



Spectro PowerCap™

Your Landfill Cap is an Asset, Profit from It!

40th Annual SWANA
2011 Western
Regional Symposium
May 17th

Carlisle Companies

Fast Facts:

- Founded 1917
- EPDM single-ply membranes since 1950s
- TPO single-ply membranes since the 1970s
- > 15 billion square feet of single-ply membrane produced
- Industry-leading warranty reserves

Carlisle Companies is a diversified global manufacturing company serving the **construction materials, commercial roofing, specialty tire & wheel, power transmission, heavy-duty brake & friction, heavy-duty truck trailer, refrigerated truck body, food service, aerospace and test & measurement** Industries.

NYSE: CSL

'10 Sales: \$2.5M

'10 Net Income: \$139.8M

'10 EPS: \$2.40

Market Cap: \$3.0B (4/11)



Construction materials & energy solutions for the commercial and residential building envelope

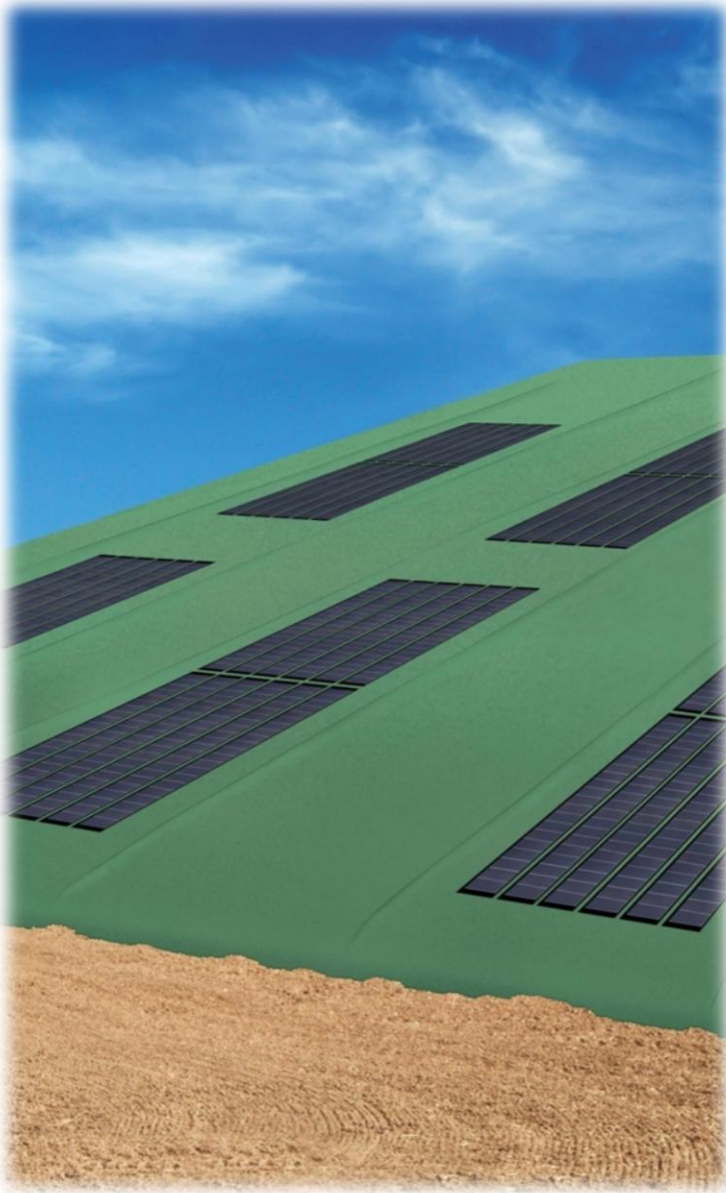


Spectro PowerCap™


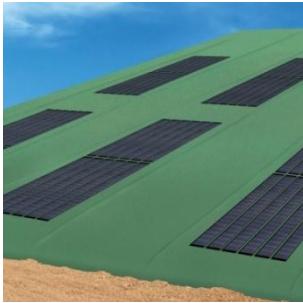
The Dual-Purpose Landfill Closure System

- Superior environmental protection
- A new financial model
- Sustainable, renewable energy
- A sound investment

An exposed geomembrane cover system featuring Carlisle's Scrim Reinforced GeoTPO™ GeoMembrane integrated with *UNI-SOLAR*® photovoltaic technology



