

## Introduction

When Brick Township, New Jersey, became responsible for bankrolling an expensive landfill closure, the town's leaders started thinking creatively about how the site could help generate revenue to defray the cost to taxpayers. They considered everything from a medical office park to an indoor firing range for area police departments. In the end, they decided on a solar power facility large enough to supply all of the electricity used by township government buildings and community parks.

When it became clear that the Township could not hire a single team to coordinate the cleanup and redevelopment efforts, the Township stepped up to coordinate the project. By assembling a public-private partnership, the Township was able to leverage the resources needed to create the 7-megawatt solar facility.

This case study describes the journey of the Brick Township Landfill Superfund site from contamination, through cleanup, to redevelopment. This story demonstrates how property owners can work with the U.S. Environmental Protection Agency and private parties to return once-contaminated sites to productive use. The story also illustrates the benefits of planning for reuse before designing a site's cleanup.

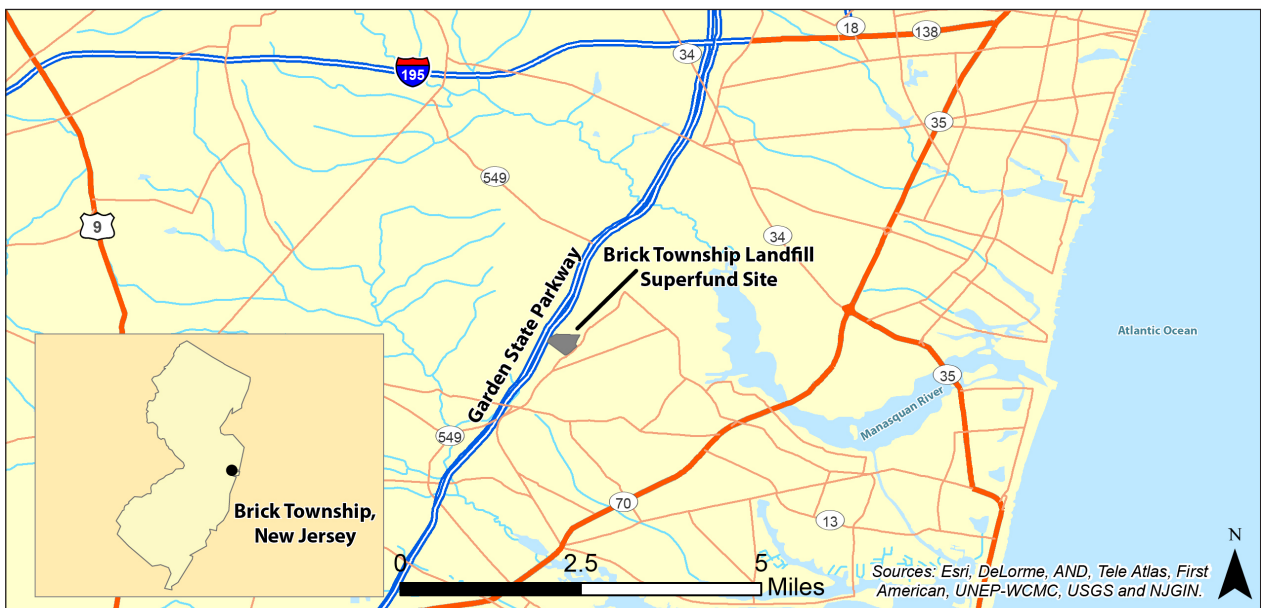
The case study provides useful information and lessons learned to companies, local governments, communities, utilities and regulators interested in exploring utility-scale solar projects at landfills or other cleaned-up sites across the United States.



Mounted solar panels on the cap.



Solar panels at the Brick Township Landfill site.



Brick Township, New Jersey, is on the Atlantic coast, about 40 miles south of New York City.

