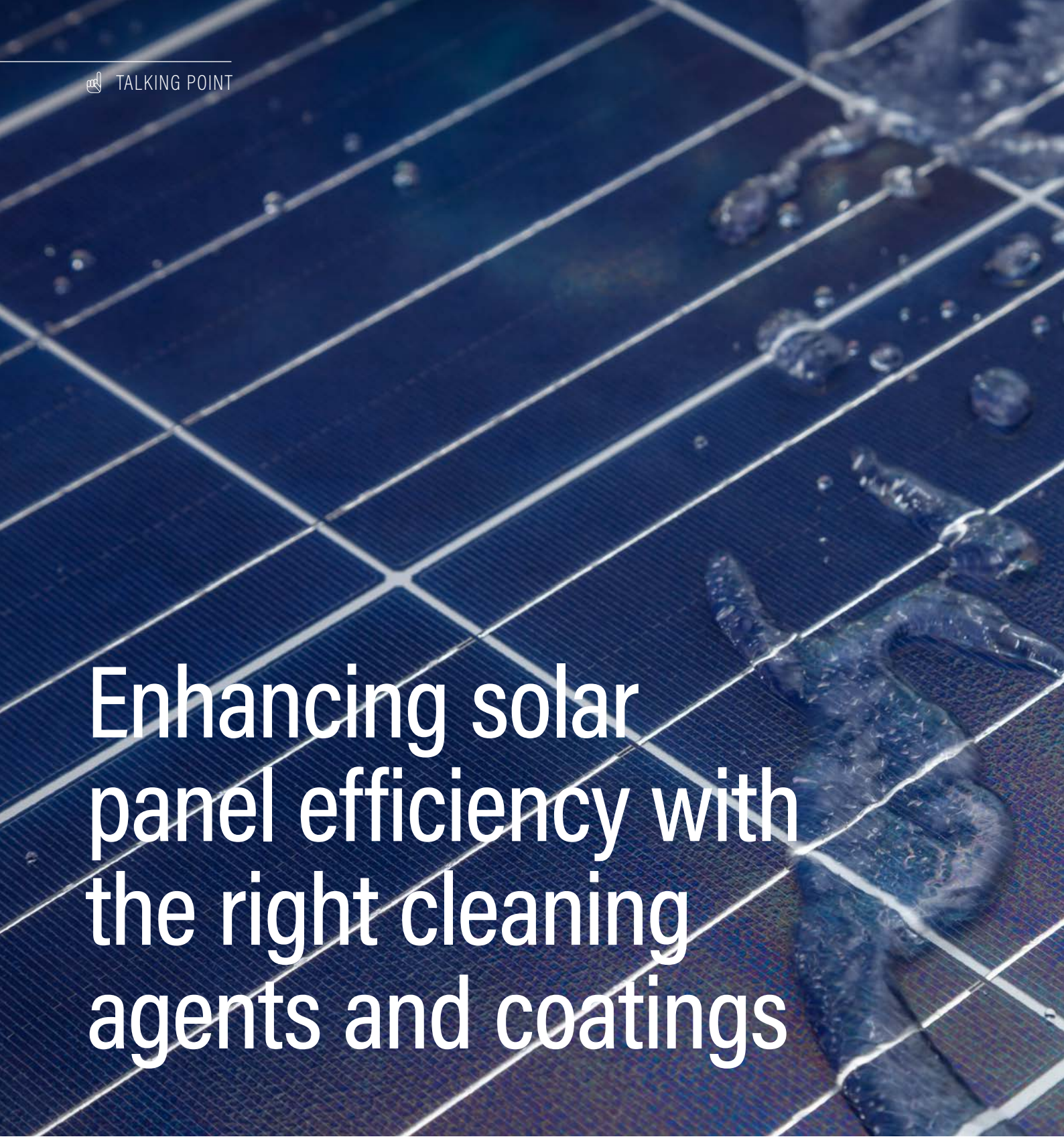