Solar Options for Landfills

	Type	How Mounted	Differential Settlement	Capping Function	Economic Models	Preferred Regions
	Ground Mounted Glass Modules	<ul style="list-style-type: none"> • Ballasted Sled • Screw penetrations w/ foundations 	<ul style="list-style-type: none"> • Not Recommended 	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • Solar ROI 	<ul style="list-style-type: none"> • Limited by solar incentives
	Exposed Geomembrane Solar Cap (EGSC) - Spectro PowerCap™	<ul style="list-style-type: none"> • Anchor Trenched 	<ul style="list-style-type: none"> • Yes 	<ul style="list-style-type: none"> • Long-term Interim Cap • Full Closure 	<ul style="list-style-type: none"> • Landfill Cost Avoidance • Solar ROI 	<ul style="list-style-type: none"> • Cost avoidance works in all states

Started at Tessman in 2009

GEN 1 (2009)

- Exposed Geomembrane Solar Cover (EGSC) concept
- Field bonded
- Applied wiring
- Membrane warranty
- PV output guarantee

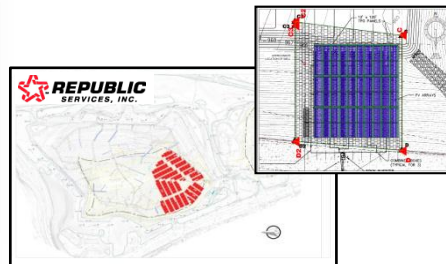
- Tessman Road



GEN 2 (2011)

- Spectro PowerCap™
- Factory bonded
- Integrated wiring
- Private landfill owner focus
- Comprehensive product & system warranties
- Certified installer program
- Complete feasibility analyses
- Engineering design services

- Hickory Ridge, GA
- Madison County, NY



GEN 3

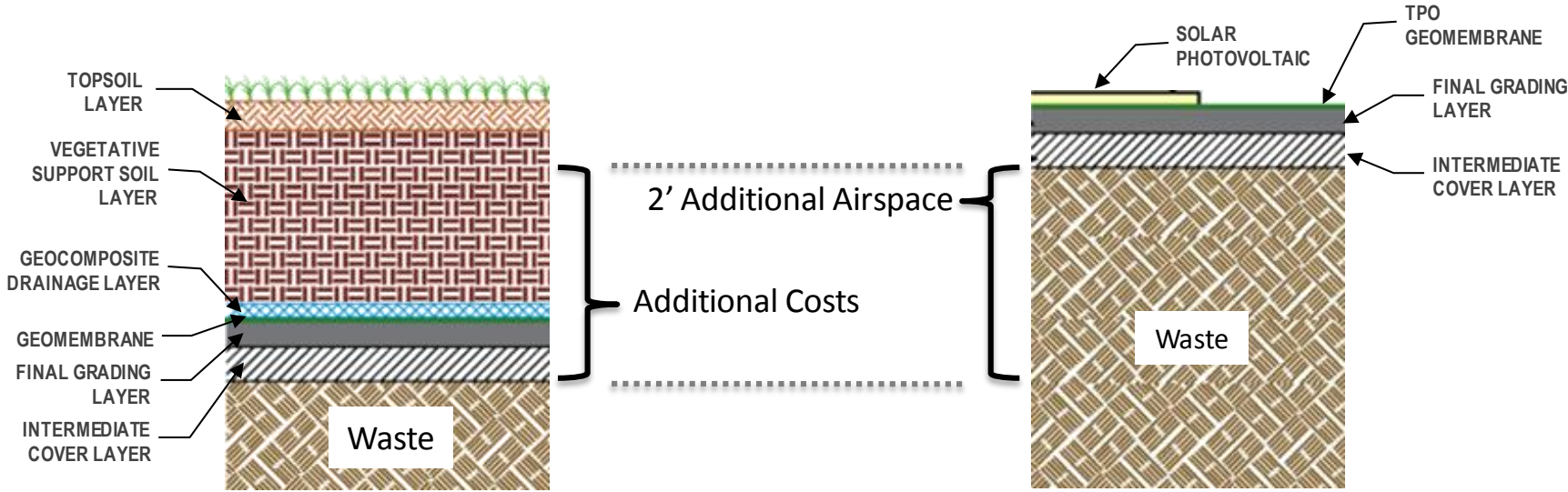
- Increased integration and technology options
- EGSC standards
- Finance options

- TBA

Design Comparison

Traditional Subtitle D

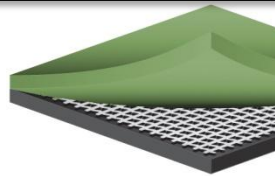
Spectro PowerCap™



Key Components of the PowerCap

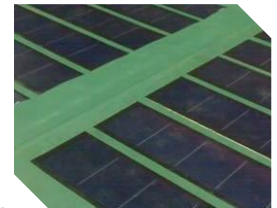
GeoTPO™ GeoMembrane

- The platform of the Spectro PowerCap™
- **Over 30 years field experience in outdoor, severe weather direct UV exposure conditions**
- Two-ply, scrim-reinforced with greater membrane reserve above scrim
- The industry's leading TPO chemistry featuring OctaGuard XT™ weathering package
- Available in 60, 72 & 80-mil thicknesses, in a variety of colors
- Backed by Carlisle warranties



