data. So in every invoice, there's the interval data, there's hourly data that underlies those aggregate statistics. And so here, we're plotting the hourly generation from the project. And initially, there might not feel like there's much to see here, the generation's moving up and down and in line with the weather patterns. I've highlighted this red box in the second half of the month, maybe if you look at it, you could say, "Well, it looks like the generation from the project's a little bit lower." But without more information, without more data, it's actually really hard to know whether that lower output in the second half of the month is being driven by just the weather that the project's experienced and the resource that was available, or whether it was due to some sort of operational issue. So in order to be able to go a level deeper, we need to add data to the situation, add information. So what we do, and what we'll show on the next slide, is adding a modeled time series. So we take the weather data, we take weather data to model the output of the project, and show in each hour how much energy that project could have produced given the resource that was available to it. And that's the green line that we've just added to the plot here. And when we do that, it becomes quickly apparent that yes, in fact, that lower generation in the second half of the month was due to some type of reduced output from the project. You can see that in the first 10 days or so of the month, the blue line and the green line agree pretty closely with one another. But then starting around the 12th the output of the projects reduced, that blue line drops below the green line. And actually that pattern continues for the rest of the month. One thing that's also worth pointing out as we dig a bit deeper, we'll see that actually there was also winter storm that came through right before Christmas here. And that actually has a bigger impact and reduces the output of the project even further. So now that we have this insight, the obvious question is "Okay, but how much did this affect my PPA settlement?" So again, to start digging into that, we have to add more data. Now we're plotting up the prices from the invoice and the price time series. And we can see that actually, around the time of that winter storm, there were some high and volatile prices that also coincided with that reduced output. So now we're starting to build a picture of, "Okay, maybe that payment that was due to the project was a function of this reduced output and the high prices during that time." So the last plot we're going to make here is to look at calculating the invoice settlement using the metered generation and the observed prices, and also the model generation. And so we can see how this contract would have settled if the project had been able to operate absent any operational issues. So this last plot here, we're seeing a cumulative settlement throughout the month. And what this shows us is, for the first, let's say two and a half

weeks, of this month, there was actually very little difference between the settlement from a financial perspective of this contract, whether it is based on the metered generation or the modeled generation. But when we get to that period right before Christmas, and that winter storm, that's where there is now a meaningful difference and a reduced financial outcome or reduced settlement value for the buyer, because of that reduced output for the project. So returning to these aggregate statistics that we started this example with, now we can add the second column to the table, we can look at what those aggregate statistics would look like with the modeled generation. And that allows us to start understanding and explaining the outcomes. And then so we can see in this case, the output of the project was reduced by about 30,000 megawatt hours, that means 30,000 RECs less towards your sustainability goals. And it also impacted the contract settlement from a financial perspective as well, as we just discussed. It's worth saying here that most of the contracts that we see and work with include earlier time-based availability guarantee. So while this type of insight doesn't necessarily affect the settlement outcomes of these contracts on an ongoing basis, it is an important insight to start building, in order to be able to understand why contracts are performing the way they are, and how that fits into your future plans and strategies around meeting your sustainability goals. You want to understand what's driving things in order to be able to make informed decisions in the future.

So I have a second example here, this one around economic curtailment. And so this, just as a quick background economics curtailment is the project reducing its output in response to low nodal prices. If price is at the node, where the project connects to the grid, become sufficiently low, then it's no longer economic for the project to continue operating. And so at that point, the project will reduce its output. The challenge here is that in order to understand whether the project that you're contracted with is experiencing this issue, the standard invoice data that you receive doesn't really give you, again, the insights to see that. So here we've plotted the generation time series, and also the hourly time series of prices. And, again, you look at it and there's nothing immediately jumping off the page. You might look at some of the quick ramp up and ramp down events in the second half of the month. And think that maybe those look a bit interesting. But without additional data, it's really hard to say whether that's being driven by the weather operations or some type of basis or curtailment issue. So again, we're going to add some more data, and supplement that invoice data to allow us to go a bit deeper. We've added the modeled generation again to this top chart. And then we've also added the nodal prices for this project to the bottom chart. And on what we see now very quickly is that yes, in fact, this project is experiencing a basis challenge and experiencing low nodal prices and that is resulting in a reduced output from the project as well. So you can see in each of these highlighted areas, the project's actual output is much below the green line, the modeled output, and that tends to coincide with prices - very low nodal prices, which is the green line on the bottom.

