Overall, some 24.4 million tonnes of post-consumer waste was recovered across Europe in 2009, pushing the percentage being diverted from landfill to 53.6%, up 2.5% on the previous year. Of this total, the amount mechanically recycled also increased by 1% to 22% of the total (5.4 million tonnes).

Nor is it not only the increasing amount of bottle recycling and industrial film packaging which is driving this growth. Initiatives on mixed plastics recycling are being developed year-on-year; and programmes like the PVC industry's Recovinyl scheme is now handling longer life applications like pipes, window frames, roofing membranes and flooring.

Complementing the improved performance in the recovery of value through mechanical recycling, the amount of material recovered as useful energy also increased by 1% during 2009 to 32.2% of the total (7.9 million tonnes). However, as in previous years, these encouraging top-line statistics conceal significant differences in the performances of different European Member States when it comes to optimising the recovery of their waste streams.

Top performing countries like Denmark, Germany and Switzerland, all complement their recycling of end-of-life plastics with high levels of energy recovery for the fractions that can't be recycled eco-efficiently, to achieve overall recovery rates of 95%+. Conversely, the worst performers who still landfill 80% of their waste rely only on low levels of recycling and are doing no energy re-capturing at all within their waste management.

Wilfried Haensel is an executive director at PlasticsEurope

■ This article is on–line. **Please visit www.waste-management-world.com**

The recycling rate for plastic packaging rose from 29% in 2008 to 30.3% in 2009

Fast facts

- Germany, Sweden, Estonia, Czech Republic, Belgium, Austria, Norway and Ireland recycled more than 25% of their total post consumer plastic waste
- Malta and 15 other countries still landfill more than 60% of their post consumer plastic waste. This group of nations also includes Spain and UK both with very low energy recovery rates of just 13.5% and 7.4% and thus a rather high degree of landfilling of 67% and 73% of their plastic waste
- Germany recycled 1.1 million tonnes of its post consumer packaging waste in 2009. Italy recycled 0.7 million tonnes, the UK 0.6 million tonnes, France and Spain recycled about 0.4 million tonnes each. Together these five countries recycled 3.2 million tonnes plastic packaging in 2009.

The IFAT ENTSORGA event was one of the largest exhibitions of waste, recycling and street cleansing equipment in the world – and, unlike several others that claim 'International' status, IFAT really is. WMW's Malcolm Bates talks through some of the highlights.

THE BIG ONE

Making a challenge: The Challenger mechanical truck-mounted sweeper from North America is out to win new markets.

For me, the key factor in assessing whether an exhibition deserves 'International' in its title doesn't hinge on whether the organisers have addressed the fact that exhibitors and visitors are unlikely to speak the same language – although information in several languages helps. It doesn't even hinge on what percentage of exhibitors or visitors come from overseas – although, again, a wide cross-section is more interesting. No, the most important factor that makes an international tradeshow worth visiting is that it attracts the key decision-makers – product designers and those who know where companies are going – and that, of course, they are willing to talk. And, in that respect, IFAT (or IFAT ENTSORGA as we should now call it following the recent merger) tends to score very highly.

And the equipment? Well, naturally, there is little point in taking several days out of your busy schedule, incurring the cost and the inconvenience of mixing it with crowds of other visitors just to see stuff you could look at back home. It may sound rather obvious, but a show should have brand new products to see and emerging trends to discuss and evaluate – for which an event's timing and presence has to be right. Again IFAT scores highly. But my problem is another one; trying to summarise previously unseen products and equipment within a couple of pages. So here goes.

The headline act

First up, without much question, IFAT 2010 was Faun's show. After several months of speculation about long-term plans – started no doubt by Faun's competitors – Faun launched three major new products in Munich, production ready.

What will naturally assume flagship status is the new, revised Rotopress Dualpower Refuse Collection Vehicle (RCV). It's a year since I drove its prototype on the streets of Aachen, but in product development terms that's a twinkling of an eye. True, there were problems, including some 'corporate issues' over the modifications needed to a standard Mercedes Econic chassis.

Things have been simplified for the production version, although the same philosophy of using Supercap technology to store braking energy to provide a launch to the next pickup point – rather than the battery packs used in competing 'hybrids' – shows original thinking by the Faun R&D department.

A factor that designers of some environmentally friendly products seem to forget is that every innovation has to perform at least as well as a conventional product, if not double-figure percentage points better. When I first discussed these issues with Georg Sandkuhler, who heads the R&D team, he suggested fuel and noise emission savings of around 20% would be possible and a viable payload on a 26-tonne gross weight vehicle had to be a minimum of 10 tonnes.