Spectro PowerMat™

- **Factory integrated** to Carlisle's leading TPO using Carlisle's proprietary adhesive technology, with integrated wiring for quality control and long-term performance
- **Proven UNI-SOLAR® PV technology – more than 15 years of field experience throughout the world**
- Membrane and integration product warranty from Carlisle – power output and PV product warranty guarantee from United Solar Ovonic

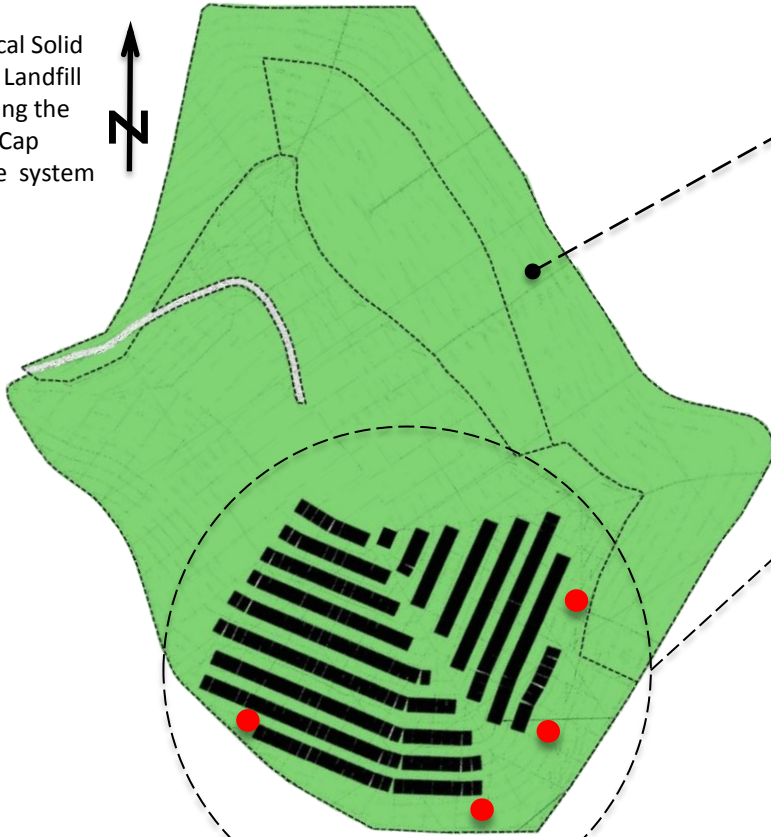


Powered by
UNI-SOLAR

Final Grading Layer

PowerCap: An Engineered Solution

A Typical Solid Waste Landfill featuring the PowerCap closure system



Solar Region

- south facing slope
- ~ 5 acres

GeoMembrane Components

■ GeoTPO GeoMembrane

Not Shown:

- › TPO boot fittings
- › TPO walkways

Photovoltaic Components

■ Spectro PowerMat

● Inverters

Not Shown:

- › Combiner Boxes
- › Junction Boxes
- › Wiring, conduit & raceways
- › Monitoring System

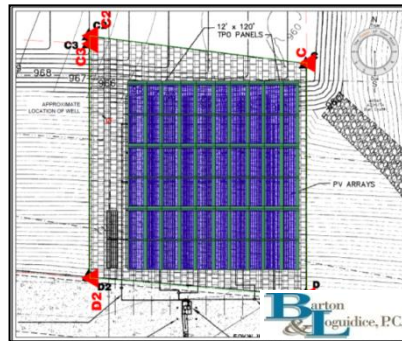
A new application for field-proven technologies and components from the building and photovoltaic industries

PowerCap is quickly being adopted...



Tessman Road, TX

- Job 1 - EGSC demonstration project
- Long-term interim permit
- 5.6 acres
- 135kWp DC



Madison County, NY

- NY's first EGSC installation
- Long-term interim permit
- 1 acre
- 40.3 kWp DC



Hickory Ridge, GA

- GA's largest solar installation
- Largest EGSC installation in the world
- FINAL Closure
- 50 acres+
- 1,000 kWp DC

