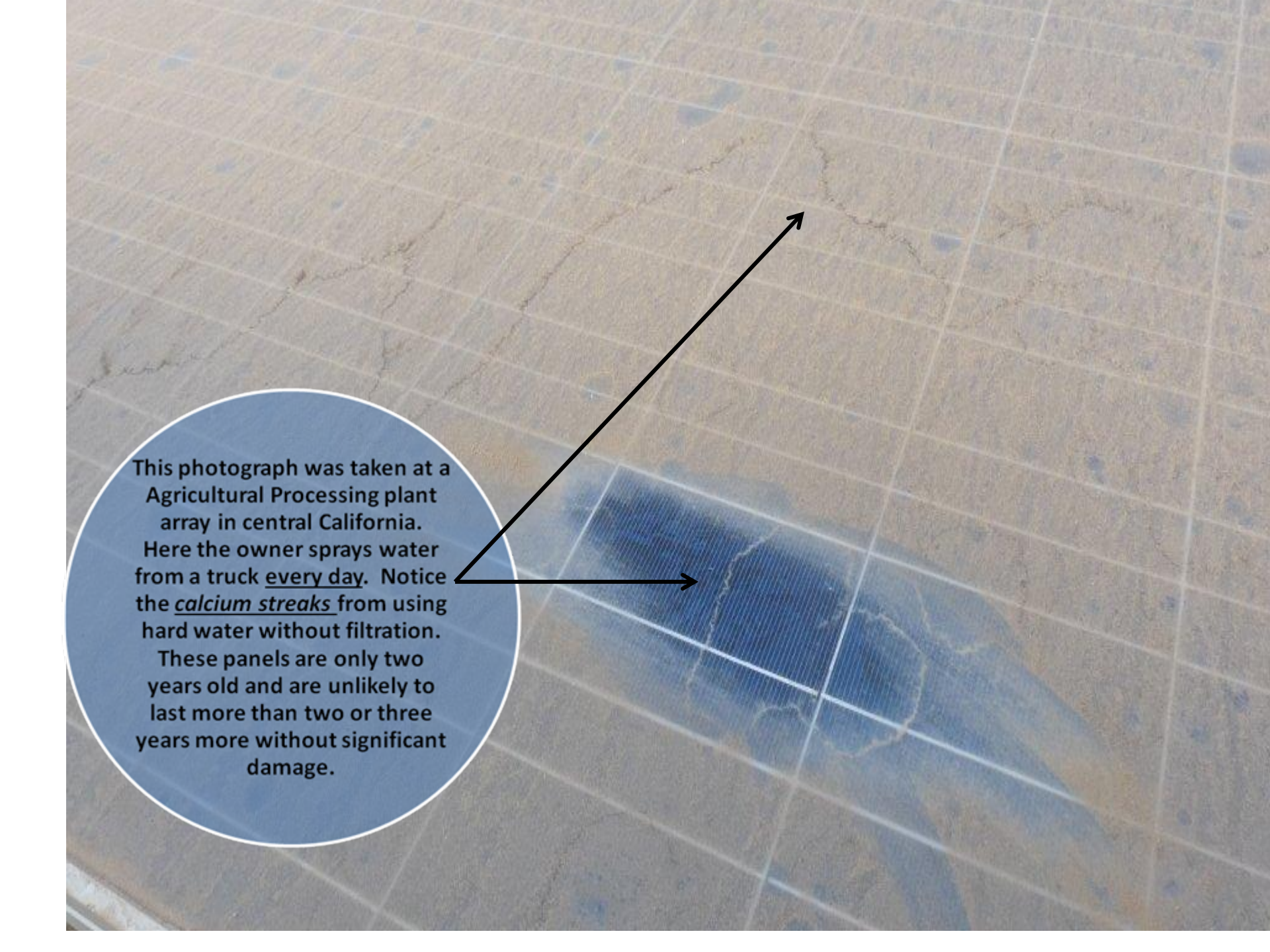


Why do you need to clean solar panels?

- Dirty solar panels cost you money. Power loss from dirt and debris results in fractional daily power loss AND is cumulative. Each day the return is diminished.
- According to engineers at a major manufacturer of solar panels, improperly cleaning a panel can result in dirt accumulating to the side. With buildup, this can create a situation where reverse polarity occurs. This destroys not only the output of this panel, but will drag down the output of other panels in the string.
- Allowing dirt to build up without cleaning can create a reverse polarity and a "hotspot" which will kill the solar panel.
- A solar panel does not produce electricity when reverse polarity occurs. It drags down other functioning solar panels in that same string, causing further loss.



