

Utility Solar's New Cleaning Paradigm

As utility solar becomes increasingly competitive, companies seek gains in efficiency and production. Ecoppia and CEO Eran Meller are delivering just that with the market's only automated cleaning solution - and the industry has noticed.



Ecoppia's E4 cleaning robot, with its docking station visible in the background. A new paradigm for utility solar.



Side-by-side comparison of panels maintained by Ecoppia's E4 and those seeing intermittent manual cleaning.



CEO Eran Meller at Ecoppia HQ near Tel Aviv in Israel.

Several months ago a dust storm swept through Israel's southern Arava Valley, depositing a fine layer of dust over utility solar parks owned by Arava Power - Israel's original clean energy company - with O&M services from Siemens. The storm came through at about 10am, knocking production off just as daily production was nearing its peak.

As soon as the storm had passed, the sounds of Ecoppia's E4 robotic fleet undocking from their berths could be heard up and down the site. Two hours later the modules were spotless and the production day continued, having regained what would have otherwise been a 30% loss in production efficiency.

"We couldn't have asked for a better field demonstration of our technology," says Eran Meller, CEO of Ecoppia. "The storm blew in suddenly from Saudi Arabia, bringing with it this thick wall of dust. Our cloud-based platform knew about the storm before Arava and Siemens - it deployed our E4 fleet and two hours later it was like the storm hadn't happened. Another site just minutes down the road wasn't equipped with the E4, so we had the

luxury of comparison." That site was nearly two days getting a cleaning crew and two weeks before they'd finished cleaning.

"Now they're a customer," says Meller, regarding the second site.

Three years after founding the clean energy robotics company, Ecoppia has expanded into India, opening a large new manufacturing centre to deal with strong demand. In their home market of Israel, mostly concentrated in the Arava and Negev desert regions of the south, they're on track to reach 75% market share this summer.

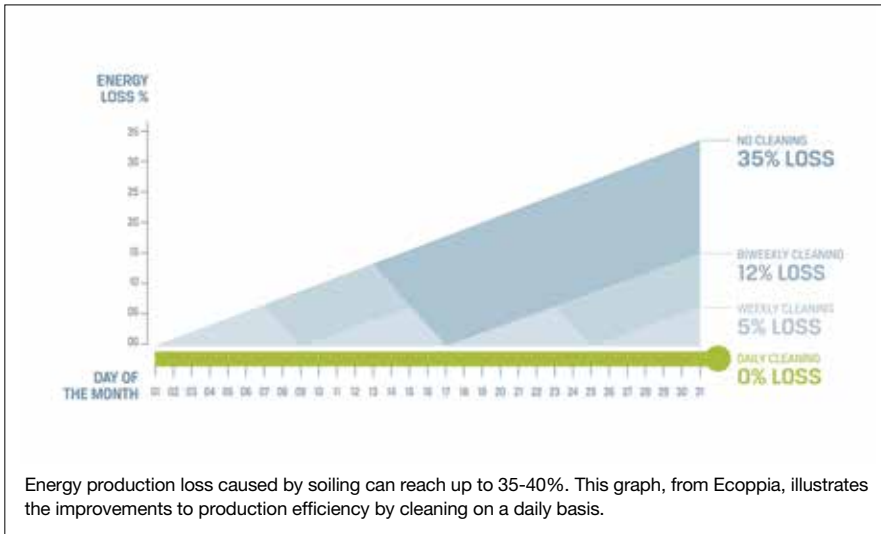
Driving Efficiency

The increased competitiveness of utility-scale solar has been big news recently, with prices decreasing globally some 50% in the last year. Records have been broken across the world, from India to Peru to Dubai, where the lowest bid ever for solar recently came in at 2.99 cents per kWh.

The drive to deliver the cheapest kWh is pushing companies to seek every efficiency gain possible and get the most out of solar production. One of the major pain points for

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Eran Meller, CEO, Ecoppia



rows and come out every night after the production day ends (by leveraging gravity, generating airflow and utilizing a unique microfibre fabric, Ecoppia ensures peak production of the solar modules every day when the sun comes up).

The robots are water-free, battery-operated (charged using their own solar modules, of course) and make use of Ecoppia’s patented ‘Eco Hybrid’ technology to capture lost energy and minimize consumption. During the day they sit off panel rows to avoid shading modules. Every evening, they undock from their stations and clean sites from top to bottom, rolling along specialized tracks to avoid putting load on the panels.

