



**DESIGNED WITH MORE  
POWER IN MIND**

an innovative landfill solar solution

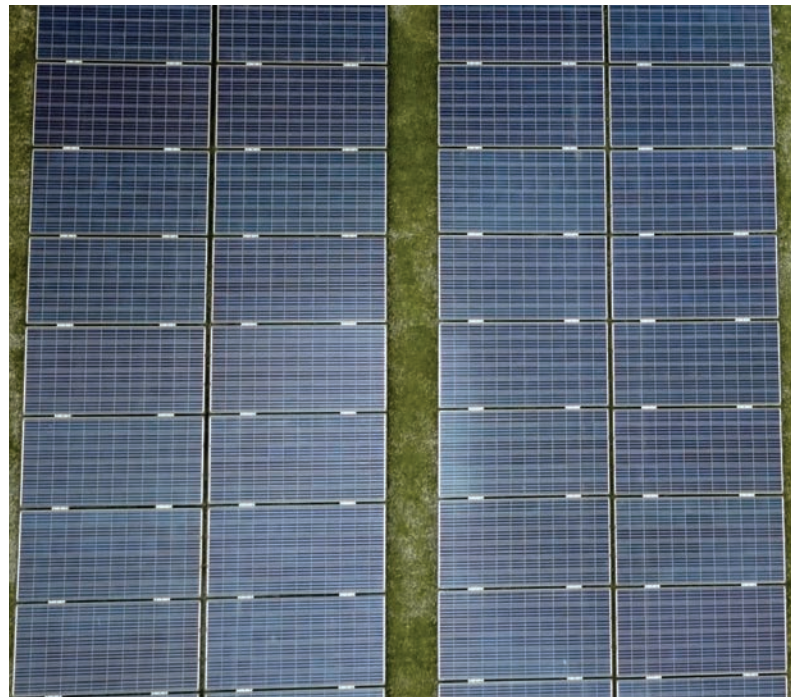


## DESIGNED WITH MORE POWER IN MIND

Introducing PowerCap™, a patented, revolutionary solar system for landfills and impoundments. PowerCap provides the latest in solar technology with direct surface attachment and “plug and play” integrated wiring technology, all on a stable, predictable closure surface. It drastically reduces the bulkiness of racking material, simplifies installation and increases the power per unit area by more than 35%. And unlike any system of its kind, PowerCap maximizes the landfill footprint with a unique slope technology allowing more of the site to become an effective means of power generation.

### PowerCap™ Patented System Provides:

- **Increased Density**—Significantly higher power per acre for various surface slope angles
- **Lower Cost & Simple**—faster and easier installation
- **Patent Pending Attachment System**—no need for traditional racking
- **Highly Versatile, Aesthetic Design**—ultra thin and seamless integration as an array
- **Adjustable Mounting System**—allows for various panel configuration such as mono-facial, bi-facial and dual-glass







*Wind Tunnel testing of ClosureTurf® and PowerCap™*

## Geotechnically and Aerodynamically Cutting-Edge Technology

This cutting edge system has taken a different approach by innovating in the geotechnical engineering discipline to enhance the simplicity of both the structural and installation aspects of a solar array. Coupled with the proven technology of ClosureTurf, PowerCap has been tested extensively in wind tunnel labs for superior aerodynamic performance.

Extensive laboratory testing has been performed on ClosureTurf and PowerCap, including:

- Rainfall erosion
- Ultraviolet (UV) resistance
- Fire resistance
- Creep tests of ClosureTurf
- Interface shear strength test of ClosureTurf and PowerCap system
- Wind tunnel test of ClosureTurf and PowerCap system