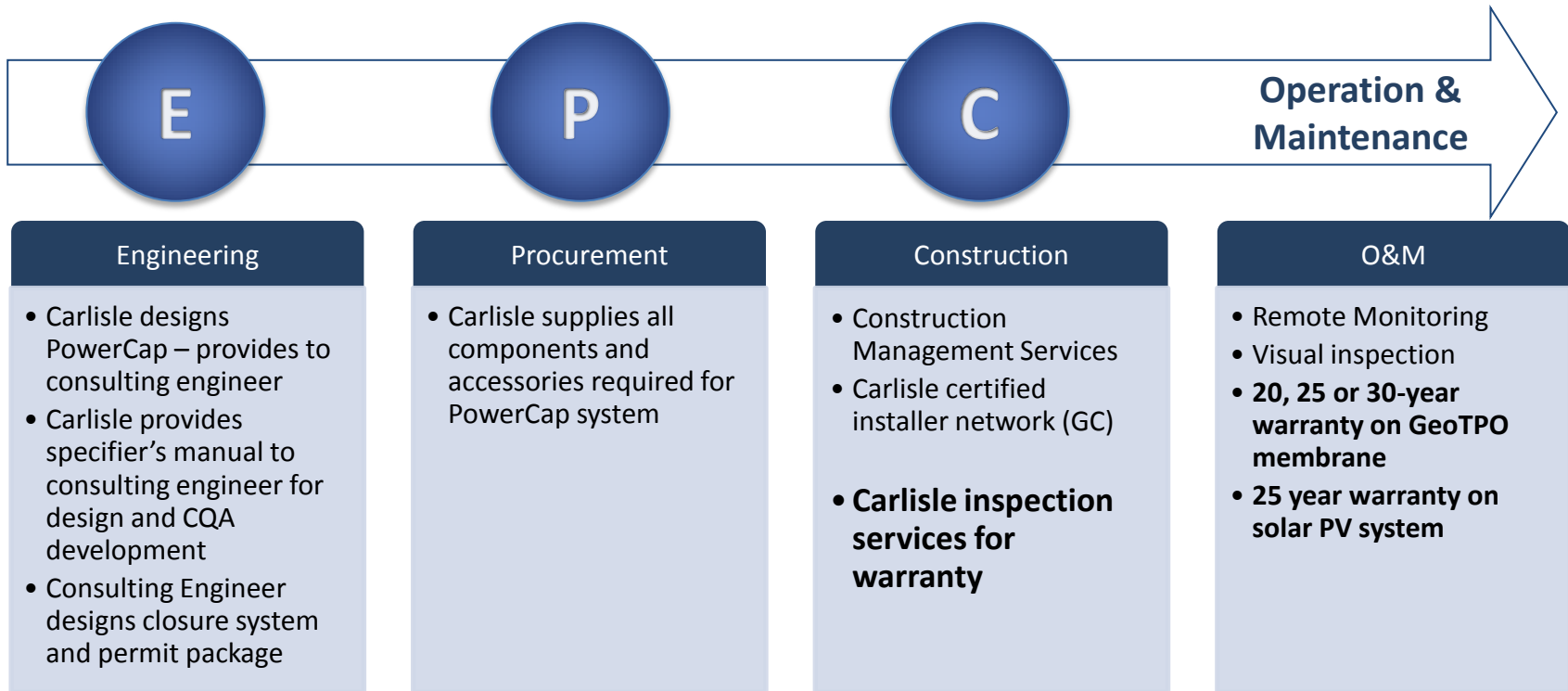
Regulators are adopting the technology as Long Term Interim or Final Closure. Future announcements expected in:



Site Specific Design Considerations

- Wind Speed - PowerCap Sheet Anchoring
- Storm water management/runoff
- LFG Uplift Pressure – GCCS Coordination
- PowerMat Positioning – Solar Design
- Soil Bedding, Impact Resistance
- Interconnection of GeoTPO to HDPE and LLDPE

A Full Solution



Installed for the Same Expense

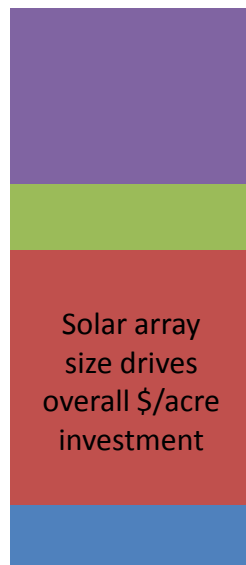
\$150,000/acre



Subtitle D Cap

- Geomembrane
- Soil
- Vegetative Layer
- Installation

\$150,000/acre



Spectro PowerCap

- GeoTPO
- PowerMat
- Electrical BOS
- Installation

Example:

- 20 acre site
 - 500kWp solar array
 - ~\$150,000/Acre
-
- Can be installed for same capital expense as traditional closure system
 - Solar array size is major cost driver
 - Can be permitted for long-term interim or final closure

Carlisle Warranties

Product Warranties

GeoTPO Geomembrane Material Warranty:

Pro-rated warranty of the membrane, covering manufacturing defects and premature degradation due to weather (20, 25 or 30 years). Included in price of material when installed by Certified Installer.