## Site History, Contamination and Cleanup

The Brick Township Landfill began operations in the late 1940s. It was previously known as McCormick's Dump and French's Landfill. The landfill operated for more than 30 years as a disposal site for residential waste, construction debris and vegetative wastes as well as sewage and septic wastes. An unknown number of 55-gallon drums were disposed of at the landfill; they contained engine oil, lubricants, automatic transmission fluid, antifreeze, resin, pesticides and herbicides. The New Jersey Department of Environmental Protection (NJDEP) and EPA estimate that a total of 63 million gallons of septic wastes were disposed of in the landfill between 1969 and 1979. Brick Township purchased the landfill property in 1973 and ceased landfill operations in 1979. EPA placed the landfill on the Superfund program's National Priorities List in 1983. Contaminants from the landfill leached into groundwater, soil and sediment. About 470 acres of groundwater were affected.

In 1992, NJDEP ordered the Township to construct an impermeable cap on the landfill. After the Township asked NJDEP to allow an alternative remedy (monitored natural attenuation), NJDEP agreed that an impermeable cap was not needed. EPA and NJDEP later found that the alternative remedy was not reducing contaminant levels quickly enough.

EPA's risk assessment found that the levels of arsenic, chromium, mercury and vinyl chloride in the site's groundwater would pose a risk to human health if people were to use it for drinking water. About 12,000 people live within a mile of the site.

After multiple sampling events, EPA selected a final remedy in 2008. It required that the Township:

- Install an impermeable landfill cap.
- Implement a groundwater monitoring program.
- Implement institutional controls to restrict the use of groundwater.
- Restrict uses on the landfill.

Brick Township's contractors designed and installed the landfill cap between 2010 and 2013.

### Terms to Understand

**Monitored natural attenuation:** Cleanup strategy in which naturally-occurring processes reduce contaminant levels, with samples collected to monitor progress.



*The Brick Township Landfill before cleanup and redevelopment.*

# Project History

## 2008-2010

### *Finalizing Cleanup Responsibilities, Exploring Reuse Options*

The 42-acre Brick Township Landfill Superfund site lies between the Garden State Parkway and Sally Ike Road. The site is surrounded by neighborhoods and school athletic fields.

Brick Township bought the landfill in 1973. The next several decades were filled with uncertainty about when and how the landfill would be closed. Shortly after the Township bought the landfill, a new state law was passed, requiring that the Township continue accepting waste at the landfill. When a new landfill opened nearby, the Township was allowed to stop accepting waste. After many years of investigations and negotiations, EPA selected the final cleanup plan for the site in 2008. EPA and the Township entered into a consent decree in 2009; the Township agreed to implement the cleanup.

The cost for capping the landfill, as required by the Township's consent decree with EPA, was estimated to be about \$7.7 million, plus ongoing monitoring costs of \$400,000 per year. The Township's mayor at the time, Stephen Acropolis, wanted to reduce the site's financial impact on taxpayers by making the area a source of revenue. Tara Paxton, the Township's assistant planner, helped lead the reuse effort. She said that "the Township's bottom line in selecting a reuse option was maximizing revenue with the least impact on nearby residents."

## CERCLA

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) is the law passed by Congress on December 11, 1980, that is commonly known as Superfund.

CERCLA governs the federal response to abandoned, uncontrolled hazardous waste sites.

EPA's project manager for the site, Jon Gorin, gives the Township full credit for driving reuse at the site. "EPA selected the cap as the site's remedy," he said. "The Township could do anything with the site as long as it doesn't damage the cap."

The Township hired a consultant to work with Township staff and explore a variety of potential reuse options for the site, including:

- Wind turbines
- Cellular phone towers
- A medical office park
- Municipal buildings
- An indoor firing range for police departments
- Sports fields
- An equipment yard for the adjacent Garden State Parkway
- Commercial redevelopment along parts of the site with road frontage

## EPA and Site Reuse: Renewable Energy

Since the inception of the Superfund program, EPA has been building on its expertise in conducting site characterization and remediation to ensure that contamination is not a barrier to the reuse of property. Today, consideration of future use is an integral part of EPA's cleanup programs, from initial site investigations and remedy selection through to the design, implementation, and operation and maintenance of a site's remedy. For example, EPA is working nationwide with public and private partners like Brick Township to encourage solar and other renewable energy development opportunities on current and formerly contaminated lands.