## PowerCap™ Surface and Slope Technology

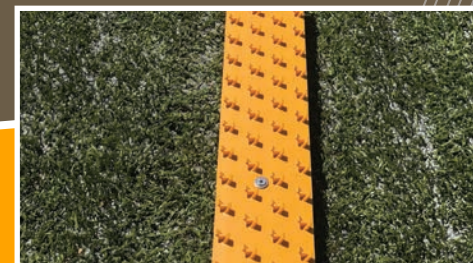
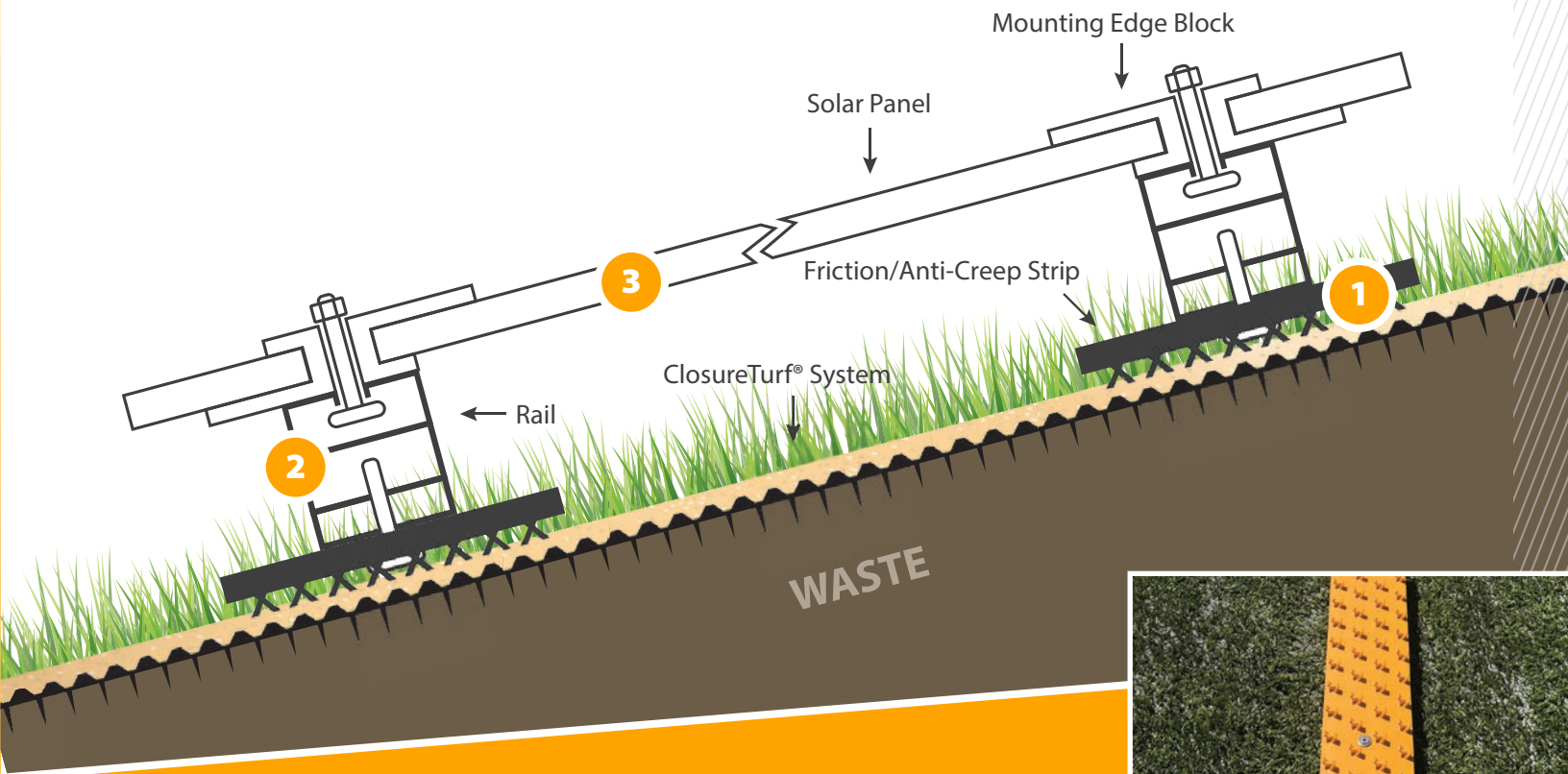
The PowerCap system is a unique geotechnical approach to creating a highly stabilized solar system for landfills and impoundments. PowerCap provides a direct attachment method from the panel to the ClosureTurf surface with no penetration of the cover system. The entire system is based on friction. Friction strips are simply laid on the ClosureTurf surface (no penetrations), while the railing and photovoltaic panels are mechanically fastened to the strips. The unique, v-shaped anchor studs of the strips significantly increase the friction between the PowerCap and ClosureTurf systems, resisting any potential shearing or sliding on the top deck or slopes of the landfill. The friction strips also eliminate concern of the creeping (or mechanical expansion) of the underlying geomembrane component of the ClosureTurf system, because the PowerCap system is not mechanically connected to it.



