Cleaning solutions

Optimizing the performance of solar panels often comes down to ensuring their cleanliness. The level and type of soiling, the local weather and the surroundings of your plant can lead to soiling problems and the subsenquent energy output drop due to the reduced light transmission. So, ensuring your modules are clean while protecting them with the coating that fits into the local weather and environment conditions should be an important part of the maintenance cycle.

ChemiTek is a Portuguese company dedicated to the development, production, and sale of efficient, easy to apply, innovative and environmentally friendly chemical products for industrial maintenance. With an already diversified portfolio, the company presents solutions for sectors such as solar, glass and automotive.

During last year, ChemiTek, in partnership with O&M companies and PV Asset Managers, has developed a range of products to solve specific problems of the solar industry,

This new range of products will be presented at Intersolar Europe, in Munich, May 11th - 13th. You will be able to learn more about their contaminants' removal agents, as well as their easy to apply coatings for soiling mitigation and efficiency enhancement.

In preparation for the presentation, the antistatic and hydrophobic coatings were tested last year at the Green Park in Morocco, with very significant results.

Having in mind the different problems and conditions of each plant, and that no two solar plants are alike, ChemiTek studies the different conditions of each one, such as the amount and type of dirt, the surroundings and the weather, as well as the cleaning method, to find the best solution for your solar asset.

Different contaminants and harsh soiling can be removed by ChemiTek's products, such as lichens, cement dust, stone dust, gypsum, hard water, bird droppings, pollen, bees' wax and others.

To remove contaminants like cement dust, stone dust, gypsum and other alkaline contaminants, the Cement Removal Agent (CRA) will react chemically, removing them in a highly effective way. This product should be used in its diluted form and only as a solar panel remediation agent.

Another problem that affects the production of energy from photovoltaic panels, and that can even damage the system, is the appearance of lichens, mosses and other fungi on their surface. This is especially the case in very humid environments and with large amounts of organic matter, near forests, agricultural plantations, etc. For this, ChemiTek developed the Lichen Removal Agent (LRA).

For the removal of organic dirt such as pollen and bees' wax, bird droppings, sand, dust, resin, etc. the cleaning and protection solution Solar Wash Protect (SWP) is an innovative solution. As well as effectively removing the dirt accumulated on the panels, it also gives the glass of the solar module an antistatic coating that repels dust and prevents the adhesion of the soiling. This antistatic effect keeps the modules cleaner, as well as facilitating the subsequent cleaning, whilst reducing water consumption by up to 50%.

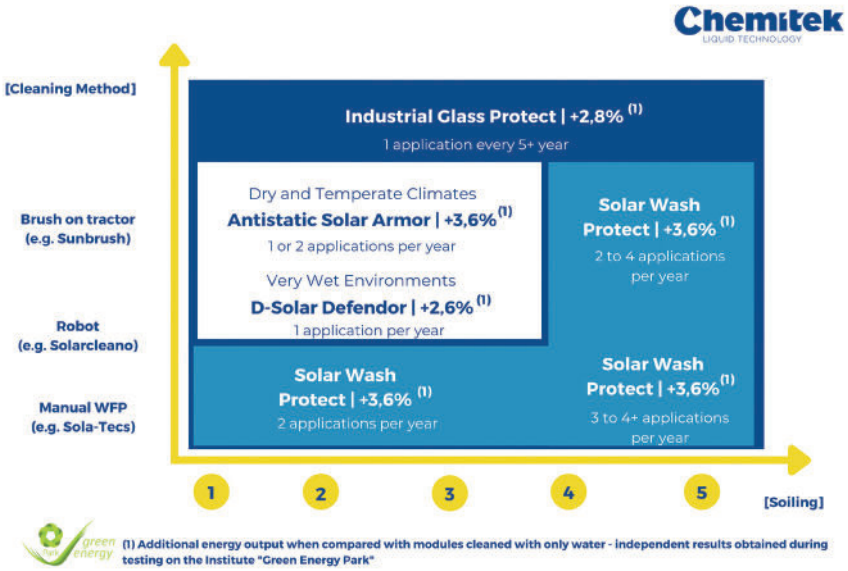
Lastly, during the cleaning process of solar panels it is important to use the correct type of water, to prevent water stains on the module. For example, if the cleaning is done with hard water, with a high content of minerals and metal ions, it is likely that stains and deposits of these minerals will appear.

This will block light transmission and can even lead to the creation of hotspots on the module. To solve this problem, ChemiTek has developed the Water Softening Agent (WSA), a biodegradable agent that captures minerals and metal ions, making the water completely safe to use for PV modules cleaning.