**EPA's Green Power Partnership** is a voluntary program that supports the organizational procurement of green power – electricity produced from renewable resources – by offering expert advice, technical support, tools and resources. Partnering with EPA helps organizations lower the transaction costs of buying green power, reduce their carbon footprints and communicate their environmental leadership to stakeholders. To date, more than 1,300 organizations have joined the partnership, buying nearly 28 billion kilowatt hours of green power annually. Leading municipalities are also partnering with EPA to become Green Power Communities.

**EPA's RE-Powering America's Land Initiative** identifies the renewable energy potential of contaminated lands and serves as a resource for parties interested in reusing these lands for renewable energy development. Through coordination and partnerships among federal, state, tribal and other government agencies, utilities, communities and the private sector, EPA and its partners are exploring how new renewable energy facilities can be developed on these properties.

**EPA's Green Remediation Strategy** fosters the use of best management practices for green remediation at contaminated sites. "Green remediation" is the practice of considering all environmental effects of remedy implementation and incorporating options to maximize the environmental benefits of cleanups. By incorporating the use of renewable energy sources, EPA and its partners are maintaining the effectiveness of remediation methods while reducing greenhouse gas emissions from conventional power sources.



The Township decided to pursue solar energy redevelopment because it was the highest-revenue-generating and least-intrusive option. The solar option was also attractive because of its greenness: it promised to transform the site from a source of pollution into a clean energy provider. According to former mayor Acropolis, redeveloping the landfill would mean “closing the last open sore in Brick Township.” In addition, once in place, the solar facility would have no traffic impact.

## 2010-2015

### *Carrying Out Cleanup and Redevelopment*

Starting in early 2010, and throughout the cleanup and redevelopment process, residents were invited to attend public meetings and share their opinions. The Township used a variety of channels to notify the public, including newspaper ads, phone calls and social media. Meetings were held during evening hours, to make it easier for residents to attend.

In 2010, the Township designated the site as an “Area in Need of Redevelopment.” Under New Jersey’s Local Redevelopment and Housing Law, these areas are granted regulatory flexibility and exemptions to make it easier to redevelop them. For instance, the Township could choose an experienced solar developer for the job rather than being required to hire the lowest bidder. The law also provides for additional financing options as well as zoning ordinance flexibility.

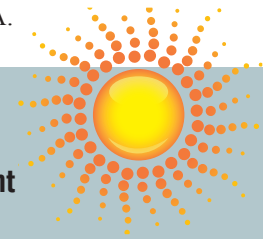
The Township held a series of public meetings to get community input on the proposed redevelopment. The Township then adopted a redevelopment plan for the site, as required under the Local Redevelopment and Housing Law. The plan laid out the Township’s goals for the site’s redevelopment as well as the procedures for making it happen. The plan’s goals included:

- Capping the landfill in accordance with the site’s consent decree.
- Allowing for the construction of a solar facility.
- Allowing for light industrial, manufacturing or municipal uses.

The Township’s original intent was to hire a collaborative team of private companies to handle both the capping and the solar project. The Township hoped that cleanup contractors would team up with solar developers to submit proposals. However, no proposals came in, possibly because cleanup contractors and solar developers operate in separate spheres and are not accustomed to working together.

Given the lack of response, the Township decided to split the project’s contracting into two parts. Private remediation contractors would take the lead on landfill capping. Solar redevelopment would be a public-private partnership between the Township and a private solar developer. Although the contracting was split into two parts, the Township still treated

the cleanup and redevelopment as a combined, integrated effort. Tara Paxton said, “The Township always viewed it as a combined project.” The collaborative team included the Township, design engineers and the solar developer, with regulatory oversight provided by EPA.



## **Policies and Incentives for Solar Energy Development**

Solar energy development incentives include both policy requirements (e.g., renewable portfolio standards) and financial incentives (e.g., tax credits and rebates).

Federal and state policies continue to play a major role in creating markets favorable for solar energy deployment. Solar energy’s cost premium has declined in recent years due to technology improvements and the increased cost of fossil fuel-based energy generation. At the same time, a nationwide public policy focus on carbon-free, renewable energy has created a range of financial incentives to further lower costs.