Which raises the question – do sites really need to be cleaned every night?

“In the last year we’ve been approached by just about every major player globally that has, or will have, a site in an arid region. Certainly we are in discussion with the leading tier-1 companies in India and the Middle East. So the market tells us that we’re on to something,” says Meller.

the industry that’s remained stubbornly unsolved is the dust and soiling deposits that shade panels and impact production. Until recently, the solution has been decidedly low-tech: work crews with mops and water. Besides being slow and cost-ineffective, it also means additional labourers on site, insurance and added chances for damaged panels. So far, the only automated solution to these problems that has seen commercial deployment, in both the Middle East and India, is Ecoppia’s.

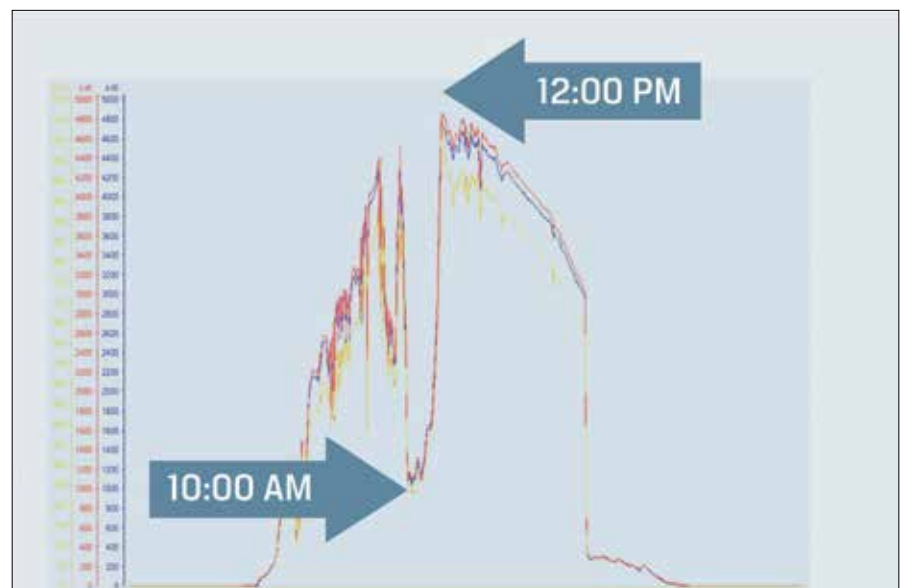
A New Cleaning Paradigm

Ecoppia markets itself as the only field-proven autonomous and water-free utility solar cleaning solution. But what they’re doing is changing the equation of how solar sites, especially in arid regions, are operated and maintained. In dusty regions, soiling can have a significant impact on production in as little as a day. As natural soiling increases, production efficiency declines until sites are cleaned, at which point production returns to near 100%. For sites cleaned manually, the loss from natural soiling can reach upwards of 10-20% a month (here we’re assuming a site sees a manual cleaning roughly twice a month), even without dust storms or heavy deposits. (see graph, top)

At the scale of hundreds, even tens, of megawatts, it adds up to a lot. Over the course of a lifetime of a site it can mean

tens of millions of dollars to the bottom line.

Ecoppia is targeting the utility solar industry by claiming to capture that lost revenue by maintaining 100% peak production year around for the lifetime of the site. They do this through their robotic cleaning technology, called the E4. E4 robots are installed permanently at the end of solar



The graph above illustrates power production at a site equipped with Ecoppia’s E4 cleaning technology. When the dust storm swept in at 10am, production plummeted (bottom of trough). The notification was received to add a cleaning cycle and by lunchtime the entire site was back to peak production (right peak). The falloff to the right represents the end of production as the sun set.



Ecoppia E4 robots in their docking stations, waiting for the sun to go down.

Indian Production Facility

To deal with demand Ecoppia recently announced a partnership with a Fortune 500 company to open a 100,000 square foot state-of-the-art production facility in Chennai, India, to start producing E4s later this summer. Meller states the factory will be able to supply in excess of 1 GW worth of robots by 2017.