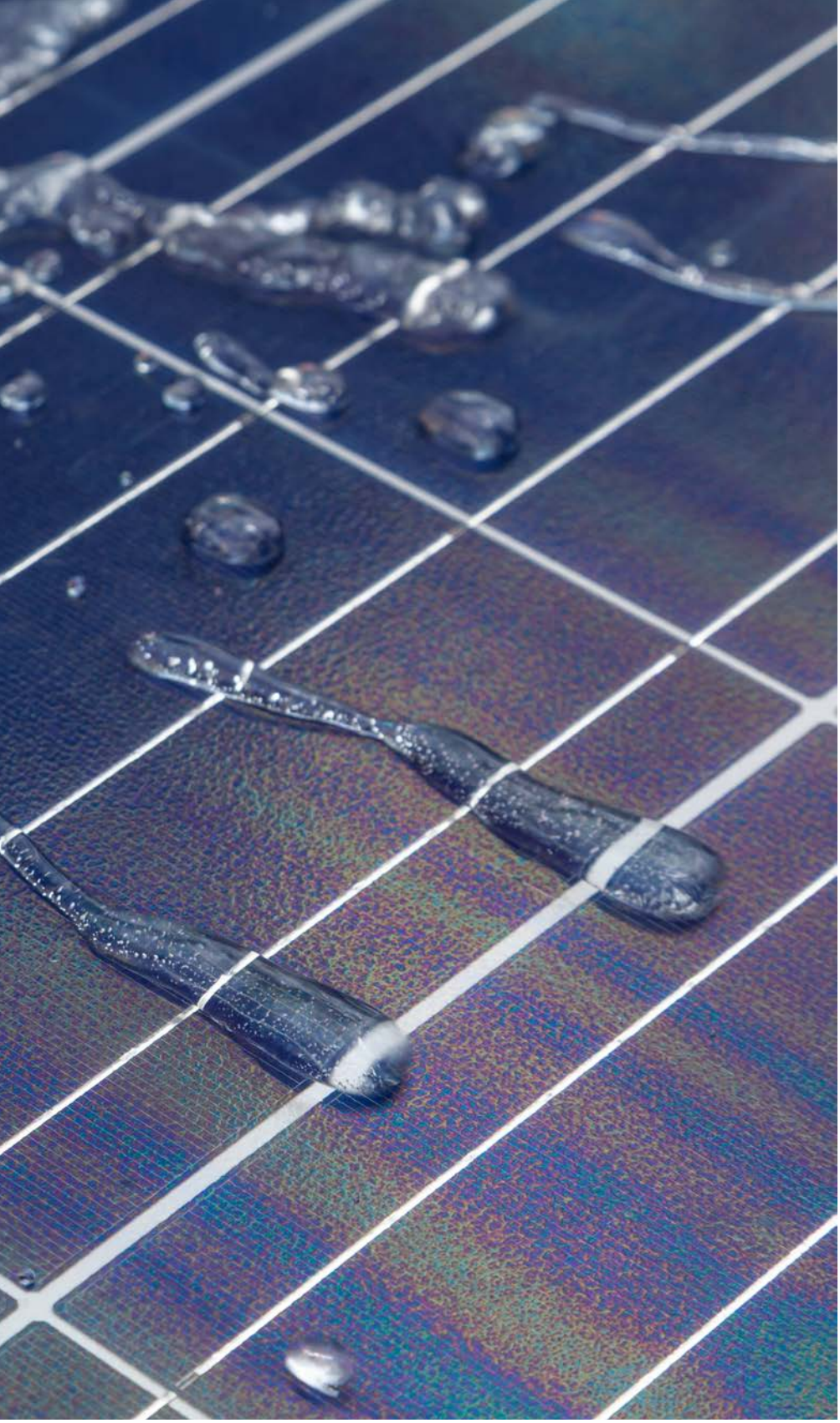