At the state level, renewable portfolio standards (RPSs) are a powerful policy tool requiring that retail electric providers in a given political jurisdiction include a minimum amount of renewable power in their energy mix. As of 2015, 29 states plus the District of Columbia and Puerto Rico have RPS policies in place.

### **Financial Incentives and Structures**

#### *State and Local Governments*

- systems benefit charge funds
- issuance of energy bonds
- clean renewable energy bonds
- federal renewable energy production incentives
- state or utility cash incentives and rebates
- solar renewable energy certificates
- net metering (banking excess electricity production for future credit)

#### *Private Parties*

- federal investment tax credit
- accelerated depreciation under the federal Modified Accelerated Cost Recovery System
- state tax incentives and rebates
- state or utility cash incentives and rebates
- solar renewable energy certificates
- net metering

Please see the **Sources and Resources** section for more information.

According to the project’s design engineer, Dr. Arie Kremen, EPA’s involvement in the cleanup and redevelopment process “helped tremendously in moving the project forward.” To help the project meet the deadline for tax credits, EPA reviewed documents on an expedited basis. “EPA acted as a partner, not a regulator, and provided frequent input,” said Kremen. “[EPA project manager Jon Gorin] was very approachable and hands-on. He was involved on a day-to-day basis.”

Because the future use of the site was determined early on, the project’s design engineers were able to design the landfill’s cap with reuse in mind. The cap was given steeper-than-usual side slopes, to maximize the flat area available for solar panels. The U.S. Army Corps of Engineers reviewed the design and agreed that the steep slopes would be stable. The cap’s grade was designed for increased southern exposure to increase the amount of solar energy reaching the panels. To avoid having the solar facility’s electric lines running above ground on the side slopes, the project’s engineers designed a below-the-cap electrical conduit in consultation with the solar developer’s engineering team; EPA approved the conduit design after review by the U.S. Army Corps of Engineers. Burying the electric lines instead of placing them on top of the cap improves drainage and makes slope maintenance easier.

One unexpected event delayed the project: Superstorm Sandy. The storm hit New Jersey in 2012, causing massive, widespread damage to shore communities like Brick Township. The cap’s slopes sustained some damage from the rain and wind, delaying the project while the damage was repaired.

*“The redevelopment of this site will only serve to improve a municipal landfill that is currently a liability, and transform it into a sustainably productive asset. The infrastructure planned for this solar project will provide the Township with the ability to create a stable source of revenue that will allow for savings of energy costs in the future.”*

– 2010 Township of Brick Landfill Redevelopment Plan

The landfill cap consists of an impermeable geocomposite clay liner covered by sand and then bluestone, with grass-covered side slopes. In 2013 and 2014, after the landfill cap was in place, the solar developer installed the site’s 24,000 solar panels. The panels are mounted on ballasted skids, avoiding the need for posts penetrating the cap. The solar facility is connected to the regional electric grid.

The 7-megawatt (MW) solar facility started producing electricity in October 2014. By May 2015, the solar facility had generated over 3 million kilowatt-hours of power, offsetting as much carbon dioxide as 60,000 trees.



The cap’s configuration was designed to maximize solar power.





Construction underway on the landfill cap in 2011.



Preparing to unroll the geosynthetic clay liner.



Nearing the completion of landfill cap construction in 2012.



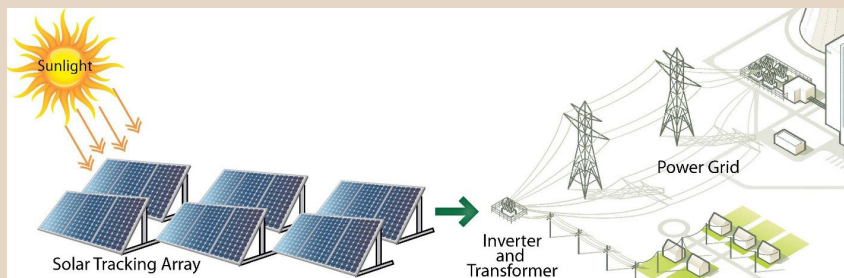
2013 aerial photo of Brick Township Landfill during redevelopment, with about half of the solar panels installed.

