Yield is king

High Seismic over River Cobble in Chile

PES had a great catch up with Mark Kingsley, CEO of Alion Energy, California. Leaders in solutions for trackers and O&M robotics and currently enjoying the bifacial surge in our industry. Although the current Covid 19 situation presenting some challenges, he has no doubt about the future opportunities.

PES: Hi Mark, it's a pleasure to welcome you to PES Solar. Would you like to begin by giving our readers a brief overview of Alion Energy?

Mark Kingsley: Alion Energy is a total solutions provider for bifacial trackers and O&M robotics. Our brand promise is 'The Most Power from PV' as we use integrated design to combine reflective foundations and cleaning robotics, with a patented A-frame + ballasted tracker. System design optimizes our tracker's steel content to <18 metric tons per MWp, which allows for both a stronger and cost competitive design.

PES: Would you say the solar/PV industry is expanding at the moment?

MK: Very much so. Bifacial has finally arrived in force and our industry's economics vs alternative sources of energy have never been better.

PES: Please could you tell us about your tracker solutions?

MK: The design goal was to enable unsubsidized solar PV to compete directly with combined cycle gas turbine economics. To accomplish this, we needed to extend the solar project useful life, whilst ensuring maximum generation.

The supporting technologies include slip formed concrete foundations to eliminate subsurface corrosion. These foundations enable construction on sites closer to interconnects including: sites that are sloped, rocky or filled with corrosive clays, or on caliche and karst formations. They also function as a bifacial diffusion reflector and a driving surface for our robotics platform. Taken together our design lets you build where you want and keep your arrays clean while maximizing bifacial gains.

PES: Why are trackers so important in our industry?

MK: 'Yield is king'.... Energy generation is in the denominator of all levelized-cost-of-energy calculations. Trackers x bifacial modules x reflective foundations x O&M robotics deliver the highest kWh/kWp.

PES: What are the technical advantages of your trackers and are there any cost implications to the clients?

MK: We handle the much heavier 450Wp+ 27.5kg module formats better than other designs in longer 145 module rows. This means less TCUs. Unlike traditional direct torque-tube based designs, we can stow at 0° and not flutter or gallop. This results in lower overturn loads and hence the lowest mass ballast designs. Our A-Frame is more mechanically efficient than traditional tracker designs and hence uses much less steel while being up to 7x stiffer.

So, clients save on land, shipment, drilling, assembly and O&M. Concrete is always local and avoids duties.

PES: How do the trackers cope in difficult environments and unusual terrain?

MK: We avoid drilling through the use of slip-formed or precast ballasts. We have flexible couplings between each 5, 6 or 8-module table and this enables the tracker row to follow the landscape sinusoidally. The design also works well on active clays or in frost heave conditions.

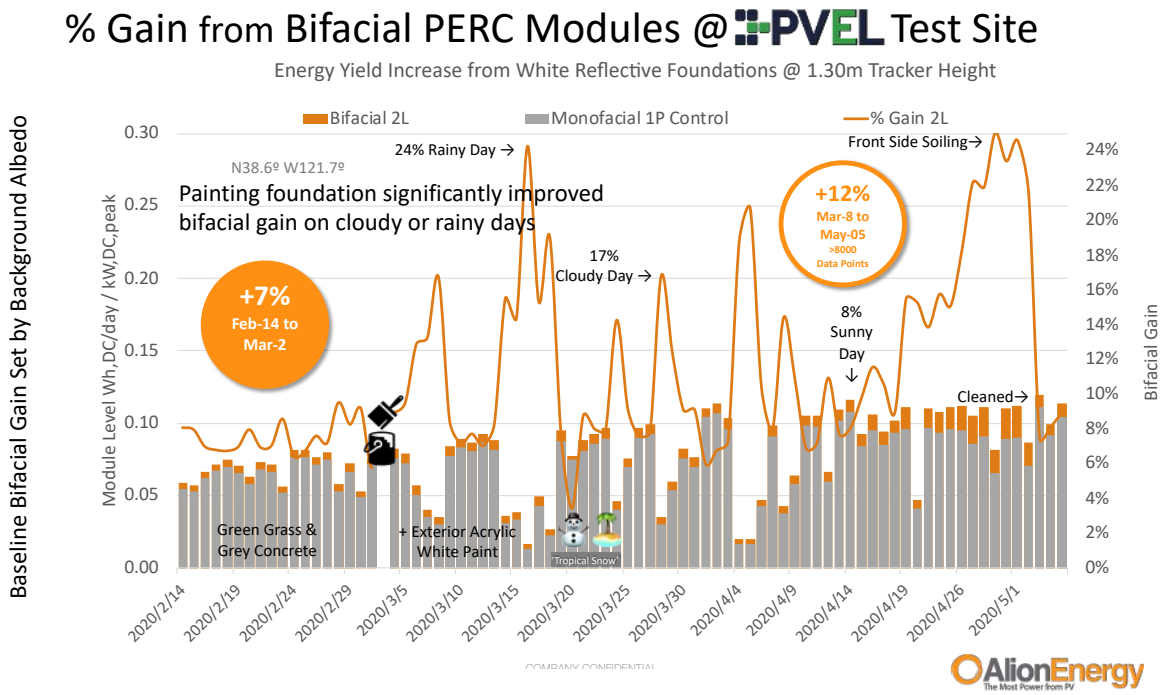
A durable bifacial reflector made from concrete as opposed to cloth, plastics or small rocks, stays cleaner and hence more effective in harsh environments. Furthermore, our robot platform may be configured to read site albedo and treat the foundation area to ensure maximum bifacial gains.