PowerMat Product Warranty:

Provides coverage against delamination of the flexible thin-film PV laminate from the geomembrane, material warranty for the GeoTPO, and a pass-through power output and product warranty from the photovoltaic manufacturer. Included in price of material when installed by Certified Installer.

System Warranties

GeoTPO Exposed Geomembrane Cap System Warranty:

Coverage for workmanship and materials used in the installation of the complete cover system consisting of the geomembrane, the geomembrane with the PV laminates attached, the welded seams and the flashing details. Available at an extra cost when installed by a Certified installer.

Spectro PowerCap Landfill Closure System Warranty:

Coverage for workmanship and materials used in the installation of the complete cover system consisting of the geomembrane, the geomembrane with the PV laminates attached, the welded seams and the flashing details. This system warranty length will coincide with the flexible PV laminate output warranty of 25 years in turn requiring a minimum .072 inches (1.8 mm) thick GeoTPO. Available at an extra cost when installed by a Certified installer.

System Power Output warranties available upon request

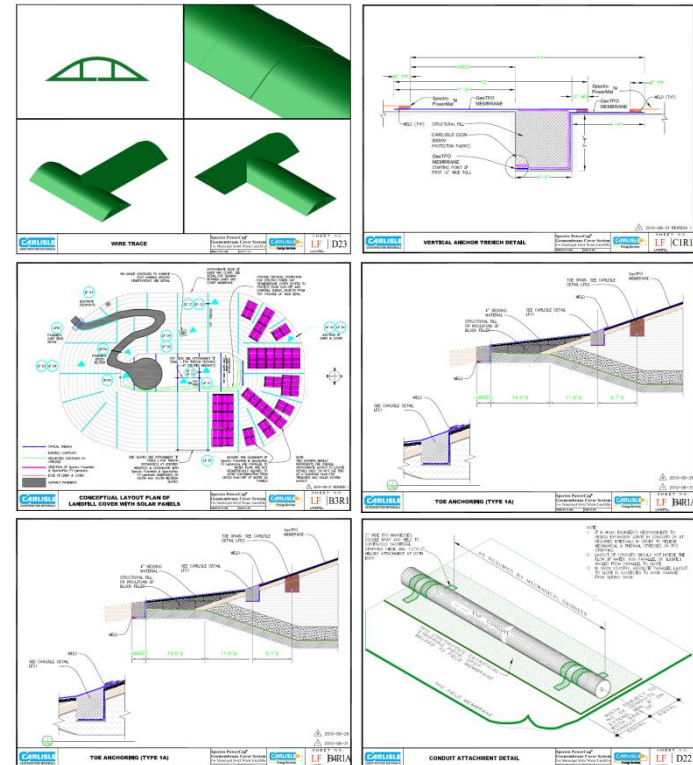
Exclusive Installation Partners

- Member in good standing
 - International Association of Geosynthetics Installers (IAGI)
 - Fabricated Geomembrane Institute (FGI)
- Credit worthiness and Carlisle credit check for warranty requirements
- Training and regular re-certification
- Minimum 2 year workmanship warranty
- Stages to certification
 - Pre-qualification
 - Demonstrated competency via first project
 - Carlisle inspection of first project
 - Approval



Specifier's Manual ("How-To" Design Book)

- Specifications, details, instructions
- EGSC PowerCap "How-to" design book for consulting engineers – Draft version – limited release
- EGC Specifier Manual required

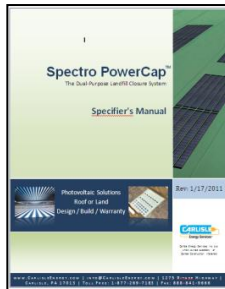


Demand Creation Support Tools

Specifier's

Specifier's Manual

Specifications, details, calculations, test reports and CQA for consulting engineers.



