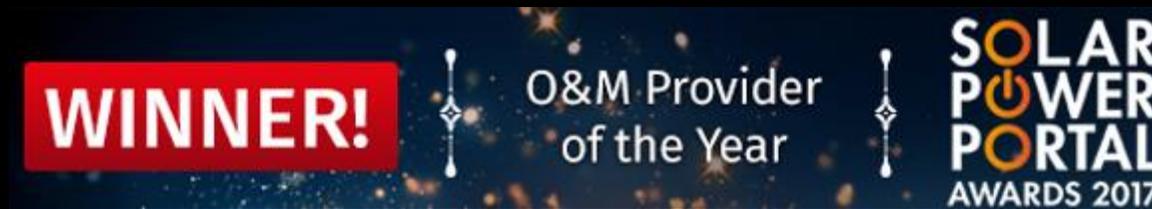


Raising the Standard in Safe & Professional Solar Panel Maintenance



MAKING CLEAN ENERGY CLEANER



Solar Panel Cleaning In The UK – The Story So Far

- 2011 solar power took off in UK.
- Majority of solar panels sold under guise of being 'self-cleaning'.
- Clean Solar Solutions Ltd played strong part in busting that myth within solar industry.
- UK solar cleaning industry still changing & maturing.
- New challenges present themselves as time passes. Mexico can learn from other people's mistakes.

Dropping the Bomb ...



Panels Do Not Self Clean

Solar Panels In UK Face Unique Challenges



- Self-cleaning myth pervaded the industry.
- UK has a wetter climate than most countries best suited for solar. Algae, lichen.
- Lack of knowledge and forethought created massive financial problems for Operations & Maintenance providers and asset owners alike.
- People expected bird droppings, but the appearance of lichen and how to deal with it was completely unexpected.

Solar Panel Cleaning In O&M – The Current Situation



- Many O&M contracts omitted cleaning as part of their scope.
- As a result, many sites did not get cleaned for 2 or 3 or more years, leading to big problems.
- This caused assets to deteriorate from bird droppings and more recently lichen.

Solar Panels Cleaning In O&M – The Current Situation



- Bird droppings are easier to remove. Lichen, on the other hand is more tricky.
- Like a limpet on a rock, Lichen adheres to the surface of solar panels by means of hyphae being put down in the pits in the glass, making it much harder to remove.
- Lichen can only grow where there is algae. Keep the algae levels down & lichen will not grow.

Solar Panels Cleaning In O&M – The Current Situation



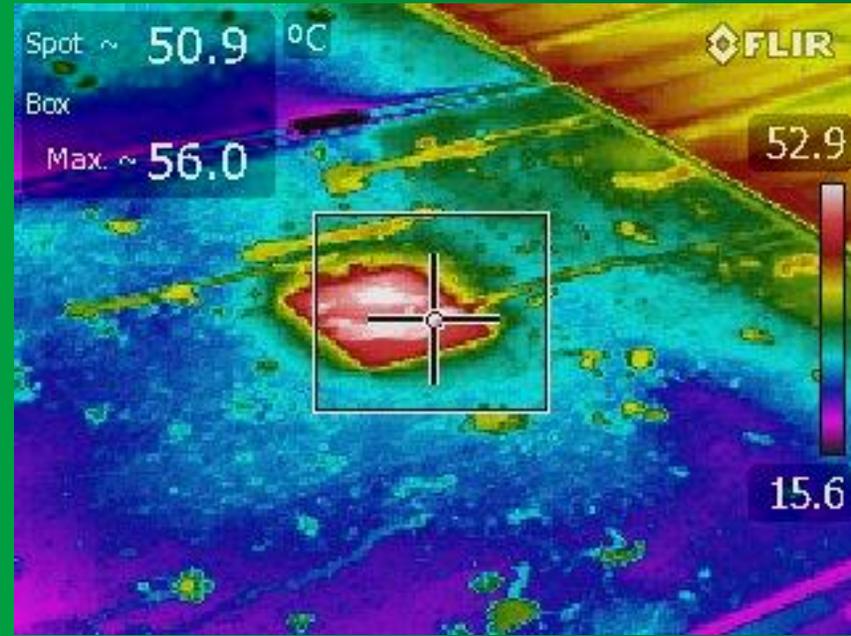
- Mexico with its wide range of habitats is one of the major biodiversity hot spots in the world
- Accordingly, it is not surprising that over 20% of the world's largest family of lichen, Parmeliaceaea exists in Mexico
- The challenges of lichen faced in the UK will soon be prevalent for solar arrays in Mexico. YOU HAVE BEEN WARNED!!!

Solar Panels Cleaning In O&M – The Current Situation



- The wrong methods of removing lichen and bird droppings can create permanent damage.
- Standard lichen removal chemicals used for paving or roof tiles will invalidate the panel warranty.

Solar Panels Cleaning In O&M – The Current Situation



- Shading created by debris of any sort is the enemy of a solar panel.
- Shading creates hot spots. If left, these can create permanent damage to the solar panel, as seen here.

What Does This Mean For Solar Panel Cleaners?



- The solar panel cleaning market is sizeable and continues to grow.
- The risk of electrocution does exist on all solar panels that need cleaning because of how they work. The risk of electrocution is increased on thousands of installs across the whole country as a result of poor quality panels and installs. The risk of electrocution is often unseen.
- As a result, the UK solar industry does NOT recognise solar panel cleaning as being the same as window cleaning. Solar panel cleaning must be regulated and health and safety standards as a stand-alone industry.

DC Electrical Shock – More Likely, More Dangerous



Solar panels always produce DC electricity. Accumulative.

National Institute for Occupational Safety and Health states "Under dry conditions, the resistance offered by the human body may be as high as 100,000 Ohms. Wet or broken skin may drop the body's resistance to 1,000 Ohms," adding that "high-voltage electrical energy quickly breaks down human skin, reducing the human body's resistance to 500 Ohms." Perspiration also lowers the resistance of your skin.

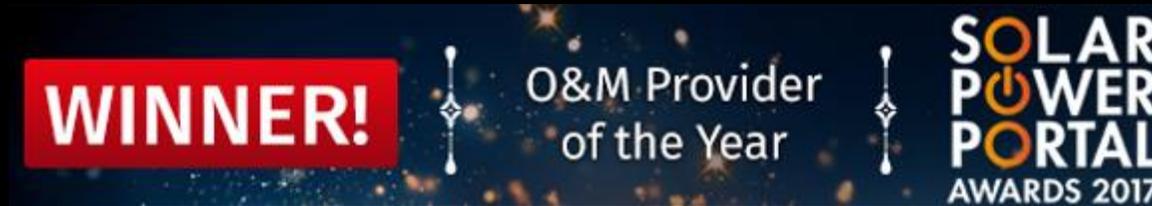
- DC shock causes muscles to contract.
- DC shock is less likely to cause the heart to stop than AC, but it still can occur between 300 to 500mA.
- DC shocks nearly always result in burns because the person cannot let go of the source. Electricity heats the body tissue and the burns may require surgery or result in permanent disablement.

Removing Bird Droppings and Lichen – The Solution



- Choose a quality panel cleaning company, one who adheres to the best practice guidelines as set out by the Solar Power Europe O & M Taskforce
- Health & safety must be considered
- Ensure your panel cleaning company has the capability to remove lichen
- Regular panel cleaning will not allow lichen to accumulate in the first place

Long May The Sun Shine On Mexico!



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