

Mark Culpepper





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General Manager Solar Solutions
at Zeitview, Global

Interview with **Mark Culpepper**

Alan Ross: Hi, I'm Alan Ross. I'm the Managing Editor of APC Media, our APC Technology Productions, Transformer Technology, Power Systems Technology. We are here at the RE+ 2023 event in Las Vegas. This thing is huge. We've got wind, solar, battery storage, and everything in between. I hope you enjoy these interviews.

My next guest is Mark Culpepper. Mark, good to meet you. You are the General Manager for global solar solutions for the company Zeitview. There are some things about that that are very unique. First of all, how long have you been in the industry and how did you get in the industry?

Mark Culpepper: I started out in solar back in late 2005.

AR Oh, my gosh! You're like a legacy guy, right?

MC Yeah, an OG, I guess you could call me. I started out in 2005 working for what was considered a large-scale EPC developer at that time, which was Team - Solar out of Sacramento. They did a one-megawatt tracker, which was considered substantial at the time. I originally started out as the head of business development. We sold the business to Sun Edison not too long after I came on board. Then at Sun, I initially ran marketing. I did all the global go-to-market. Then, because of my background in tech, I just started taking over a lot of the technology projects. The first one I took over was our Workflow System. I built the Workflow System in-house. Then after that, they said, *Mark, you're pretty good at this one. Would you be our CTO and build out our global O&M and asset management function?* I did all that work and basically that's where I ended up. I built out the global operations and maintenance business for the company and the asset.

AR Management function. That was Sun Edison?

MC That was Sun Edison. I left in late 2011.

Now I'm with Zeitview. Our tagline at Zeitview is "advancing inspection."

AR First of all, because of your background as a CTO, talk a little bit about what's happening in the industry. What are the challenges? We're seeing a lot of innovation, probably 90% of the innovative companies who are not going to make it. We just see a lot of change.

MC I think the biggest challenge the industry faces right now is labor.

There literally are not enough people to do the work that we find. We do inspections. What we're finding is that there are companies that just can't move quick enough to actually close the gap between what they're seeing in the field and what we're revealing to them and what they need to deliver for their clients. That labor gap is real. I don't think that's going to go away. I think it's actually becoming more acute. Anything that companies are doing to help focus and tune that has got a lot of value. Making labor more efficient. That's through automation technologies, through a number of other aspects. But automation is absolutely foundational to that whole problem.

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AR I love the idea that you solve a labor problem with automation, digitalization, data management. I have a philosophy. Let the machine talk. Let it tell you what the issue is, and somehow inspections do that. You mentioned that you're in the inspection business. Is that infrared? How is that used?

MC We do both what's called thermal or infrared inspections, typically called infrared, but thermal is probably a little more accurate, and visual or RGB inspections. We're pretty agnostic. We don't really care if you use a crewed aircraft, typically an airplane, a drone, or boots on the ground. It really doesn't matter to us. We'll use any one of those as tools to solve the problem. For the clients, they don't really care either at the end of the day. They're trying to basically get their assets inspected and get them prepped for the next high production season or take corrective action in many cases. They don't care how you collect the data.

AR What is a high production season?

MC As we orbit around the globe, you've got this oscillation of sunlight that plays out over the course of the year. The peak of that - the high production season - is during the summer months. That's where you've got to make sure your systems are really primed and are producing. If you come into late winter, early spring and your systems are really degraded and you're not ready for that peak production period, you're going to lose a lot of money that would have gone into



your pocket. Making sure that your field teams are ready to actually get that work done and that they've got a plan of attack when they go into that season is really key.

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AR The other part of that is labor shortage. Those field crews that have to go into the field to do that. How do you help solve that problem, if at all?

MC That's a great question. Our entire mode has been, how we like to say, *How do you get to the cheese quickly?*

How do you get to it quickly? We know from our own research that field teams spend 10-15% of the time just trying to find the problem. At a different level, though, if you look at a lot of portfolios, we just completed the North American Solar Scan. We scanned every solar asset thermally and visually in the lower 48 from 1 megawatt and above.

AR That fascinates me. How did you do that? What does that mean and who paid for it?

MC We paid for it. That entire exercise was done with crewed aircraft. It was about 95 gigawatts and over 6,200 sites. It took us a little longer than we wanted to take this first year. We had some weather issues in California. I don't know if you heard about that. We got absolutely hammered. There were 13 storms just back-to-back. That really threw our schedule off a little bit. But the net of it is that from that scan, we were able to determine which assets were performing well and which assets were performing not as well as we would have liked, and which assets were truly distressed.





AR Connect that for me. When you're doing the solar scans and you're in a crewed aircraft, how do you determine that an asset is not effectively operating?