Regulators

Regulator Book of Knowledge

Engineering design details, specifications, conformance testing

Installers

Certified Installer Application

Requirements, agreement and credit application for interested installers

Field Training Program

Installer training manual for supervisors and field personnel

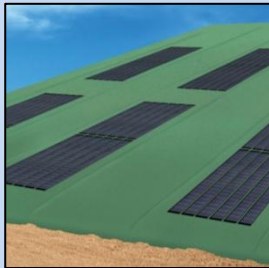
Field Guide



Landfill Product Offering

Solutions

Exposed Geomembrane
Solar Caps (EGSC)
Spectro PowerCap™



TPO Exposed
Geomembrane Caps



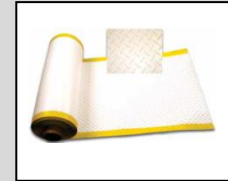
Products



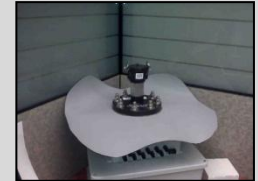
Molded Pipe Seals



T-Joint Covers



Walkway Rolls



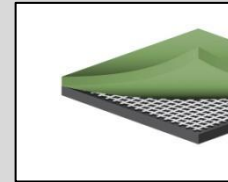
Gas Vents



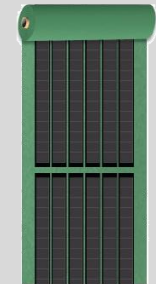
Split Pipe Seals



Cut-Edge Sealant



Scrim-Reinforced
Geomembranes
GeoTPO™



Spectro
PowerMat™

Incl. Photovoltaic
Electrical Components

Services

- Design & Engineering Services
- Product Warranties
- System Warranties
- Power Output Warranties
- Maintenance & Operation
- System monitoring
- Energy /interconnect agreements

Provides Substantial Cash Benefits

Cost Avoidance Benefits

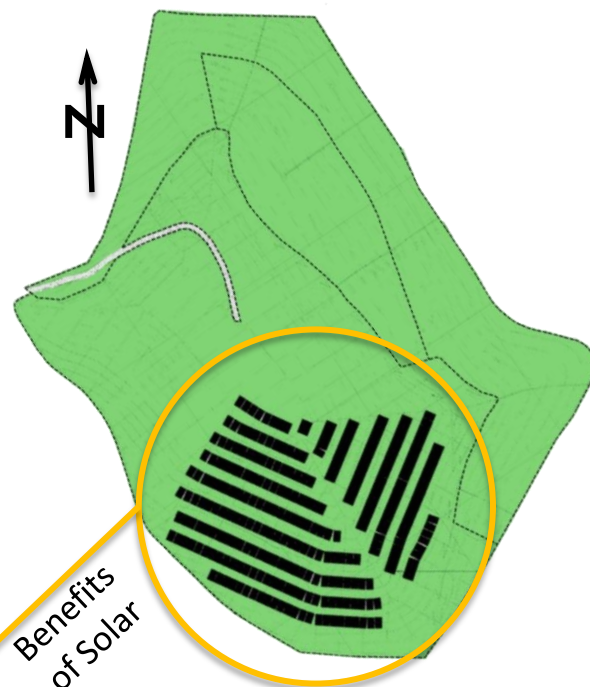
- Lower overall cost of closure from geomembrane
- Lower operational and maintenance costs
- Lower on-site electricity costs

Revenue Benefits

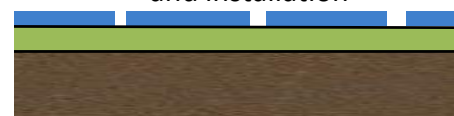
- Airspace efficiency (pre & post closure)
- Renewable energy credits (sRECs)
- Energy offtake

Incentive Benefits

- 30% Federal Investment Tax Credit*
- State Investment Tax Credit
- Property & Sales Tax Relief
- Accelerated depreciation*
- Rebates and/or grants