Twelve months on, Faun is claiming a fuel saving of up to 33% and a reduction in noise emissions from a typical 106 dbA, down to 91 dbA. This in effect is another 33% reduction. And, best of all, a payload of 10,300 kg should be possible on a production Rotopress Dualpower, mounted on a 6x2 rear-steer Econic chassis. Remember, the entire compaction cycle is rotary and electrically powered – so shock loadings are also much reduced. One of the largest issues facing street cleansing operations has to be reduced dust emissions from highway and precinct sweeping machines, which leads me onto the other new products from Faun.

The production Faun Rotopress Dualpower hybrid RCV.

Looking ahead

Faun has dealt the traditional crew-operated rear-loading RCV another blow with its new Easypress. In Germany, sideloaders are now widely used in rural and suburban locations and the efficiency savings can be further improved by adopting demountable body sideloaders, which reduce journey times to disposal and indeed the number of units required. But, until now, side loaders have been open to criticism when it comes to driver vision and hence overall safety. The two solutions were either to employ a truck chassis with the steering wheel on the kerbside – as with a highway sweeper – so the driver can keep a closer eye on the lifting process. Or to use extensive camera systems and maybe employ an extra crew member to 'present' the bins to the lifter.

Now? Faun has come up with a far better solution. The initial bin docking process takes place ahead of the collection truck, where the driver can see what is going on through the swept front screen of the truck cab. The second key advance over other systems is that of eight independent 'fingers' designed to engage with the bin 'combs', only three have to latch on for a safe lift. As the whole assembly has a flexible design, bins that are significantly out of alignment – as will happen in real life – can be picked up without the driver having to leave the cab, or without a special girth clamp system being deployed.

Another electric performance

So if Faun was IFAT's headline act, what about the supporting bands? Top of the credits in that respect is the Zoeller Group, whose significant product launch for this year is the final announcement of two electrically operated binlifters.

Originally a 'partner' in the Faun Dualpower project, Iceland-based Ecoprocess undertook all the pioneering work on electric binlifters. The Semat division of Zoeller has also been busy with new technology, using IFAT to promote its own battery-electric 'hybrid' compaction system. There was another new development on sideloaders – and one that caused a lot of interest amongst visitors – the new Varia-Split E-Maxx from Dutch manufacturer Translift. An issue with sideloaders is that will have to do twice the mileage of a typical rear-loading RCV to pick up the same number of bins. Why? Because it can only load from the kerbside, so all the houses on the other side of the street will require another pass. As highlighted in our last e-newsletter Translift has overcome this rather negative ecological aspect by fitting a lift system on both sides of the Varia-Split hopper.

A clean sweep

In the field of electricity, the UK-based Green Machine division of US manufacturer Tennant used IFAT to highlight what really

The new all-electric Green Machine 500ZE sub-compact precinct sweeper. The German city of Cologne will be first in Europe to operate it.

is the first fully functioning battery electric precinct sweeper. Others might have tried before, but the benchmark is an ability to work a full eight-hour shift on one charge. And the designers of the 500ZE stand by that claim. Cologne in Germany has already become the first city in Europe to order a 500ZE.

Until now, most mechanical sweepers have been expensive purpose-built machines. But Challenger is out to change that. Based on any 7.5- to 10-tonne gross weight chassis, the North American sweeper's rear brush and pickup (sweeping forward into a 3 metre plus tip over height high-lift hopper with a capacity of 3 cubic metres) looks unconventional. But access for servicing is excellent. Dealer enquiries are being sought.

Another manufacturer with sweepers in its product portfolio is Boschung. Like Challenger, Boschung is looking for new markets and the latest move is into the UK and Ireland. The mid-sized S-60 Boschung's display at IFAT suggested the company sees potential for quality winter maintenance, sweeping and multipurpose trucks in wider, emerging global markets.

And, finally, to illustrate that the most interesting ideas aren't necessarily from the large multinational 'corporates' – I bring you details of a robotic waste bin and container washing unit from Spain's Grupo San Cristobal. As bi-weekly waste collections are increasingly being justified as a trade-off for a recycling strategy, many of us in more temperate climates increasingly face the problem of smelly waste bins. The solution? Some city authorities have tried special bin-washing trucks. Others use bin-washing contractors with mobile pressure-washing plants. In both cases, the problem is how to handle the used water. The team at San Cristobal sees things differently: build a fixed bin-washing plant where environmental controls can be designed in, set up an automated production process using robotic-arm brushes to clean containers inside and out – and establish a logistics operation to collect the dirty bins, while delivering freshly cleaned units.