Enhancing solar panel efficiency with the right cleaning agents and coatings

Airborne dust particles, sticky tree and plant sap, lichen, soot and bird droppings are just a few of the things that can contribute to a build-up of dirt on your solar panels. Accumulation creates shading on the panels and will prevent sunlight reaching the cells. This results in poor system performance, loss of efficiency and a loss of financial return for the owner and investor of solar energy. Rainwater alone is not always enough to combat the problem, but using chemicals in a sustainable way is just as important.



The fast expansion of the solar industry has led to increased demand for efficient and safe solar panel cleaning products. Solar panels are exposed to environmental pollutants, such as dust, pollen, bird droppings, lichens, fungi and other organic matter, but also to inorganic matter, such as cement dust, stone dust, paint stains, etc., that accumulate on the surface of the panels over time. This soiling will lead to a decrease in the energy production, since it lowers the overall efficiency of the solar plant.

In fact, on large-scale solar plants if enhanced cleaning is not performed, it will result in a decline of the amount of energy produced and a loss of income for the asset managers/owners. The efficiency loss due to soiling is estimated to be between 2 and 5% annually worldwide and represents losses of over 4bn € annually. In large-scale PV plants, a soiling loss of as little as 2% can be already enough to justify a cleaning.

There is a huge range of equipment available that is used for cleaning large-scale plants, from brushes to robots, to rotative brushes, all with their advantages and disadvantages and depending on the size and layout of the solar plant. A combination of all the different types of equipment can also be required to effectively clean a PV plant.

Large solar farm cleaning systems are commonly used in the cleaning of large-scale solar installations, due to the magnitude of the solar farm and the need for cleaning optimization. Farm tractors are usually the go-to equipment in the cleaning of solar farms due to the size of the installation and the width of the strings. The space between the rows is, usually, large enough for the use of this type of machinery to optimize cleaning.

The most common equipment is a hydraulic driven articulated brush that is coupled to the tractor. The tractor is only used to support and bring the brush close to modules. The brush is usually self-adjusting by means of capacitive or hydraulic sensors. The length of the brush can be as little as 2m and as big as 8m.

In order to make cleaning more effective, it is necessary to find the right cleaning solution to optimize the efficiency of the solar plant. Every PV plant is different, and different layouts and terrains need to be considered. When it comes to the location and atmospheric conditions of the solar plant, in very humid or very dry climates, located in agricultural fields, near industries, e.g. cement plants, coastal areas, among other factors, cleaning solar plants only with water will probably be inefficient, because many of the contaminants cannot be cleaned with water alone.

It is necessary in these cases to use products specific for solar panel cleaning to avoid voiding the warranty of the solar modules. These products need to be safe for all the different components of the solar modules: aluminum frame, silicone seal, glass and ARC, anti-reflective coating. Also, the product used should be biodegradable and environmentally friendly so as not to spoil the fauna and flora of the site.

To address this problem, Chemitek Solar has developed a range of cleaning and contaminants removal agents and anti soiling coatings to help asset owners and O&M companies clean better and thus improve the output of their solar plants.

Chemitek Solar's Contaminant Removal Agents are designed to effectively remove all types of soiling from the surface of solar panels without damaging them. The products are differentiated based on the type of contaminants they target, such as bird droppings, dust, cement dust, lichens, paint stains, hard water stains, and other organic and inorganic matter. These contaminants often accumulate on solar panels, causing significant reductions in energy output and even damages, e.g., hotspots, if not removed.

Usually, removing the harder contaminants requires the use of scrapers, harsh chemicals