## Solar Technologies

There are a variety of ways to capture or convert sunlight into useful energy. Solar technologies use the sun's energy to provide heat, light, hot water, electricity and cooling for homes, businesses and industry. Solar technologies are broadly characterized as either "passive" or "active" depending on how they capture, convert and distribute sunlight. Active solar activities and technologies use photovoltaic panels, pumps and fans to convert sunlight into useful outputs, such as electricity. Passive solar techniques include selecting materials with favorable thermal properties, designing spaces that naturally circulate air, and aligning the position of a building to the sun.

The solar facility at the Brick Township Landfill site consists of photovoltaic (PV) devices, or "solar cells," that convert sunlight into energy. PV systems are one of two primary active solar technologies, along with solar thermal plants. PV systems produce two main products that can be sold in the marketplace: electricity and the green attributes of this electricity. PV systems make use of highly purified silicon that functions to convert sunlight directly into electricity. Solar cells are a familiar and widely used technology – calculators, toys, yard lights, roadside warning signs all use solar cells to convert sunlight directly into electricity. There are more than 24,000 solar panels in the solar facility at the Brick Township Landfill site.

### Photovoltaic solar system diagram





Skid-mounted PV solar panels installed at the site.

## 2011-2012

### *Financing the Solar Project*

The solar developer is paying for the solar facility. To take advantage of the low interest rates available to Brick Township, the Township issued municipal bonds to raise the funds for the project. The solar developer is responsible for paying off these bonds. A loan guaranty from a backer of the solar developer was in place until the solar facility was completed, to ensure that the payments would be made. The developer paid \$1.1 million in loan origination fees to the Township, as payment for acquiring the financing. As a municipality with an excellent debt rating, the Township was able to get a better interest rate than the solar developer would have been able to obtain on the private market.

The federal solar investment tax credit also played a major role in the project's feasibility. The incentive works by providing a tax credit equal to 30 percent of the cost of a solar project. At the Brick solar project, the 30 percent tax credit provided \$9 million to the solar developer.

The Township and the solar developer entered into a redevelopment agreement in 2011. The solar developer will operate the solar facility for 15 years, selling all the electricity produced to Brick Township at a set rate (currently 8.5 cents per kWh). Scott Pezarras, Brick Township's chief financial officer, said that, before the solar field was operating, the Township's electricity price rate would fluctuate every year, making it hard to budget. "Having a set price is a benefit to the Township's budgeting process," said Pezarras.

### Terms to Understand

**Kilowatt (kW):** Unit of measure for the amount of electricity needed to operate given equipment.

**Kilowatt-hour (kWh):** Unit of measure indicating the amount of electricity produced or consumed over time. One kWh means one kilowatt of electricity supplied for one hour.

**Megawatt (MW):** 1,000 kW or 1,000,000 watts. One MW is sufficient to power about 140 homes in New Jersey.

In 2012, the solar developer made a \$2.5 million lease payment in advance to the Township for the 15-year lease of the site. At that time, the Township was struggling to comply with a state-mandated cap on expenses. The \$2.5 million payment was vital to the Township's finances, supplying the revenue needed to comply with the state's cap.

The solar project provides all the electricity needed by the Township government (3.5 MW), as well as about a third of the electricity used by the Municipal Utilities Authority, the area's water and sewer provider. The solar energy powers the Township's municipal buildings, community parks and all other metered uses. Any remaining electricity is sold onto the grid.

When the 15-year lease ends, the Township will assume ownership of the solar field. The solar field will provide free electricity to the Township, providing a cost savings of \$500,000 to \$600,000 per year. Allowing for the solar panels' decreased efficiency over time, the panels will still provide more than 3.5 MW in 15 years' time, enough to supply all of the electricity needed by the municipal government.