## ClosureTurf®: The Ideal Foundation

Installing solar generation on capped landfills has proven an effective way to deploy large systems on typically unused space. ClosureTurf is a patented, Subtitle D compliant final closure system that provides the ideal foundation for the PowerCap solar system. It provides a predictable benchmark of performance when capping environmental waste and significantly reduces the O&M expenses related to vegetation and erosion. There is no rebuilding of slopes, mowing or seeding required. Panels operate in a clean environment and are easily accessible. Best of all, ClosureTurf allows for installation of panels on slopes in addition to top decks for maximum output.





*Friction/Anti-Creep Strips –  
Back Side Showing V-shaped  
Anchor Studs*



*Embedded Rail Attachment*



*Adjustable Mounting System*

## PowerCap™ is a Three-Component System:

- 1 Friction/Anti-Creep Strips**
  - No penetration of geosynthetic material
  - Prevents sliding on slopes and shearing on the top deck
  - Friction strip ballast trays below the panel may offer additional factor of safety
- 2 Embedded Rail Attachment**
  - Gives the array a clean smooth look that allows it to conform to the subgrade
  - Has the capability to handle a large degree of differential settlement
- 3 Adjustable Mounting System**
  - Versatile panel options with mono-facial, bi-facial and dual glass options available
  - Flat design for slopes as well as tilt options for the top deck
  - Adjustable attachments allow for various panel type and frame thickness to be securely attached to the rail



## Faster & Simpler Installation

Rackless integration of PowerCap provides many benefits to reduce costs and simplify installation. Fluctuating steel costs are eliminated. Grounding is not required but can be added. The system allows for integrated wiring which reduces Balance of System (BOS) hardware and simplifies installation. PowerCap also reduces engineering time, project management costs and associated overhead.

## High Quality Solar Panels

Due to consistent changes in frame configurations, PowerCap was designed with versatility in panel configurations. PowerCap's design flexibility accommodates various types of panels including mono-facial, bi-facial and dual glass configurations. Depending on procurement requirements, panels can be sourced internationally or domestically.

## Unique Design Options

The PowerCap patented technology optimizes an array by increasing density through:

- Utilization of typically unused slopes
- Maximization of power production on nearby flat surfaces through panel tilt
- Elimination of traditional racking





## Increased Density = More Power Per Area

The PowerCap™ system is capable of providing:

- Up to one MW per two acres
- Up to 300% larger capacity compared to a ballasted metal racking
- Up to 60% greater fill factor due to the slope and panel density per unit area
- More energy per unit of area compared with standard installation at optimal angle



## A Smart Solution for:

### Utilities

With federal regulations requiring the closing of power plants' coal ash impoundments, PowerCap provides an ideal opportunity for utilities to deploy solar generation alongside active or retired coal-fired plants. One of the biggest hurdles to utility-scale solar is finding suitable sites with suitable grid infrastructure for interconnection. By nature, this problem is alleviated when solar is sited at an existing or retired power plant and the impoundments have been capped with ClosureTurf®. Utilities benefit from PowerCap generation, from ClosureTurf environmental aspects and from showing communities the commitment to clean energy sources.

### Industrial

Commonly known as monofills, industrial sites where byproducts are disposed and stored make an ideal site for PowerCap. Companies are able to combine renewable energy production for nearby facilities with resource-efficient land use for monofills that are already capped with ClosureTurf.

### Municipal Solid Waste

Landfill owners are given the opportunity to generate revenue from what might be otherwise undevelopable land. Such sites are usually located near roads and electricity distribution infrastructure. Areas with larger populations tend to have high energy demand. Opportunities exist to lease the land, sell energy to a local utility and/or generate state renewable energy credits (SRECs). For sites already capped with ClosureTurf and future closures slated for ClosureTurf, PowerCap system is an ideal solution.

### Mining

Tailings, also called tailing ponds, are the materials left over after the process of separating the valuable portion from an uneconomic portion of an ore. The pond is generally impounded with a dam, and known as a tailings impoundment. Tailings ponds are used to store waste made from separating minerals from rocks (slurry) produced from mining. Companies that utilize ClosureTurf on its tailing impoundments for a capping medium will be able to add a renewable energy alternative with PowerCap. This will allow mines to generate energy at their facility from waste sites.



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