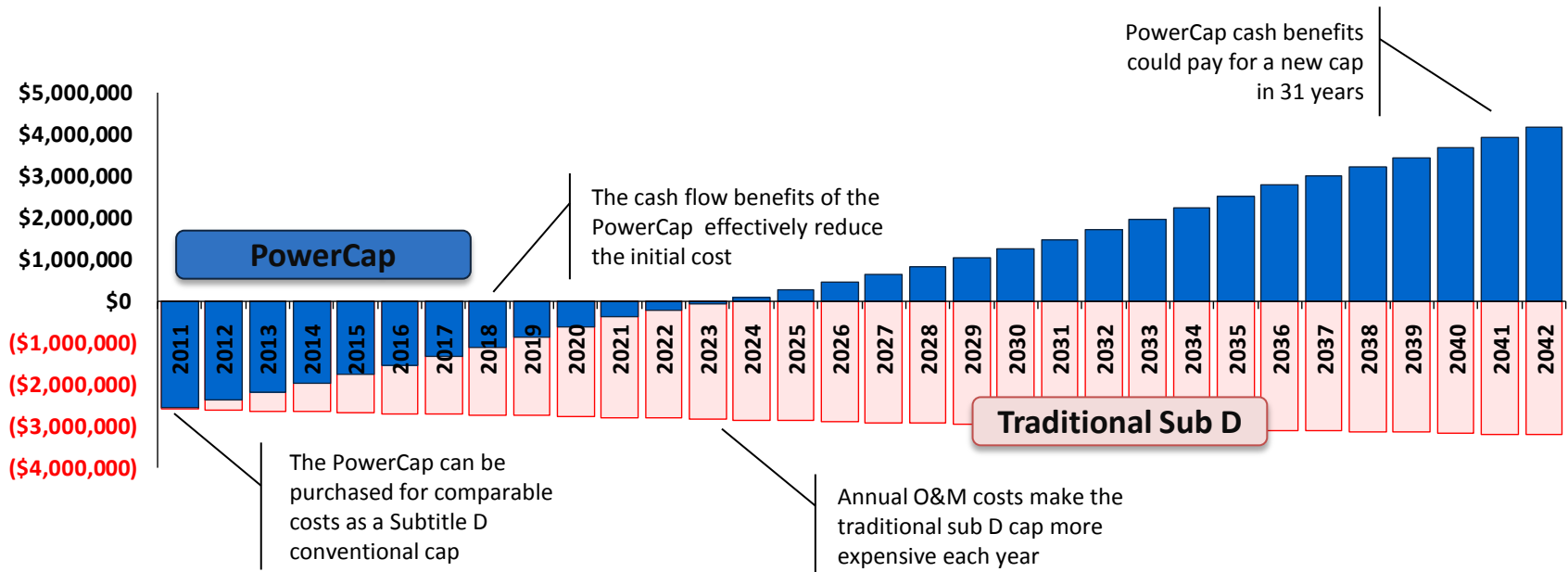


*applies to PowerMat , liner and installation



Cost Avoidance Potential (Tax Paying Entity)

Accumulated Cash Benefits (Pre-Tax)



20 acre site, 300kWp DC, Massachusetts. 2011

Tax Exempt Landfills

① Design and Install Exposed Geomembrane Cover (GeoTPO Geomembrane) on entire landfill. Justification: Lower Overall Costs.

- First Costs:
 - GeoTPO cost ~\$50-75,000/acre
 - Conventional Cap ~\$150,000/acre
- Lower Maintenance

② Lease south/west and top slope (?) to 3rd party solar developers (Carlisle's solar integrated PowerMats post-applied)



Benefit: Lease and PPA provides return on investment of Exposed Geomembrane Cover with additional income for future investments

Summary

- Carlisle's landfill closure system provides improved environmental protection and lower overall costs:
 - Environmental Benefits:
 - Proven material performance for exposed geomembrane applications
 - Easier to inspect
 - Predictable stormwater runoff management
 - Wind uplift protection
 - Lower Costs:
 - Lower first costs than conventional cover (for EGC)
 - Lower NPV than conventional cover (for EGSC)
 - Lower repair costs
- Tax Paying and Tax Exempt Entities can benefit

Republic Services, Hickory Ridge Landfill

Before Construction – October 2010



Republic Services, Hickory Ridge Landfill

Phase I Construction – December 2010



Republic Services, Hickory Ridge Landfill

PHASE 1 Complete



Republic Services, Hickory Ridge Landfill

Phase II Construction – April 2011



Republic Services, Hickory Ridge Landfill

Solar Array Construction – April 2011



Republic Services, Hickory Ridge Landfill

Miscellaneous



Boot Fittings and
Flashing Details



Carlisle MQA

Anchor Trenching



CQA

Single Wedge or Hot Air Welding



Republic Services, Hickory Ridge Landfill

Carlisle Training



Carlisle certified the liner installer (American Environmental Group) and trained CQA engineers onsite before and during construction

Republic Services, Hickory Ridge Landfill

Construction In Progress



Republic Services, Hickory Ridge Landfill

Summary

Key Facts:

- Location: Conley, GA (near Atlanta)
- Estimated Completion: July 2010
- Total Landfill Closure Area: 48 acres
- Geomembrane: 2.8 million SF, Carlisle GeoTPO, 60-mil Scrim-Reinforced Dark Ivy Thermoplastic Polyolefin (TPO)
- Solar Photovoltaics: 6,984 UNI-SOLAR® PVL-144 Laminates
- Electrical Generation Capacity: 1,005.7 kWp DC
- First Year Power Output (est): 1,300,740 kWh AC
- Inverters: 4x Satcon PowerGate 250kWp DC
- The largest exposed geomembrane solar cap (EGSC) in the world.
- The first EGSC and the first approved use of Thermoplastic Polyolefin (TPO) Geomembrane as a landfill closure system in the state of Georgia.
- Final Closure designation by GEPD
- The largest solar photovoltaic array installation in Georgia.