ChemiTek coatings are certified and fully tested by international laboratory TÜV Sud and PV manufacturers, to prevent problems from reappearing.

The product range includes protection for dry and moderate climates and hydrophobic protection for rainy environments.

For antistatic protection there is the SWP and the Antistatic Solar Armor (ASA). SWP is



Green Energy Park Chart

a cleaning and protection product that can be used by O&M teams and Asset Managers, or on a residential scale, for manual cleaning of modules in houses. As an antistatic protection for PV solar panels, it was developed to be applied by professionals on panels installed in dry climates, and to be applied during the cleaning with semi-automatic equipment such as a brush on a tractor and robot.

For very humid and rainy climates, hydrophobic or water repellent coatings such as D-Solar Defendor (DSD) are recommended. These keep the modules cleaner and easier to clean. This is a product for professional use and is applied at high dilutions of 1 kg per 1000l of water with a brush on tractors or robots.

The Industrial Glass Protect (IGP) is a long-lasting hydrophobic protection for professional use, very resistant to adverse environmental conditions, such as acid rain, high salinity and extreme temperatures, great to reduce the amount of cleaning required.

Their soiling mitigation and efficiency enhancement products were put to the test on the Institute 'Green Energy Park' between August '21 and February '22. Modules coated with their antistatic and hydrophobic coatings were compared to modules cleaned with just water and uncleaned modules. The results were as expected. With ChemiTek's coatings, the modules obtained an additional energy output of +3,6% for the antistatic coating and +2,6% for the hydrophobic coating!

If you have soiling and contaminant problems, avoid desperate measures. Visit ChemiTek at Intersolar Europe in München from May 11th to 13th at stand A5.260!

To demonstrate the effectiveness in problem solving and prevention that ChemiTek offers, its products were used for the remediation of a solar park in Chile, highly contaminated with cement dust, already solidified and cured on the surface of the solar modules.

To solve the cement cured problem, the Cement Removal Agent (CRA) was used, in order to remove all the cement deposited on the panels, without damaging the panels.

Then, to prevent the problem from reappearing, the modules were protected with the antistatic coating of the Solar Wash Protect.

Case Study Chile: before Cleaning and Protecting

Case Study Chile: after cleaning with CRA and protecting with SWP

A few months later, it had noticeably reduced the amount of dust deposited on the panels, as well as it was easily removed with a simple wash, without the need to use the CRA again.

To verify the operational and efficiency gains of ChemiTek's Solar Wash Protect to improve solar power generation and make soiling removal easier, the product was tested. Solar Wash Protect by ChemiTek, regarding solar power generation improvement and ease of soiling removal, followed by non-adherence of the soiling, it was tested at a utility scale plant of Scatec, in Honduras.

The plant had light soiling and dust, pollen and the occasional bird droppings.

The plant was cleaned every two months during the dry season with manual brushes, with no cleaning during the rainy season.

The comparison test was run over one month on three strings with the same number of solar panels. Two strings, CH3 & CH4, were cleaned with just water as a baseline and the other string, CH6, was cleaned and protected with Solar Wash Protect.

The O&M team controlled the operational gains, water consumption and easiness of cleaning, and the energy output.

First, the product was diluted in water at the correct dilution ratio and sprayed directly on the panels with a sprayer.

Then, the product was applied manually with brushes and the panels were thoroughly brushed and finally rinsed to remove the dirt and any excess product.

The O&M team found it easier to clean and remove the soil, when compared to cleaning the string with just water.

The water consumption was largely reduced as it was only needed to dilute the product and to rinse the panels.

The energy output of each string was controlled at the inverter level and compared between them.

Scatec: Honduras Solar Park

In this test, the temperature of the panels had no bearing on the results, as all panels were subject to the same solar irradiation and ambient temperature.

After one month, the results from the CH6 string were compared with the results from the strings CH3 and CH4. The CH6 string, cleaned and protected with Solar Wash Protect, showed an increased energy output of 1.8% when compared with the CH3 string and an increase of 2,9% compared with the CH4 string.

Importantly, according to Scatec, in this situation CH6 panels were subject to much more dust, due to being nearer the road, than CH3 and CH4 and therefore the results may be under evaluated.

The test was considered a success and the O&M team decided to move forward with the use of Solar Wash Protect for all their cleaning operations.

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Scatec, Honduras Solar Park: before cleaning with SWP

Scatec, Honduras Solar Park: after cleaning with SWP