

Cleaning Buggy Boosts Solar Panel Performance

Written by Nicole Lang 11 February 2019



As solar energy evolves and becomes more mainstream, the industry will shift its focus from development and installation to maintenance and performance. The global solar market grew by more than 29% in 2017, according to [a study](#)

published by Yale University, bringing total operating solar power in the world to 405 GW – 89% of which was installed since 2010.

As the focus turns to maintenance, system owners will need to devote more time and resources to overall performance. Clean solar panels can dramatically enhance system efficiency, but doing so can be dangerous, labor-intensive and ineffective. Uncleaned systems can also break down far sooner than regularly and properly cleaned systems.



“The feedback on solar performance from customers is very much dependent on the degree of soiling,” said Sören Dethlefs, an experienced operator of solar cleaning equipment for Solarreinigung + Service Nord of Germany. “In the case of agricultural farms and livestock farming, ammonia gases lead to an increased degree of soiling. If not regularly cleaned, the heavy soiling may reduce performance by up to 30 degrees.”

One recent innovation is helping companies conquer solar panel cleaning. [TG hyLIFT GmbH](#) of Germany has designed a battery-powered, remote-controlled buggy that enables users to clean up to five times faster than manual labor. The buggy is safer than manual cleaning of solar panels and can dramatically improve the efficiency of the solar power system.

“The concept of solar plant cleaning is still largely unknown in the industry,” said Andreas Grochowiak, the company’s managing director. “We have to start here and convince solar operators and service providers in the facility management industry of our product.”

Clean sweep

Dethlefs and his company were trained on the use of the hyCLEANER black SOLAR by Dieter Roters and his team at Equipment Service, a German company that specializes in the cleaning and maintenance of aerial work platforms. "It's our target to show the operator how many solar panels can be cleaned when using semi-automatic cleaning equipment compared to manual cleaning methods," Roter said. "Our motto is to work smarter, not harder."



The cleaning buggy looks like a little car and moves on four wheels with two toothed-belts. The belts are covered with special straps that grip the wet surface, and can move at angles up to 35 degrees. The buggy can cross over maintenance aisles and panels of up to 35 centimeters.

Users need a water connection to start the machine. A reel manages the hose connection, and surfaces are cleaned with water and a special cleaning brush. The brush is 90 centimeters wide with a diameter of 30 centimeters. Other sizes are also available. The brush rotates at 400 revolutions per minute.

The unit is powered by lithium-ion batteries that can last for more than three hours. The device also cleans up to five times faster than manual labor.

"It was our aim to enable gentle, fast and efficient cleaning of solar panels when using the hyCLEANER system," Grochowiak said. "Work safety was a big issue, which we were able to resolve by the development of this system."

Safety first, with better results

Most operators at solar power facilities use manual labor to clean panels. But some areas can be hard to access, and solar power materials are sensitive. "Manual work by personnel is a common solution, but it can be dangerous and physically demanding," Grochowiak said.

Dethlefs said his teams used brush systems and poles before using the hyCLEANER black SOLAR. "This meant a lot of physical stress for the cleaning staff," he said. "The cleaning result was not constant. It was good in the morning, but suboptimal in the evening due to fatigue of the cleaning staff. Thanks to hyCLEANER black SOLAR there is no physical stress for the operator, therefore a high and constantly good cleaning result can be achieved from sunset to sunrise."

The system is also safer for the solar panels. "When using the hyCLEANER black SOLAR there is no need to step on to the roof and or on to the sensitive solar panels," Dethlefs said. "There is no physical stress for the operator."

Regular cleaning improves system performance, and extends the life of the panels. "Even small contaminations may reduce the performance and efficiency of the complete plant, due to the series connection of modules," Dethlefs said. "The weakest module determines the total output. However, it is not only the financial loss, which gives reason to concern. Soiling can attack panel coatings and seals. Incoming water then causes damages to the complete system. The plant becomes susceptible to faults and failure. All these issues can only be avoided by regular cleaning."

Critical plastic components

Key parts of the hyCLEANER black SOLAR are manufactured by [igus](#), the Germany-based manufacturer of motion plastics. The device includes bushings made with igus' iglide P material, and help prevent wear between wheels on the assembly and a stainless steel shaft. The bushings are designed for outdoor use and absorb moisture in low quantities.

The shaft end of the brush also includes fixed flange bearings manufactured by igus. The spherical ball of the fixed flange bearing is made with iglide W300, and is characterized by high wear-resistance and service life.

"We wanted to develop and create machine technology that does not require any greased rotating components such as wheels, rollers and brushes," Grochowiak said. "The use of greased rotating components in cleaning machines is something that would not have been accepted by the customers and users of our machines. Possible leaks could negatively affect the cleaning results."

The hyCLEANER black SOLAR has been used to clean some well-known European solar arrays. Stade de Suisse in Bern, Switzerland, one of the most unique soccer stadiums in the world, had its vast system cleaned with hyCLEANER black SOLAR. The system includes 7,930 modules and provides an overall output of 1,346,774 kWp. In Marineda City in Spain, the system was used to clean the nation's largest shopping center. The complex includes 1,2000 triangle-shaped glasses covering nearly 14,000 square meters.

Dethlefs has seen the benefits of the product, both for workers and improved performance for the solar power system. "I am very much surprised at the good adherence and grip the machine generates on the solar panels, even when working on inclination angles of 35° (with one brush) and 25° (with two brushes)," he said. "It's an easy-handling system for a safe and efficient cleaning operation."

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Labels: [cleaning solar panels](#), [HyClean Black Solar](#), [igus](#), [battery powered](#), [maintenance](#)

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