In fact, for Meller, India might represent the holy land of utility solar. As part of Prime Minister Modi's national priority to build out 100 GW of solar by 2022 as well as the 'Make in India' policy, capital is flooding

into the country, geared towards building new solar capacity. In a country already under severe water stress (the World Bank suggests that by 2050 India could run out of fresh drinking water), being able to provide new solar capacity with a water-free cleaning solution - saving the cost of untold millions of gallons of water - is a compelling thought for many of India's largest energy players. Having cut their teeth cleaning solar sites in the harshest desert conditions on Earth, Ecoppia is now expanding readily in India

"We're currently up and running with some of the big, tier-1 companies in India and in

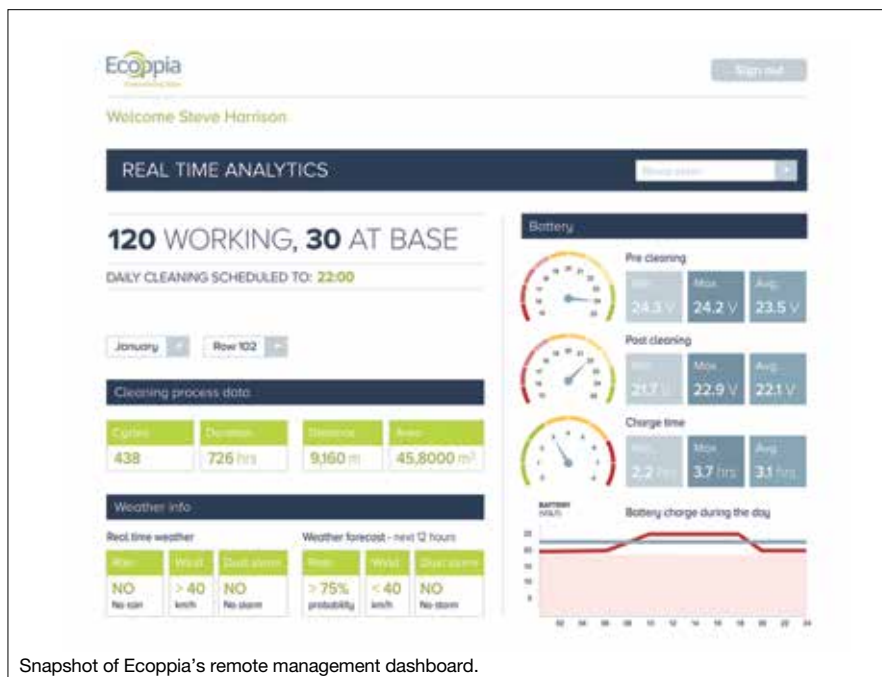
late stage discussions with several more." In addition to the new production facility, the company will soon open an Asian sales and operations hub in Delhi to facilitate expansion. "India's our most important market right now, no doubt," says Meller, noting that interest is coming from sites up and down the country, not only ones located in arid regions.

Building a Smarter Solution

It's after considering the smart technology that Ecoppia has baked into the system that the entire platform really begins to shine. Ecoppia hasn't built a cleaning robot - they've built an autonomous, cloud-based, sensor-enabled smart cleaning platform, one that makes decisions and is an active participant in suggesting how best to manage the O&M of sites.

"We listed the challenges it had to solve in order to provide real value to the industry - water free, damage free, maintenance free, electricity-independent. Remote management was required and robots had to be able to respond to weather conditions autonomously - and it all had to be cost-effective. We're bringing utility-cleaning out of the Stone Age and into the 21st century, to automate an aspect of solar energy production that has been a headache, a pain point for the industry," Meller explains. "We're not just introducing a new mop or a new method: this is a new way to think about utility-scale O&M. There's no water, no onsite labourers, no inconsistency in the cleaning level - just autonomous robotics. It's the next step for smart utility PV. ■

www.ecoppia.com



Snapshot of Ecoppia's remote management dashboard.

Ecoppia at a glance

- Founded: 2013
- Headquarters: Israel
- CEO: Eran Meller
- Currently Cleaning: 14 million panels a month by end of year
- Deployed Capacity: 110 MW by end of year
- Main Production Center: Chennai, India
- Methodology: Water free, fully autonomous, electricity independent
- Target Market: Medium to large scale utility sites (10 MW and larger) in the Middle East and India
- Certifications: PI Berlin and Tier 1 module manufacturers
- Website: www.ecoppia.com