Conclusion

In view of IFAT ENTSORGA's tens of thousands of visitors and hundreds of exhibitors from dozens of countries, no review can ever be definitive, but through our technical product test and on-site evaluation articles, Waste Management World will be featuring some of the other innovations over the next few months. Also look out for our big 'Transport & Collection' special issue within the May/June 2011 issue.

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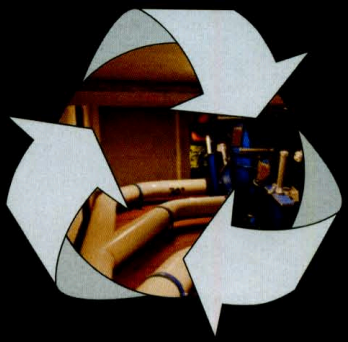

What's this? Unrest in peaceful Scandinavia? Quite the reverse actually – the 'movement' in question is aimed at putting waste collection systems underground in order to enhance the environment. And the locals are all for it. In fact, as Malcolm Bates reports, the only fighting going on is the battle to introduce the most efficient system.

The Swedish Underground Movement

There are several interesting ways to see the beautiful Swedish city of Stockholm: by boat - it is laced with waterways; by cycle - in summer, most of the population seems to get on their bikes; or by foot - after all, if you walk too far, there are plenty of cafes and bars for refreshments. And if you overdo things on the physical effort front? Stockholm has one of the best public transport systems of any capital city on the planet. So you can ride home.

But a metro ride isn't the 'underground' scenario I have in mind here. Waste Management World is in Sweden to look at the latest developments in waste and recyclable materials collection systems. And although modest in size (as capital cities go), Stockholm is a shining example of how various municipalities – and commercial contractors – can work hand-in-hand for the good of local residents and of tourism, commerce and the environment as a whole.

The climate can impose all sorts of additional burdens on any outdoor workforce – of which staying warm in cold, icy weather conditions and the increased dangers of working in poor light in winter are just the most obvious. This helps explain how the traditionally easygoing Scandinavian temperament can co-exist with a strong trade union ethic. But employers and workers share a desire to do the best possible job within a framework of high safely standards.

So how does all this translate into today's waste and recycling collection regime? That was one of the reasons for my visit – to find out. The second reason was to check out the equipment used by the interesting cross-section of organisations responsible for doing the job. And the third? That was to visit my old friend Anders Haglund, the Swedish representative of Finnish-based manufacturer, Narpes Tra & Metall. Or NTM to us.

Flagship product

Haglund had already briefed me on several exciting developments that he'd been involved with in the greater Stockholm area. Firstly, he reminded me that some five years had passed since Waste Management World magazine had led with the article on the revolutionary NTM Quatro System. This enables four separate (and therefore uncontaminated) waste streams to be collected at the same time, by one vehicle.

In true Scandinavian style, everyone involved with the project wanted to ensure the system worked before making it widely available. Five years, Haglund suggested, had been a suitable shakedown period and now everyone in Sweden – and back at the NTM factory in Narpes, Finland – was happy. So the Quatro System can finally take its place as a flagship product in a range already far more extensive than you might expect.

Taking a look at the productionised Quatro compaction body was one reason for my visit, but he had also informed me that as a number of demonstration units (mounted on Volvo-powered low entry Dennis Elite chassis) were now available in northern European markets, I should take the time to see the finished product in action as well.

NTM designers have done well to make the higher, four compartment body available on a range of RCV chassis, but thanks to a clever new production process, the length (and therefore capacity) of each NTM compaction body can be tailored exactly to match the chassis wheelbase it is being mounted on, in order to give the optimum axle weights.

Sure, the Quatro needs special four-compartment (and therefore expensive) wheeled bins that fit into the four different compaction hoppers of differing capacities, but you really need to see it in action to appreciate the advantages of the 'four waste streams in one lift' capability. It really is magic.

It would have been worth going to Stockholm just to see the latest production versions of the Quatro, but to make my trip doubly worthwhile, Haglund had also arranged for me to see the new prototype Mini-Mas dedicated food waste collection unit, currently on trial with waste contractor SITA in the Stockholm area. This brand new product can be based on any five- to seven-tonne gross weight chassis and is designed to operate either with just a driver or with a driver and an additional crew member, depending on operating conditions. The Mini-Mas was designed to meet two specific criteria.