This photograph was taken at a
Agricultural Processing plant
array in central California.
Here the owner sprays water
from a truck every day. Notice
the calcium streaks from using
hard water without filtration.
These panels are only two
years old and are unlikely to
last more than two or three
years more without significant
damage.

The image is an aerial photograph of a large solar panel array. A blue circular callout is positioned on the left side, containing text. Two black arrows originate from the right side of the callout: one points horizontally to a specific solar panel, and the other points diagonally upwards to a larger area of the array. The solar panels are arranged in a grid, and the surrounding ground is a mix of brown and green, indicating agricultural land. The solar panels themselves show signs of wear, with some appearing darker and more damaged than others.



Here is a photograph
at from a Food
Processing plant array
in central California.
Here we can see that
the flat mounting
angle has increased
the problem. Lack of
frequent cleaning has
baked on bird
excrement and dirt.

What are the advantages of the Heliotex Automatic Solar Panel Cleaning System?

Heliotex systems have automatic controllers that allow you to independently wash or rinse solar panels at any frequency and duration you wish. Additional wash or rinse cycles can be manually engaged if unusual weather conditions dictate and additional cleaning (such as a major dust blow in one day). The controller programming can be changed for seasonal requirements.

- Once installed, the systems operate automatically, eliminating any need for personnel. The only service requirements are to refill the soap concentrate and change any filtration required.

Personnel injury and property damage to panels is removed. Expensive trucks and spray or brush equipment is eliminated. Note that panels need to be cleaned during the hours of darkness. There is a lot of sharp racking and unstable ground between panel array rows. Damage to the panels from trucks is a real concern.

Tax advantages

A. With a new installation, a 30% tax credit with the remaining 70% going to the accelerated depreciation schedule. (*In the U.S. A. only.* Note: Check with CPA.)

B. Normally cleaning is only an annual deduction over the lifecycle of the project.
Recover 25 yrs. of cleaning deductions in just five years by using accelerated depreciation.

C. Labor costs, expenses, supervision issues are eliminated.
Annual inflation of manual cleaning labor costs is avoided.

Increased power


output over the life cycle of the panels

A. OR one may elect to reduce the number of panels at the original installation as those panels will be given the opportunity to achieve their potential.


B. Installing additional panels to offset loss due to dirt and debris can be minimized.

More panels in a smaller land area

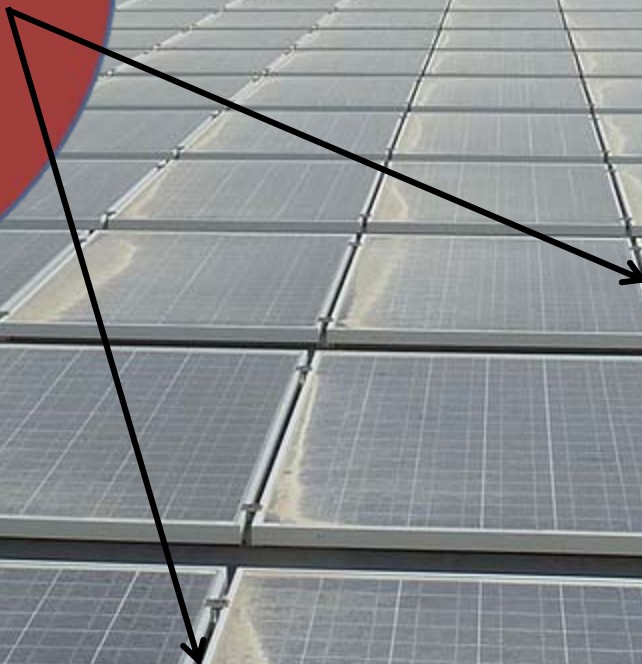
If spacing for trucks between rows for repair work is not needed, rows can be placed closer together allowing more panels in a land footprint. Only the shading issue needs to be addressed.



Here we can see that the owner tried to simply irrigate the panels and used the **wrong type of spray head**. This is another example of improper application of water. Note that all of the dirt has been pushed to one side and has created a **reverse polarity concern** with **potential hotspot damage** that will eventually kill the panel. **Spray patterns must carefully be determined and properly directed to ensure total coverage and removal.**



This photograph was taken on the roof of a Food Processing plant array in central California. This is an example of improper application of water. Note that all of the dirt has been pushed to one side and has created a reverse polarity concern with a potential hotspot damage that will eventually kill the panel.





What are the disadvantages of Manual Cleaning?