# Lessons Learned

One of the main challenges facing the cleanup and redevelopment project was making sure all residents were well informed throughout the process. Tara Paxton, the Township’s project manager for the landfill redevelopment, said that one of the main lessons learned during the project was that “getting out ahead of the redevelopment plan would have been good,” to help everyone living nearby understand that the Township was legally required to cap the landfill. Despite the public meetings and other outreach, some residents were not aware that the landfill was a contaminated site or that the Township was legally required to clean it up. Back when houses were first built near the landfill, notices were included in the deeds. However, as years passed and owners changed, the deed notices were forgotten.

During landfill capping, the project’s design engineers were available to speak with concerned neighbors. Some residents were upset that capping required the removal of all trees on

## Solar Energy Incentives in New Jersey

New Jersey has a set of policies that aggressively promote solar energy and other renewables. As a result, the state’s installed solar capacity ranks among the top 10 in the United States.

The state’s renewable portfolio standard (RPS) requires that renewable sources supply 24.5 percent of the state’s power by 2027. Solar electricity must supply 4.1 percent of the state’s power by 2027.

Electricity suppliers can meet the solar RPS requirement by purchasing solar renewable energy credits (SRECs) from solar electricity producers. For each megawatt-hour of solar electricity produced, the producer receives one SREC, which can then be sold on the open market.

New Jersey also has favorable interconnection and net metering standards, making it easier for projects to connect to the grid and earn revenue.

## Solar Power Purchase Agreements (SPPAs)\*

A Solar Power Purchase Agreement (SPPA) is a financial arrangement in which a third-party solar developer owns, operates and maintains the photovoltaic (PV) system, and a host customer like Brick Township agrees to site the system on its property and purchases the system’s electric output from the solar services provider for a predetermined period. This financial arrangement allows the host customer to receive stable, and typically lower-cost electricity, while the solar services provider or another party acquires valuable financial benefits such as tax credits, renewable energy credits and income generated from the sale of electricity to the host customer. SPPAs are common in both the public and private-sector PV marketplace.

With this business model, the host customer buys the services produced by the PV system rather than the PV system itself. This framework is referred to as the “solar services” model, and the developers who offer SPPAs are known as solar services providers. SPPA arrangements enable the host customer to avoid many of the traditional barriers to adoption for organizations looking to install solar systems: high up-front capital costs; system performance risk; and complex design and permitting processes. Bottom line: SPPAs can provide host customers with solar power at an affordable price. As a result, the majority of PV financing agreements in the United States are now SPPAs.

### Benefits & Challenges of SPPAs

Benefits for host customer	Challenges for host customer
<ul style="list-style-type: none"> <li>• No upfront capital cost.</li> <li>• Predictable energy pricing.</li> <li>• No system performance or operating risk.</li> <li>• Projects can be cash flow positive from day one.</li> <li>• Visibly demonstrable environmental commitment.</li> <li>• Potential to make claims about being solar-powered.</li> <li>• Potential reduction in carbon footprint.</li> <li>• Potential increase in property value.</li> <li>• Support for local economy and job creation.</li> </ul>	<ul style="list-style-type: none"> <li>• More complex negotiations and potentially higher transaction costs than buying PV system outright.</li> <li>• Administrative cost of paying two separate electricity bills if system does not meet 100 percent of site’s electric load.</li> <li>• Potential increase in property taxes if site is reassessed.</li> <li>• Site lease may limit ability to make changes to property that would affect PV system performance or access to the system.</li> </ul>

Please see the **Sources and Resources** section for more SPPA information.

\* Information provided by EPA’s Green Power Partnership.