Firstly, NTM designers favoured a fully enclosed body for dedicated foodwaste collections. So while the unit can, of course, be used to pick up other kinds of waste, the body/hopper is sealed and leachate leak-proof.

Down, down, deeper down

But there is another element to waste collection in Stockholm – the urban refuse collection vehicles need to be as low as possible, as many shops and offices are linked by a network of underground service tunnels, in some cases offering no more than two metres of useable headroom. "This is a critical issue here in Stockholm," Haglund explained as a huge electrically powered door opened up and closed behind us.

We were venturing down into the tunnels under the downtown area, which were started during the Second World War, then enlarged to include deep anti-nuclear shelters in the Cold War era and more recently turned over to commercial use. "These tunnels and caverns are used as storage areas for the buildings above, but as they are carved out of solid rock, it isn't possible to make them any higher, so we have to design our products to fit," Anders

The Quatro needs special four-compartment wheeled bins that fit into the four different compaction hoppers of differing capacities

Sweden above ground: Swedish contractor 'Resta' also has RCVs working underground, although this unit fitted with hydraulic loader crane is used to pick-up and empty 'bottom-dump' bottlebanks located above ground

Pipe dreams: deep down in the basement of a new apartment block, the waste is held in these vacuum vessels. Each can be emptied automatically from the truck cab in the right sequence

explained. As designing an RCV under four metres high is a challenge, you can imagine the problems of designing a product under two metres high. "This is why we designed the Mini-Mas to fit the Iveco Turbo daily chassis with air suspension," he said, before noting that while NTM can get the bodywork under the height limit, new laws in Europe prevent modification of the cab roof height on future production units. "Keeping ahead of legislation is always a challenge," said Anders with a smile.

But it isn't just the Mini-Mas that is designed to operate underground in helping to keep environmentally conscious Stockholm ahead of the rest of Europe. NTM also has waste contractor customers such as Resta AB that run RCVs down inside the larger service tunnels in the downtown area, while another high-profile commercial contractor – Liselotte Loof – also garages and services a large part of its RCV fleet underground!

High profile, but based underground? Well, yes. Having taken over the business from her father, Liselotte has introduced several innovations, of which operating an up-to-date fleet of Mercedes Econic chassis fitted with NTM compaction bodywork is one.

Latest adition to the Resta fleet is this of large four-axle Volvo chassis - with 'tridem' rear bogie - fitted with NTM vacuum waste collection system, and capable of sucking over 3-tonnes per hour through underground pipes

Why garage trucks underground? Stable temperatures all year round, lack of snow and ice in winter, safety from theft or vandalism. It makes sense.

Solving customers' problems

So we have underground service roads in the downtown area, underground, out of sight garaging of the RCV fleet, downtown.

And there were yet more tunnelling projects underway to extend the inner ring road deep beneath traffic-choked city streets, during my visit. Here too, headroom is still tight and even regular distribution trucks have special low height bodies. I thought I had my 'underground' references fully sewn up, but Anders had a couple more surprises up his sleeve.

Even though the Swedish market favours conventional rear-end loading RCVs with container lifters, larger semi-industrial units with rear winches for 'Big Bite' containers, side loaders, front-end loaders – and of course the innovative Quatro System – there are still operators that require other solutions. And the other unique element in this story is that as a manufacturer, NTM is keen to provide them. It is this 'tell us your problem and we'll help you solve it' approach that has helped transform NTM from a small specialist domestic manufacturer in Finland, into the market leader in Sweden – and more recently an increasingly important player in a number of other European markets.

To achieve an increased market share based on a low price, or quick delivery basis is hard enough – but to do so on a high-quality, long service life and 'built specifically to customer requirement' approach, is even harder. "This is the sort of project we are increasingly being involved with," Haglund explains as we pull alongside a huge white four-axle Volvo truck in a district of modern high rise apartments.

It looks like a deep sewer jetter. There's a cylindrical body and what looks like a gully arm of extra wide dimensions vanishing down a hole in the pavement. This is one of the first vacuum waste collection units at work in Sweden. It's built entirely by NTM to meet the requirements of the forward-thinking Swedish contractor Resta AB. Well, when I say 'working', I'm amazed to find the driver sitting in his cab, doing nothing more exhausting than checking out a flat TV screen full of computerised data. Further discussion revealed the true nature of what was going on – this truck was picking up over three tonnes of waste an hour, automatically by a vacuum system, up to 300 metres away. All without moving a wheel! Time for one more trip underground – this time down into the basement of a new apartment block that is part of an impressive inner-city regeneration project near the

docks area. On this development there was an opportunity to 'start with a clean sheet of paper', so an impressive underground network of waste collection pipes, valves and storage chambers (supplied by Envac) for each waste faction was built-in from day one.