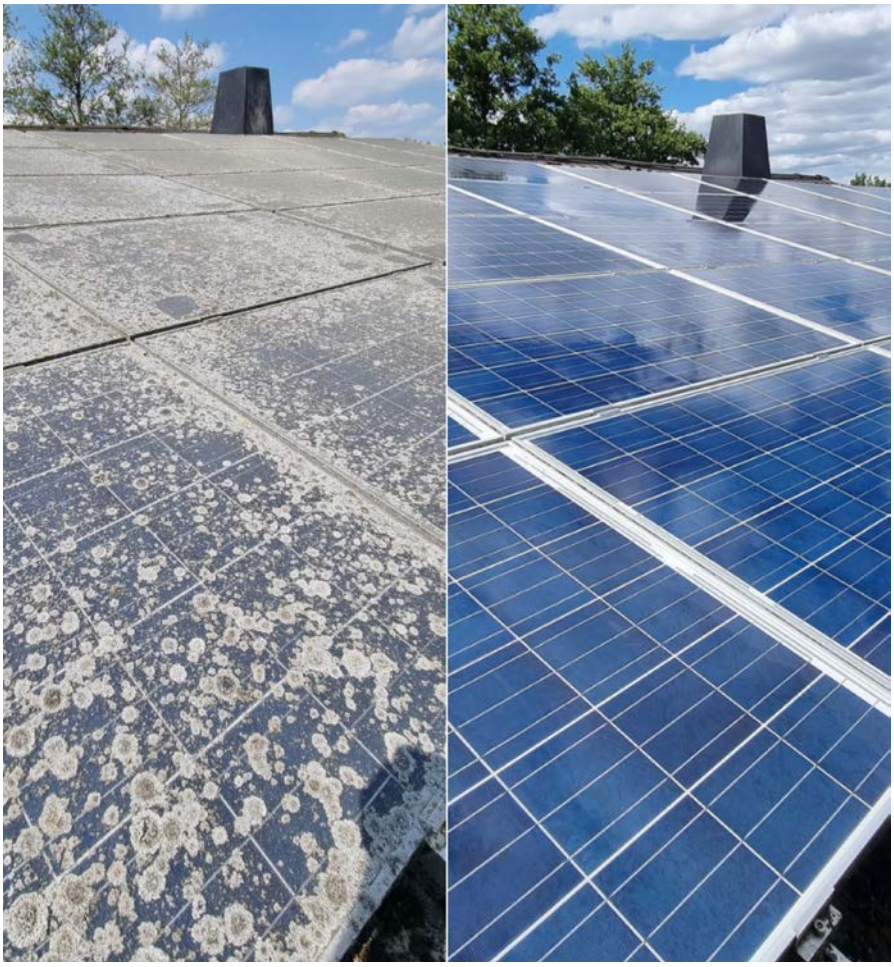
or even high-pressure cleaning machines which will cause damages to the surface of the panels.

Furthermore, most detergents used for cleaning solar panels are neither certified for use on solar panels by an independent laboratory nor approved by the solar panel manufacturers. On the other hand, Chemitek Solar's Contaminant Removal Agents are designed to be safe, effective, easy to apply, environmentally friendly, while ensuring that the solar panels are cleaned without causing any damage to them, the environment or the persons handling the products. All products are fully tested and certified by the international laboratory TÜV Sud and several have conformity letters from the biggest solar panels' manufacturers.

To complement the removal of different types of soiling from the modules, Chemitek Solar has developed a range of antisoiling coatings. These coatings are designed to help protect solar panels, reduce the soiling rate, the attack of contaminants, and make them easier to clean. This means less time and money spent by O&M teams and higher energy output for the asset owner.

Chemitek Solar's coatings work by creating either an antistatic or hydrophobic layer,

Before and After CRA



Before and After LRA

depending on the coating applied, on the surface of the solar panel, which, in case of the hydrophobic coatings, repels water and, in case of the antistatic coating, reduces the dust deposition. Both also have antiadherent properties that reduce the adherence of the soiling to the surface of the modules.

The application of the coatings is quite simple, since they are applied during the normal cleaning operations by just mixing them with the cleaning water. The mechanical action of the bristles against the surface of the panels promotes their adhesion.

In conclusion, ChemiTek's range of cleaning products and coatings for solar panels are designed to help asset owners and O&M companies improve their cleaning and maintenance and the efficiency of their solar plants. By using these products, solar plant owners and O&M companies can save time and money on cleaning and maintenance, and ultimately increase the energy production and improve the efficiency of their solar plants. The dozens of PV plants that have been cleaned and protected with ChemiTek products shows that using a specific product for remediation of contaminants together with a coating is a highly effective method for cleaning solar panels.

Find more about Chemitek Solar's range of products for the solar industry at The Smarter E Europe Intersolar München. Visit them at booth A4.630 from June 14th to 16th.

https://www.chemitek.pt/