Mark Kingsley

PES: Can you tell us about the typical life expectancy of a system?

MK: The accepted useful life on an unreinforced concrete slab is 50 years. Our foundations do not suffer from subsurface corrosion, or face tree roots, overloading from delivery trucks, or the salt ingress to steel reinforcements that can harm urban concrete pavements. So, we remain inspired by the 1,800-year-old unreinforced concrete used in the roof panels of The Pantheon in Rome.

Our mechanical design will never gallop and we offer extended warranties on our structure, as well as C4/C5 corrosive environment upgrades. So, with good maintenance practices, including motor and controller spares, we intend our design to



last through two PPAs and a repowering. At end of life the concrete can be reground and reused and does not need to be dug out from the earth.

PES: What about monitoring? How is this done?

MK: Our controllers follow broadly adopted Zibgee enabled communication protocols that connect with the PV plant SCADA. Wired solutions for cold environments are also available.

PES: We would like to hear about Alion's offerings with respect to cleaning solutions. How do these differ?

MK: A critical difference is our cleaning robots ride on the concrete foundation rail as opposed to on the PV module. Other robots often require additional racking and intertable bridges. Hence, while other PV robot designs must be very lightweight in order not to damage PV cells, our robotic platform can be heavy and carry fluids and inspection equipment. Our system also avoids the ruts created by repeatedly driving trucks and tractors between rows.

Another difference is our system has both dry and wet cleaning capabilities. A robot may dry-brush off sand, however liquids are required to effectively remove organic deposits. These organics range from seabird guano to industrial or agricultural carbons.

PES: What are the benefits to the client of autonomous cleaning solutions?

MK: To sum up, cleaning robots are an

Bifacial Reflective Foundation Reduces Overhead Lift Demands

Spot dry and wet robot

insurance tool to know you will meet your debt service coverage ratio on a low priced PPA. Low PPA prices equate to a lower tolerance for energy losses. Affordably increasing cleaning frequency minimizes these losses.

Robotic cleaning economics are driven by asset efficiency. In the Alion Energy system, two workers, with two transfer carts and four robots can clean up to 20MWp per night. The workers remain at the end of the rows and ping-pong robots back and forth to each other. No need to follow the robots down a row or lift them over gaps and obstacles. Cleaning head position is actively controlled by LIDAR and both dry and wet cleaning modes are possible. Longer rows allow for faster cleaning as inter row transfers are minimized.

Although one can fully automate row-to-row transfers with a rail, most sites have more amoeba-shaped boundaries and hence we offer electric transfer carts.

PES: Why should prospective clients choose your solutions, what makes AlionEnergy stand out from the competition, what are the benefits in terms of cost and performance?

MK: Better LCOE from a differentiated and holistic design meant to last. We optimize the full bifacial equation and eliminate the galloping sensitivities seen in some 2-in-portrait designs.

PES: Where are your main markets and are there any particular geographical areas where you are looking to drive further growth?

MK: Our team operates globally outside of mainland China. We focus on the following use cases:

- Rocky, corrosive, dusty desert environments from Chile to the Middle East.
- Littoral sites with hurricane, cyclone or typhoon-force winds and often with clay or limestone soil challenges.
- Areas with >50% average cloudiness. This as our reflective foundations drive bifacial gains >15% under diffuse irradiation conditions. This includes project sites from Maine to Malaysia. Bifacial modules, boosted by a reflective foundation, now allow tracker economics to win in Northern Europe. This as 30% yield improvements overcome high land costs and lower tariff rates.
- Brownfields such as shuttered coal interconnects ash dams or landfills.

PES: What are your predictions for the solar/PV industry in general and your company in particular for 2020?

MK: More excitement and grey hair as we all fit 10 months of projects into the last 6 months of 2020. Accelerated by the COVID-19 shock, I see a general shortening of supply chains, with a continued drive to component localization, plus a renewed focus on leaner construction practices. As to technology we will continue to add capability to our robotics platform.

Forecasting further ahead, coal's demise is clear. The improving economics and response speed of PV + storage spell continued change for gas turbines in 2020. Within 5 years new gas turbines will either burn hydrogen or be relegated to mobility-related applications such as ships and aircraft. This will further shake our legacy energy ecosystem.

Harnessing the nearly free energy from sub 2¢/kWh solar will drive additional business model innovation and geographic disruption. I am optimistic for our future as opportunities abound.

Stay healthy, we all have lots more to do in renewables.

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