- **Cost** - Manual cleaning require hiring a full-time crew or contracting with an expensive service. You can not clean at the frequency needed to prevent buildup and fractional daily power loss.



- **Difficulty** - For larger arrays, by the time you manually clean the array, it is dirty again.
 - A. Cleaning should be done during the hours of darkness to avoid damaging the panels and interrupting production.
 - B. It is a difficult task for manual cleaning crews working in the dark.
 - C. Spraying cold water onto a hot solar panel risks creating micro fractures in the glass. Working in the dark would most likely increase employee injury and truck damage to solar panels.
 - D. Washing the panels correctly, not just driving by and shooting water on them from a distance is important to keeping the panel clean. The key to keeping panels clean is to not allow the buildup to occur so that frequent rinsing and occasional wash cycles ensure that the panels stay clean.



What are the disadvantages of Manual Cleaning?

3. A solar panel has essentially a glass window covering its ability to produce power. If this glass window is not clean, power and revenue are reduced and damage to the panel can occur.

4. Reduced R.O.I. –

A. Cleaning is normally an O&M budget item yielding annual deductions only. There are no tax credits nor accelerated depreciation

B. Loss of electricity between cleanings. Most clean two to four times a year. This results in clean panels 50 to 100 days over a lifecycle of 9,125 days (excluding leap years).