Key Partners

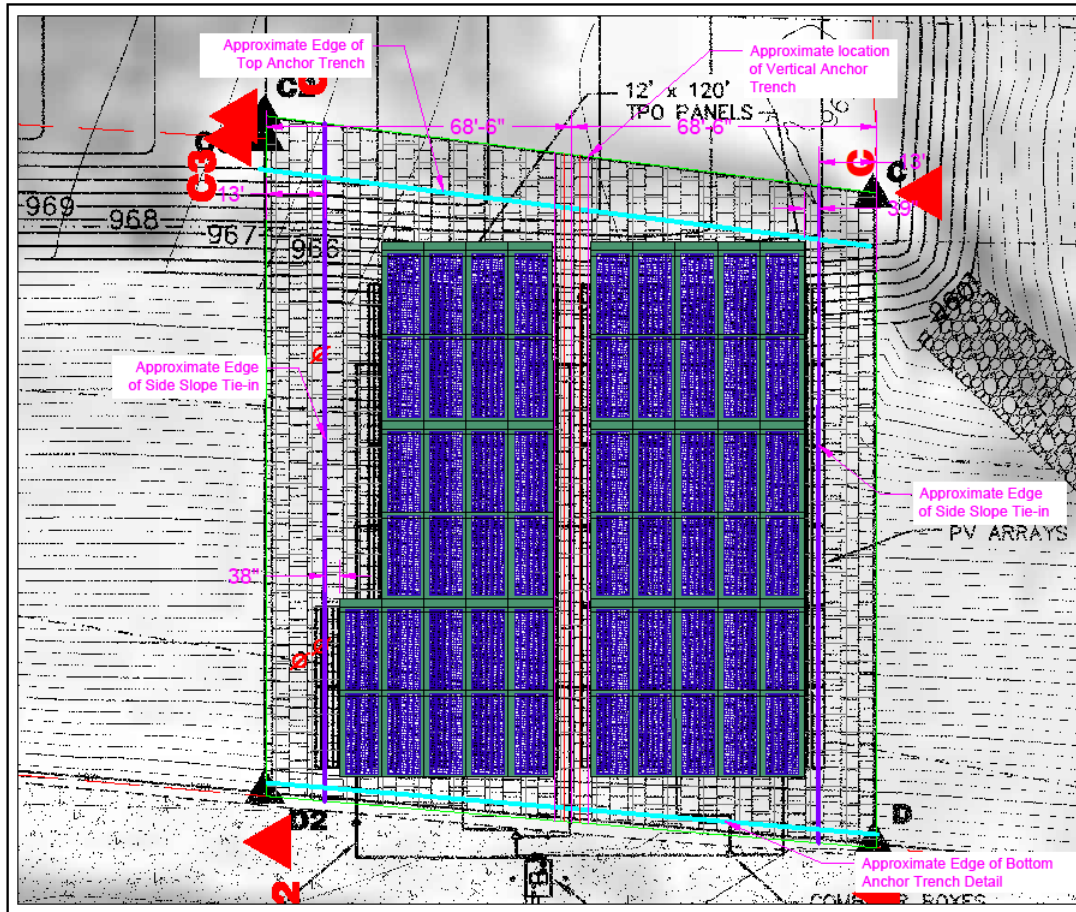


Comments

- Construction will be completed by July 2011
- Prospective customers are invited to visit the site to learn more about the construction and inspect the system. Please contact Carlisle to schedule your visit.
- Carlisle has an onsite camera that updates construction photos every 15 minutes. The camera can be accessed at our website:
http://carlisleenergy.com/?page=ces_landfillholder

Madison County, NY

"On Deck"



1275 RITNER HIGHWAY
 CARLISLE, PA 17013
 PHONE: +1-877-2697183
 FAX: +1-888-941-0686

CES PowerCAP™ PV System

- (28) - 40' x 10' - 10 Panel string PowerMat™
- (280) - 144 W SpectroFlex™ Laminates
- Total System: 40.32 kWp DC
- Proposed 35% slope results in a tilt angle of 20
- Azimuth of Laminates: due South
- Location:
 Latitude: 43.034733° N
 Longitude: 75.707058° W

NOTE:

This conceptual layout is provided for sales purposes only and does not represent a complete accurate system design. System shown is a 2D layout and will change when applied to actual terrain. Quantities listed are approximate. Final system design will vary depending on site specific conditions.

PROJECT WORKSHEET

TITLE			
Madison County Landfill PowerCap™ Conceptual layout 10 Laminata String 10' Wide Sheet			
SCALE	BY	DATE	PROJECT NO.
AS SHOWN	CE	11-18-11	
DATE	BY	DATE	PROJECT NO.
11-18-11	CE		

Summary

- Dual purpose: Cap plus Solar Energy
- Best capping value
- Proven technology
- System approach
- Labor, material and performance warranties (Backed by Carlisle)
- Made in USA

Thank you ! Any Questions ?

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