That none of this is obvious when looking at the street above ground, is impressive enough; there was only that manhole cover to which the suction arm is connected to give any clue. But what is really impressive is that each collection vessel in each building can be accessed electronically direct from the driver's cab. NTM helped design and develop that technology.

But what if the buildings you have to service are already built? NTM also has a product range to meet the other growing underground movement – underground bulk waste containers. NTM is the only manufacturer to currently offer its own design of rear hopper-mounted crane to lift containers from their location to line-up with the rear binlifter.

In Stockholm, large numbers of recyclables such as glass and paper are also placed by residents into above-ground bulk containers. These 'bottom-dump' units are also unloaded by crane-equipped rear end-loading RCVs using proprietary front chassis-mounted units from companies such as Hiab. The bottom line? Well, a couple come to mind. Firstly, from a waste and recycling vehicle-operations viewpoint, make sure you can meet your customer's growing requirements for underground container collections as, increasingly, the environmental benefits of removing containers from public view is seen as a price worth paying.

> "his truck was picking up over three tonnes of waste an hour, automatically by a vacuum system, up to 300 metres away. All without moving a wheel!"

And secondly? While yet to be seen as a global brand, that could soon change. NTM as a manufacturer is 60 years old this month and after major gains in the demanding Swedish market, a full product range will be launched in the UK in early 2011. After that? According to CEO Kurt-Eric Nordin, NTM is keen to extend its product range to meet the needs of other global markets. "We are using the expansion into the highly competitive UK market as a template for this," he explains. "This will help us when we launch in the remaining European markets, but we're also interested in talking to potential partners that are keen to share our technology on a more global level," he adds.

Having flown in to Finland from Stockholm in order to visit Kurt-Eric at the NTM plant, I predict visitor traffic at the modest regional airport at Vaasa is going to get pretty busy from now on. They may even need to double the number of check-in desks to...well, two.

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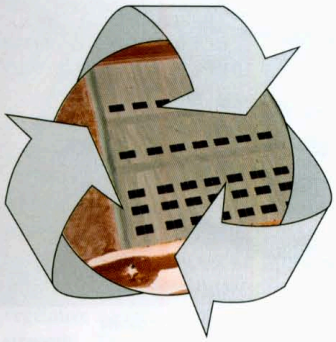


Landfill solar energy covers are now starting to be taken more seriously following the installation at a site in Texas, US. A new project in Georgia now aims to go one step further and convert a 35-acre landfill into one of the world's largest solar covers. Mark Roberts looks at the advancements in geomembranes and cost and practical considerations for landfill owners.

Solar Landfills: the Future?

A Georgia, U.S. based landfill site has been transformed from an operating landfill that has reached capacity into a commercial scale, solar energy generating facility. A key part of this development is the use of an Exposed Geomembrane Solar Cover (EGSC) system. This technology combines an enhanced final cover anchoring system and thin film photovoltaic solar panel attached to a geomembrane. The result? An integrated final landfill cover system that allows a landfill owner to close a landfill but generate renewable electrical power.

The Hickory Ridge Landfill Solar Energy Cover uses approximately 7000 solar panels to generate more than 1 MW of renewable electricity. Republic Services, who used the EGSC system, has also used this technology to perform partial closure at its Tessman Road Landfill in San Antonio, Texas.

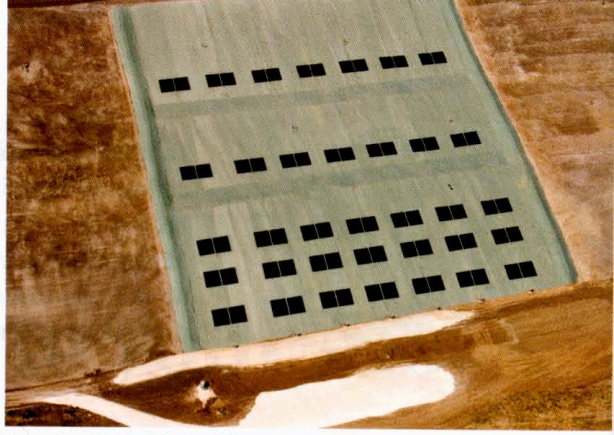
The 35-acre closure at Hickory Ridge converts the landfill into a solar park, transforming a liability into a revenue stream with the following potential benefits:

- Landfill post-closure care cost savings
- Solar incentives and rebates for project construction
- Solar renewable energy credits
- Sale of renewable power
- Carbon cap and trade credits
- Positive image of sustainability and energy independence.