5. Increased insurance costs –

A. Due to liability for injury and damage to panels. Also for vehicles and equipment needed for maintenance crews.





Heliotex Installation
on steep hillside
above a working
gravel pit mine





**330 gallon soap
concentrate tank**

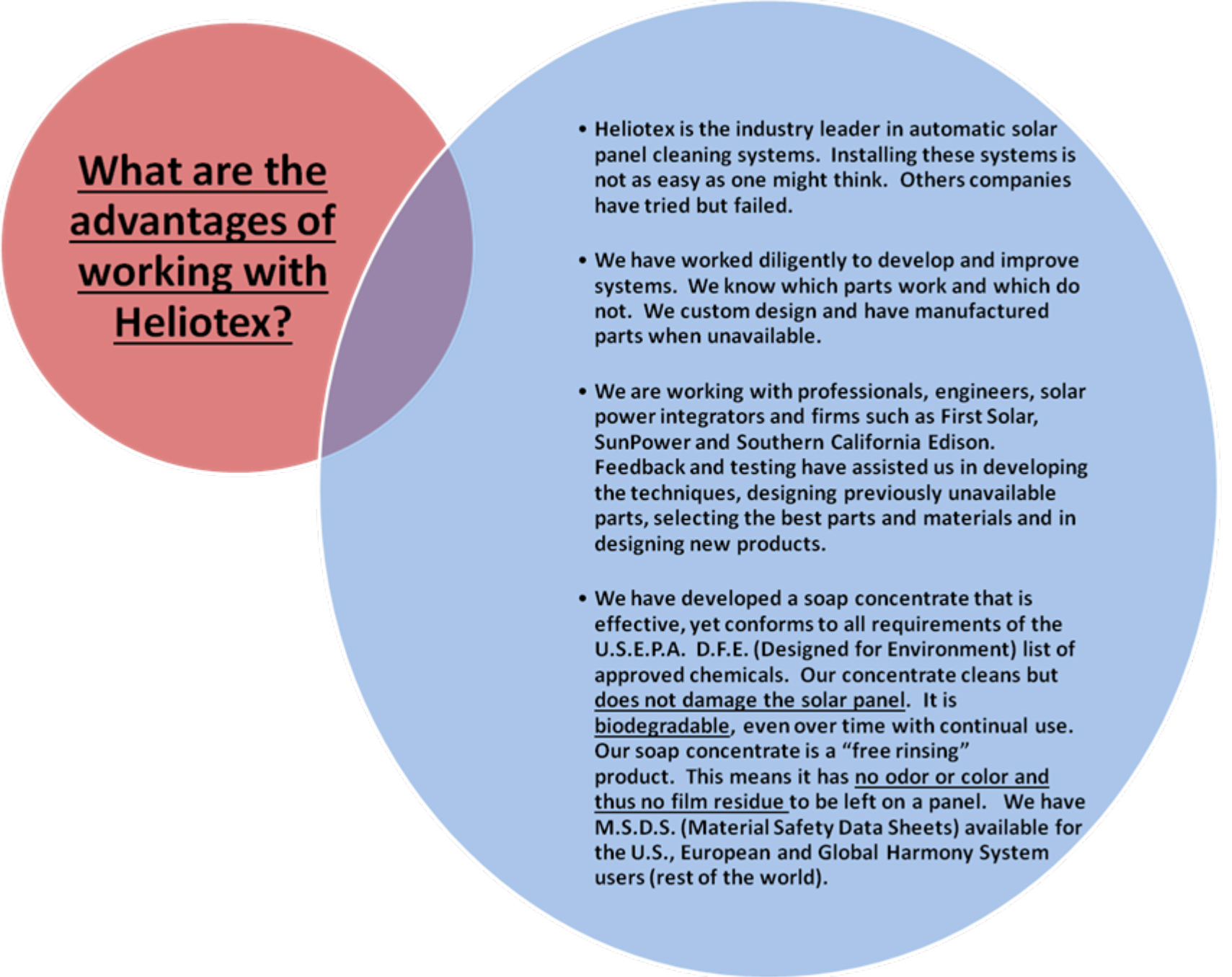


**Soap pump housing and automatic
controller with hand held remote**

R.O. Water tanks
and water pump







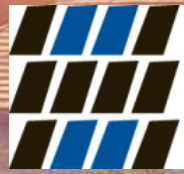
What are the advantages of working with Heliotex?

- Heliotex is the industry leader in automatic solar panel cleaning systems. Installing these systems is not as easy as one might think. Others companies have tried but failed.
- We have worked diligently to develop and improve systems. We know which parts work and which do not. We custom design and have manufactured parts when unavailable.
- We are working with professionals, engineers, solar power integrators and firms such as First Solar, SunPower and Southern California Edison. Feedback and testing have assisted us in developing the techniques, designing previously unavailable parts, selecting the best parts and materials and in designing new products.
- We have developed a soap concentrate that is effective, yet conforms to all requirements of the U.S.E.P.A. D.F.E. (Designed for Environment) list of approved chemicals. Our concentrate cleans but does not damage the solar panel. It is biodegradable, even over time with continual use. Our soap concentrate is a “free rinsing” product. This means it has no odor or color and thus no film residue to be left on a panel. We have M.S.D.S. (Material Safety Data Sheets) available for the U.S., European and Global Harmony System users (rest of the world).

What are the advantages of working with Heliotex?

- Working with SunPower we have developed brackets and fastening techniques which do not void solar panel warranties.
- Working with a major chemical company, we have a special adhesive product that can be used to attach our custom designed brackets to the solar panel frame without any penetrations to the frame.
- We utilize professionals to assist us with design calculations for water piping requirements, pump design and filtration needs.
- We can provide unique stainless steel security fasteners if there is a security concern. Private patterns can be cut and registered to you. There are over one million unique patterns available.
- We provide a one year warranty on all our products. We will also contract to provide maintenance service after the warranty period.





HELIOTEX[®]

AUTOMATIC SOLAR PANEL CLEANING SYSTEMS





Double cut nozzle with spray coverage 180 degrees low front and upper spray pattern also





HELIOTEX[®]

AUTOMATIC SOLAR PANEL CLEANING SYSTEMS





HELIOTEX[®]