## Timeline of Events

<i>Late 1940s</i>	Landfill operations began at the site
<i>1973</i>	Brick Township purchased the landfill
<i>1979</i>	Township stopped accepting waste at the landfill
<i>December 1980</i>	NJDEP conducted water analysis program on and off site
<i>March 1981</i>	NJDEP site inspection discovered about 150 55-gallon drums and soil and groundwater contamination
<i>August 1982</i>	NJDEP entered into an Administrative Consent Order with the Township for closure of the landfill
<i>September 1983</i>	EPA listed the site on the National Priorities List
<i>1992</i>	NJDEP issued a decision document calling for an impermeable cap and groundwater monitoring. The Township petitioned NJDEP to allow an alternative remedy.
<i>1994</i>	NJDEP decided that an impermeable cap was not necessary. NJDEP stated that the existing soil cover would be sufficient, with the addition of fencing and a groundwater monitoring program.
<i>1996</i>	NJDEP and EPA found that groundwater contamination exceeded the allowable risk range
<i>1997</i>	Township sampled groundwater and found that contamination exceeded drinking water standards
<i>1999</i>	Township imposed a Groundwater Use Restriction Area where use of private wells was prohibited
<i>2001-2007</i>	Township conducted 14 rounds of groundwater sampling
<i>August 2008</i>	EPA released the Remedial Investigation/Feasibility Study and the Proposed Plan for public comment
<i>September 2008</i>	EPA held a public meeting to inform the public about the Remedial Investigation/Feasibility Study and cleanup options for the site
<i>September 2008</i>	EPA issued the Record of Decision, selecting a cleanup plan for the site
<i>December 2009</i>	EPA and Township signed consent decree, with Township agreeing to implement the cleanup plan
<i>April 2010</i>	Township issued the Landfill Redevelopment Plan
<i>June 2011</i>	Township's contractor started cleanup construction
<i>February 2012</i>	Township council members voted to fund construction of solar facility
<i>June 2013</i>	Solar panel installation began
<i>October 2014</i>	Solar panels started producing electricity
<i>July 2015</i>	EPA presented Excellence in Site Reuse Award to Brick Township

site. They were afraid that the area, which had looked like a nature preserve, would be an unsightly, barren hill. In response to this concern, the engineers focused on making the cap as aesthetically pleasing as possible. For example, hidden benches placed on the cap's side slopes allow for trees and shrubs, which are usually not allowed on caps. Today, trees and shrubs extend along all parts of the property that abut nearby homes.

The landfill's steep side slopes, designed to maximize the flat area available for solar panels, also pose a few challenges. Mowing the steep slopes has been a challenge. In addition, runoff from the steep slopes can be very intense during rainstorms.

Members of the collaborative project team learned several lessons during the project that they would share with communities considering a similar project:

- Integrating cleanup and reuse was crucial to the success of the project. By selecting a desired reuse prior to designing the cap, the project's design engineers were able to adjust the cap's design to optimize it for the planned solar reuse.
- Having an experienced solar developer is crucial. Make sure your solar contractor has experience with similar projects.
- Environmental cleanup companies and solar developers operate in separate industries; they may not want to team up together on a combined contract.
- Make an extra effort to inform the public about the project, using a variety of methods. Putting in extra effort up front can help avoid misunderstandings down the road.

## The Bigger Picture

While these lessons were learned during the successful reuse of the Brick Township Landfill Superfund site, there are also a range of broader lessons learned that can help guide similar projects at contaminated lands across the country.

**EPA works with potentially responsible parties and other stakeholders to support green remediation and reuse projects like renewable energy development that are compatible with site cleanups.**

The Agency places a high priority on green remediation and the development of renewable energy opportunities as part of the reuse of contaminated lands. At the Brick Township Landfill site, EPA's collaboration with the Township, the Township's design engineers and the solar developer enabled an appropriate cap design to allow for the planned solar reuse.

**While EPA provides tools and resources to support Superfund reuse, communities and public and private sector organizations make it happen.**

EPA's mission is to protect human health and the environment. EPA relies on engaged community stakeholders to bring their future land use goals and priorities to the table so that this information can be incorporated as part of the remedial process, linking cleanup and redevelopment. In New Jersey, Brick Township motivated the productive reuse of its former landfill. When possible, future use plans should be shared with EPA as early in the remedial process as is feasible.



*Catherine McCabe, EPA deputy regional administrator, presents the Excellence in Site Reuse Award to Brick Mayor John Ducey.*

## Recognizing Excellence

In July 2015, EPA awarded an Excellence in Site Reuse Award to Brick Township, recognizing the successful redevelopment of the former landfill into a solar panel array. "Brick Township has succeeded in turning the environmental liability of a former Superfund site into a community asset," said Deputy Regional Administrator Catherine McCabe, who presented the award during a ceremony at the site. "Renewable energy is a key component of our work to combat climate change, and it's great to see that a landfill that once only generated contamination now can provide Brick Township with clean energy."