Landfill secondary use

The Hickory Ridge Landfill closure represents a milestone in the solid waste industry because it replaces the prescribed Subtitle D closure cap with an alternative cap system, which provides a number of environmental and economic benefits. The transformation of a landfill that has reached its design capacity into a commercial sized solar energy facility is an extension of the "solar moment" in the solid waste industry, realized earlier in 2009 with HDR Engineering Inc.'s (HDR) design of Republic Services Tessman Road Landfill Solar Energy Cover in San

Facing the right direction: geomembrane sidelopes on which the solar panels are mounted have an angle of approximately 18 degrees from horizontal



Approximately 10 of the sites' 35 acres are covered by solar panels

Antonio, Texas. This Tessman Road Landfill Solar Energy Cover project represented the first design and installation of a solar landfill capping system, integrating an exposed geomembrane cap design and modern photovoltaic technology with a landfill closure.

The Hickory Ridge Landfill in Georgia capped the majority of a 35 acre landfill with the same type of alternative exposed geomembrane solar capping system as that at Tessman Road Landfill. This system allows a closed landfill to generate revenue while eliminating the ongoing maintenance costs of mowing and soil replacement. With this technology, long term care has a new positive economic and sustainable component that may change the way landfill closures are approached in the future.

Long-term performance

The EGSC was engineered to meet all EPA landfill closure requirements, while providing a stable surface on which to mount an array of thin, flexible photovoltaic laminates for large-scale renewable electricity generation. For the geomembrane portion of the system, HDR used a 60-mil reinforced TPO (thermoplastic polyolefin) roofing material with a long history of successful application and performance characteristics, including UV resistance, seam strength, chemical and puncture resistance and interface friction.

The Hickory Ridge solar energy cover caps three tiers of southerly-facing landfill sideslope and crown. There are benches, or relatively flat areas, separating the tiers. The panel layout design includes 580 sub-arrays made up 12 panels each.

The solar panel area of the closure is approximately 10 acres. The solar panels are laid out to allow access to landfill utilities such as landfill gas collection wells, while also designing it for cost effective wiring and efficient electrical operations. The entire array of panels and their accompanying infrastructure are installed on the exposed geomembrane to produce year-round

renewable electricity during the 30-year post closure long-term care period and beyond.

Engineered environmental controls

Exposed geomembrane caps are designed to outperform traditional landfill closure designs with greater environmental protection, at less than half the material cost of a conventional Subtitle D prescribed landfill closure.

When comparing a solar energy cover to a traditional closure, what appears to be a missing component - the lack of topsoil or vegetative support above the geomembrane - is actually a design strength. The exposed geomembrane anchors directly into the landfill whereas a traditional Subtitle D closure drapes the geomembrane atop the landfill, holding it in place with soil layers that shift and erode over time.

The solar energy cover system takes advantage of the strength and flexibility of the geomembrane material to provide a final cover that is engineered to encapsulate the waste mass. A traditional cover system uses soil to act both as a ballast for the underlying geomembrane and also as a material to support the overlying vegetative growth.

Furthermore, at many landfills weather conditions can make it difficult to consistently maintain the vegetative cover, leading to an overall loss of top soil materials and organic nutrients. Conversely, a solar energy cover is designed for both long-term outdoor exposure and to withstand specific weather events. The solar energy cover is anchored directly into the landfill with a series of horizontal and vertical anchors. These strengthen the overall liner system by limiting the stresses and strains the material encounters during a storm.

Veneer type slope failures resulting from saturated soil conditions are a critical consideration inherent in conventional landfill closure systems. Saturated cover soil conditions can occur for a number of reasons such as changes in flow due to differential settlement, erosion, and clogging of the drainage layer. With a solar energy cover system, there are no soil or geosynthetic layers that can slip, slide and pull away from the liner in the event of saturated soil conditions.

> The 35-acre closure at Hickory Ridge converts the landfill into a solar park, transforming a liability into a revenue stream

The design of the solar energy cover creates an easily maintained, durable and stable surface that conforms to landfill surface variations with long-term reliability for both energy generation and environmental protection.

In conclusion, a solar energy cover creates a new source of renewable energy, helping communities pave the road to energy independence with creative land re-use and potential for widespread application on many other types of brownfields.

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