AUTOMATIC SOLAR PANEL CLEANING SYSTEMS





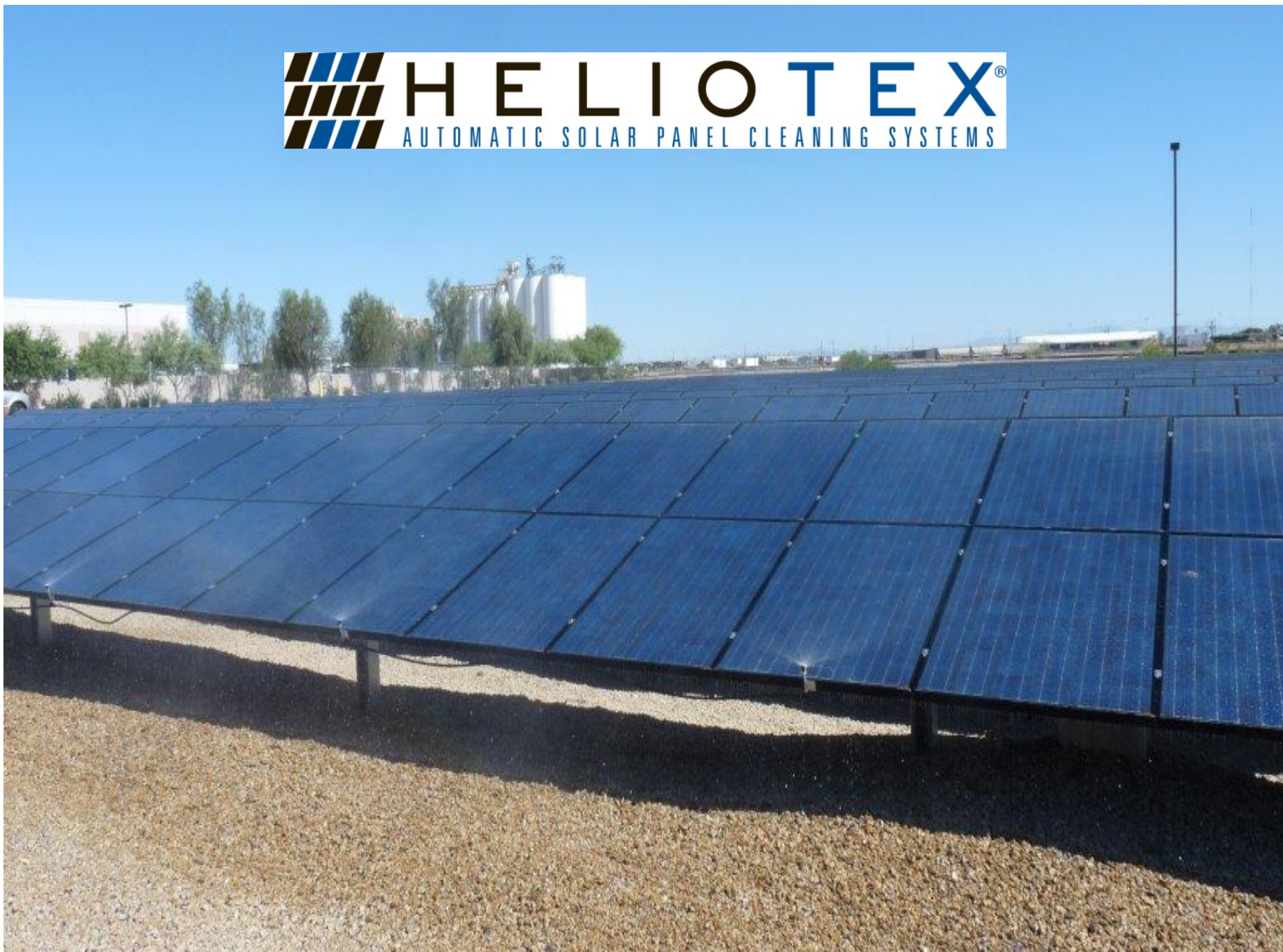


 **HELIOTEX[®]**
AUTOMATIC SOLAR PANEL CLEANING SYSTEMS





 **HELIOTEX**[®]
AUTOMATIC SOLAR PANEL CLEANING SYSTEMS



Heliotex Products

- Automatic Solar Panel Cleaning Systems for Residential or Small business Applications
- Commercial and Utility Scale Automatic Solar Panel Cleaning Systems for arrays of any size
- Portable and fixed systems for monitoring strings or evaluating sites
- Security fasteners of any type. For rack systems that utilize machine screws, private patterns can be cut and registered to you.





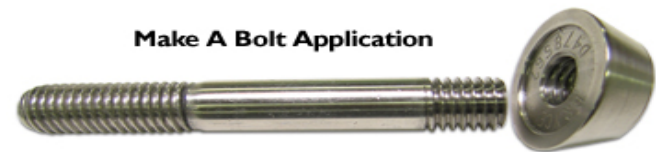
Protect your solar panels from theft Keep your solar panels safe with **Heliolox™ Locking Fasteners**. Secure and lock solar panels in one step with the patented Heliolox Solar Panel Locking fasteners. With key availability restricted, they are close to tamperproof, impossible to duplicate and are designed to withstand pressure, expansion and contraction.

For specialty machine screws, ————— over one million unique patterns are available to be licensed to you at an additional cost.



To learn more: WWW.HELIOTEX.COM Phone 800-280-6976, 760-837-0390 or contact your local solar panel integrator.

Make A Bolt Application





The Key to keeping solar panels clean is to not let them get dirty! Frequent rinsing along with occasional wash cycles work to keep dirt and debris from building up.

The Heliotex Automatic Solar Panel Cleaning System allows you to wash or rinse as often as your site requires.

In addition to automatic programming, you may engage an additional manual wash or rinse cycle any time an unusual weather occurrence, such as a dust blow occurs.



HELIOTEX[®]
AUTOMATIC SOLAR PANEL CLEANING SYSTEMS

How may we help you?

Heliotex

41995 Boardwalk, Suite E

Palm Desert, CA 92211

U.S.A.

www.heliotex.com

info@heliotex.com

760-837-3090