And again, this is something where sometimes there are basis sharing provisions in the more recent tranche of contracts that we're seeing. But most contracts, this isn't something that's going to define a settlement outcome. But it is an important insight to start building so that you can understand the performance of your existing contracts, and then use that to guide future decision making processes as well.

I'll say a few words quickly on how RESurety helps our customers track, audit, and explain outcomes. And sort of build on those issues that we were just noting. And then finally, we'll wrap up with a summary and some recommended actions that we believe everyone can follow in order to streamline this process.

So the Portfolio Tracker is the software tool that I mentioned earlier, we take a software plus experts approach. And our software does a few key things. And these are aligned with the recommendations of best practices that we think everyone should try to follow in some way, whether that's with a RESurety software or not.

So the first is visualization, you want to take in all of that data that you're getting in various different places, and visualize that in order to start gaining those insights and understand what's driving outcomes. It consolidates data into one location, and for the reasons Irina was mentioning, that's important if you're receiving lots of different data, lots of different times during the month, in lots of different formats. Gives you one place to go to see all of that information in one place. There's an independent calculation of the contract settlement. And that allows for quick checking against the values that are in the invoices and the statements that you receive from the project. We're able to add those insights through our weather-based modeled generation time series. And then finally, we have a team here who can support our customers in additional ways through auditing and explaining the results each month as needed. So to wrap things up, we've highlighted three areas of challenge on the left here, and then we have some recommendations for best practices going forward. So I think we've established that tracking and auditing monthly invoices for a buyer can be challenging, there's a large amount of data. The outcomes of these contracts are highly variable and difficult to understand and diagnose. We've also seen that invoice errors are relatively common. I think, in our experience, almost every contract that we have worked with and analyzed has experienced some type of issue at some point during its lifetime. And so these issues do happen, but they also often go unnoticed. And that's because there's limited time for processing this data and really digging deep and so an efficient approach is definitely needed there. And then the final point is that the standard invoice data typically doesn't give buyers the insights that they need to be able to really explain what's driving settlement outcomes for their contracts. And so having in things like a weather-based modeled generation time series is really important and insightful. Being able to look at nodal prices to understand whether a project is experiencing basis issues is also really important, but not part of a standard invoicing deliverable. So with that, some recommendations that we have. The first is, and this might sound like I'm stating the obvious, but really double checking those invoice calculations every month really is important. As I said, we see that almost every contract has some type of issue, whether it's small or large, at some point during its lifetime. And so it really is important to have some robust auditing process in place. As we mentioned earlier, there are certain points where you want to pay extra attention, so I would say that's when a new project is coming online, but also around the times when the clocks change every year. Those are definitely the points where we see most of those errors popping up. Visualizing the invoice data is really an important step and allows you to dig very quickly a level deeper than just those aggregated metrics that you get in the standard statements and invoices.

And then also trying to go a level deeper on looking at operational performance to understand to what extent availability and other types of bases or curtailment issues are affecting a project, help you build insights and make smarter informed decisions in the future as well. So that's all we have in terms of content. So I think with that, we will move to the Q&A. And I guess as we do that, just a reminder that if you do have questions about anything we've covered here, please do send those in. And we'll start addressing questions now.

Irina: Great, I see a couple of questions so far. Here's one that is one of my favorites. So we have years worth of settlement data in some of our contracts. Do you also process that and provide any insights into longer term trends? Like is basis getting worse over time? So absolutely, I think one of the, as Carl mentioned, around consolidating the information, that it's not just each month, you end up having aggregated data going back to the beginning of the contract. And so there can be something like you signed a contract a few years back for a wind project in Texas, maybe not expecting it to be the superstar of the portfolio, but then in recent months, all of a sudden, it seems to always be outperforming some of the other projects in the portfolio. And you might be wondering, well, is this really an actual trend? What's going on? So that's something we've run into, and we can definitely provide the data to help with communicating internally that, yes, a wind project in Texas has been benefiting from the last few years from solar build out, for example. And so wind value has increased as more solar has been coming onto the grid. Conversely, maybe you have a project somewhere else like SPP, and there's been more and more wind buildout, which has been reducing the value of wind generation in certain areas. And so maybe a contract there that you thought would be a better performer is now consistently not performing as well. And so we can definitely take all that data that's now in one place for all of the projects across time, and do some analysis that can help not just understand what to expect from the projects existing in the portfolio, but also how are you going to use that to inform procurement decisions moving forward. So there's definitely value to getting the data right, but that's just step one. And then the fun part is actually processing that data. So the next question is - I think, Carl, maybe this one can be for you. Does REsurety also forecast settlement? So I know that wasn't a topic of the webinar but I think now's a good time to address that one. Carl, do you want to take that one?