MC When you scan a solar array or even a solar panel that's producing energy, when you have a disconnected component, say an individual cell, maybe it's got a broken linkage, that cell is still generating energy, but it doesn't have anywhere to push it. That energy gets translated into heat energy. When you hit it with a thermal camera, that heat spot shows up really, really bright. That's true not only for a cell inside a module, but also for a string of modules put together. It's also true for an inverter that might be offline or large portions of an entire power plant. The whole power plant will have an elevated temperature where it's disconnected from the grid. It allows us to very easily identify where those defects or challenges are. Sometimes they're not defects, sometimes they're just components that haven't been connected for whatever reason. It allows us to then direct the crews to the right location. Now, typically, what will happen in this industry is that when the inspection is requested, they'll say, *Hey, I've got a portfolio of 100 sites, can you inspect these?* Historically, that's how the industry is operated.

We would go out and inspect those assets. Then once we're done inspecting those assets, we generate reports, comprehensive reports that tell you that you have this many cell defects, you have this many diodes out, you have this many modules that are offline, the whole nine yards. Well, when you're scanning the entire United States, you don't necessarily want

to have that much detail for the entire portfolio report, because the portfolio is 6,200 sites. What we did was we came up with a new reporting structure called the solar asset rating. You can think of the solar asset rating very much like a bond rating. We rate it triple A all the way to triple D. It's very simple. It allows you to look at an asset and determine the asset is in good condition, or that the asset has issues, or that it is distressed.

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Now, what that allows the clients to do is very quickly look at their portfolios and set their standard however they want, triple B, triple A, whatever they want to. But if they say triple B and above, they can take those assets, set them to the side and say those assets are in pretty good shape. Rather than deploying my very limited labor force out to fix basically something that's not broken, I can now focus on the assets that actually do have issues. From those assets, you can generate a comprehensive analysis that says, tell me exactly where the problems are at this asset, be it string level issues, harnesses, combiner boxes, all that good stuff. That allows them to get the crews onto that site.



Then the last piece is a mobile app that allows literally the crew to go, *This block right here is costing us \$10,000 a year in losses.* Now I can get that crew all the way down from this really big problem down to one particular problem at one particular power plant in one particular section of the plant.

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I really believe that this process will allow our overall labor problem, or at least for maintenance anyway, to really make a lot of progress. We have some clients where 70% of their portfolio is in great shape. They don't need to be running crews out there to chase ghosts. This allows them to really focus that energy on

the areas where they really do need to put their attention and get that portfolio back up to a level of performance that the overall portfolio owner wants to see.

AR I am the chairman of the Smart Grid Reliability Association, and we're big on safety and reliability. One of the things that we focus on is stopping doing maintenance on things that don't need it and focus your maintenance on the places where you do. The Department of Energy, combined with OSHA, actually looked at what's changing in the labor market. They started in 2021, and they said there will be a 5.3% attrition of labor in maintenance. They're retiring and they're going away. They also predict an 8.5% growth every year, annually. Since 2021, we've been in a 13% deficit, and it's just getting worse. This solves the problem, as it enables working on what needs work and not wasting energy. That's brilliant. I appreciate that.

Lastly, let's talk a little bit about the company and what you see for where you're going.

MC Zeitview does inspections. We do advanced inspections on high-value infrastructure, and we focus on five verticals: solar, wind, transmission & distribution, telecom, and properties. Of those, obviously, wind, solar, T&D, and properties are very tightly correlated. I was just at a solar plant yesterday just east of Las Vegas. It's about a gigawatt of solar. They probably have more of 20 miles of feeder lines. Those feeder lines have to be inspected. They have 1.8 million solar panels at that plant. The scale is mind-blowing. Literally, you drive for 20 minutes. The plant is 6 miles long, 3 miles across. You can drive for 20 minutes and not be halfway across the plant. Then you realize this is a very large plant. We're built for those scale of operations, whether it's in solar, wind, or the other verticals that we serve. Our approach to solar has always been, if we're not serving this market at scale, we're really not serving the market at all, because this market requires scale and it requires the efficiencies that come with scale. A big part of our North American Solar Scan was driving that point home, taking a look at the entire asset base in the US, and determining the condition state of the asset base and how that is actually going to be served over the course of the next several years.

That 13% gap that you talk about in labor? That's not going away. It's going to get worse before it gets better. If we're not efficient, if

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If we're not efficient, if we're not trying to automate where we can, we're going to find ourselves falling short.

AR One of the things of doing these interviews, I meet a lot of different people, and it seems like there are three different tranches of people. Those that are looking for financing, that's going to be hard, everybody's looking for that. They're not going to get a big government grant, because that's going to go to the people that have a proven technology that now needs scale.

Then there's the ones that are at scale and they're the ones that the money is going to flow to and really change the grid. I just think that's phenomenal that you did that whole thing on your nickel. Kind of says, *Guys, we're at scale. You need to get with us.* Well done.

MC Thank you, Alan.

AR Thank you, Mark. My pleasure.