Carl: Yeah, so I think there's two components to forecasting that we think about. And I guess the first thing is, the answer is yes. REsurety does provide that as a service. But just to break it down into the two components of that workflow that I see, because they're handled differently. The first is, at the end of each month before the buyer receives information from the project. They need to, in many cases, provide an estimate to their accounting team for how they expect the settlement of that contract to play out when those invoices are in and payments are made - that monthly accrual process. So that's something where we can support that through the use of that modeled generation data that we were looking at. So that's available almost up to real time. And so at the end of each month, we're able to look at how the weather has played out at each project in your portfolio and use that as a means of estimating for settlement. Of course, when the metered generation comes in, for all the reasons we were just talking about, the reality can be a bit different than that, but at least it takes out the weather variability from that accruals process. The other forecasting aspect is more long term forecasting, so trying to budget and

account for how you expect a contract to settle in the future. And the approach that we take to that is using something we call Weather-Smart modeling. So we have a fundamentals-based model that predicts power prices out into the future. And we also model scenarios across a wide range of different weather conditions as well. And that can give you a forecast of how you might expect each contract to settle given average normal conditions, but also more extreme weather conditions as well. So we have a combination of different fundamentals cases as well as different weather cases as well.

Irina: Great, thanks Carl. I see one more question about the calculation of the modeled generation and is it based on a default setup - wind turbine model and height - or does it let the user choose a setup corresponding to the project? So yes, it basically is the setup corresponding to the project for the portfolio tracking. We do model if the information is available based on the actual wind turbine at the site based on the actual hub heights at the site. And it is meant to represent a model specific to that project. Is there anything, Carl, you want to add to that particular case?

Carl: Yeah, just to say that we use all available information to be able to build the best model we can. Obviously from a customer perspective, the best outcome is that that model is as accurate as possible. And so we take all the information we can to do that and make it project specific. So I don't see any other questions coming in so I think that means it's probably time for us to hand back to Hannah in just a second. But I guess firstly, I'll just thank everyone for their time. Thank you for coming. Thank you for listening. We hope it's been informative. And yeah, thank you again.

Hannah: Thank you. Okay, great. Thank you so much for that presentation. It was so informative and we just really thank RESurety for being here today. Sorry, my screen is not wanting to work with me right now. Alright, here we go. Alright. So don't forget that our energy customer calls are recorded and loaded onto Interconnect, our member portal. So you can always check - oh sorry, by energy customer calls, I mean Solutions Showcases. So you can go ahead and check back and review that recording and slide notes. And if you are a CEBA energy provider or service provider on this call today and you're also interested in presenting your own Solution Showcase, please reach out to me I'm going to be scheduling 2024 calls in the upcoming months. So we're looking forward to that. Our next call is going to be with Silicon Ranch on December 5th, 2023 at 2pm Eastern Time. This one is going to just be open to energy customers, so our CEBA energy customers, and you can find the link to register on Interconnect. Also, coming up is going to be our CEBA at VERGE conference. So we hope all of our CEBA members and beyond are attending. That is going to be on October 23rd through the 26th in San Jose, California. As a reminder, if you are a CEBA member, you will receive VERGE tickets as part of your membership, which will give you access to all six programs at VERGE this year. You also have access to CEBA-only content like our energy customer morning and our member reception. So if you are a CEBA member make sure you get registered through Interconnect as well. And with that, I hope you all had a wonderful afternoon. Thank you again to our incredible speakers from RESurety and I hope you all have a great day. We will be sending out that post-event email within the week and thank you so much.