In addition, as part of the 2014 City Livability Awards, the U.S. Conference of Mayors awarded Brick Township an honorable mention citation for its landfill-to-solar project. The City Livability Awards recognize "mayors and their city governments for developing programs that enhance the quality of life in urban areas."



*The project's design engineers beautified the cap by planting trees and shrubs near homes.*

**Utility-scale renewable energy projects are complex undertakings. Thanks to partnerships and tools like power purchase agreements, these complexities need not deter interest in these projects.**

The development of Brick Township's solar facility required engineering, legal, financial and policy expertise. Brick Township relied on various specialized consultants for much of this expertise. Through the project's solar power purchase agreement, the solar developer built and operates the solar facility, while Brick Township purchases all power generated by the facility. Brick Township's energy and interest in making things happen were the driving force for the project.

**While utility-scale solar energy projects provide significant environmental benefits, they are higher-cost than conventional energy projects. Partnerships, incentives and supportive state and federal policies are essential to help address this cost differential.**

State and federal solar power incentives were vital to ensuring the project's financial viability. New Jersey has an aggressive Renewable Portfolio Standard, with a sizable portion set aside for solar projects. The federal solar investment tax credit also provided a large financial incentive to the solar developer. The public-private partnership allowed the redevelopment to take advantage of the lower interest rate available to municipalities.

**PV solar systems can be located in many places, at many scales.**

Brick Township built a utility-scale, grid-connected solar facility as a low-impact way to generate revenue on their closed landfill. Other PV power systems can be as small as a few solar panels on the roof of a building, and need not be connected to the electrical grid. At many remote contaminated sites like abandoned mine lands, for example, PV systems provide power for green remediation efforts.

**Outreach and engagement with communities is important.**

Even with the Township's efforts to involve the community in a series of public meetings, misperceptions about the cleanup and redevelopment persisted. This points out the importance of well-planned and effective outreach to community members.



# Conclusion

The collaboration at the Brick Township Landfill Superfund site was a success. Brick Township coordinated the project and responded to the concerns of residents. EPA reviewed documents on an expedited basis to help the project meet the deadline for tax credits. The project's design engineers and the solar developer worked together to customize the landfill cap for a successful solar project.

Thanks to this innovative collaboration, the landfill's solar field is now producing enough green electricity to supply power to all municipal buildings and community parks as well as meet some of the needs of the local water and sewer authority. The Township has transformed the landfill from a liability into a productive asset – and is now producing clean, green energy.



*Aerial photo of the solar field, 2015.*

# Sources and Resources

## **Sources**

Images and maps for this case study are from EPA, Brick Township and the project's design engineer, Dr. Arie Kremen.

## **Resources**

### *Cleanup and Reuse*

Superfund Site Progress Profile, including site decision documents:

<http://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0200540>

EPA Superfund Redevelopment Initiative – Alternative Energy Reuse at Superfund Sites:

[www.epa.gov/superfund/programs/recycle/activities/altenergy.html](http://www.epa.gov/superfund/programs/recycle/activities/altenergy.html)

Brick Landfill and other Superfund sites in reuse in EPA Region 2:

[www.epa.gov/superfund/programs/recycle/live/region2\\_nj.html#14](http://www.epa.gov/superfund/programs/recycle/live/region2_nj.html#14)

EPA Excellence in Site Reuse Award

<http://yosemite.epa.gov/opa/admpress.nsf/0/877564D39B0769A085257E8B00637EF2>

<http://patch.com/new-jersey/brick/shining-example-epa-lauds-brick-landfill-turned-solar-field-0>

<http://www.app.com/story/news/local/brick-point-pleasant/brick/2015/07/23/landfill-solar-farm/30603331/>

EPA Return to Use Initiative case study:

[www.epa.gov/superfund/programs/recycle/pdf/rtu14-bricktownship.pdf](http://www.epa.gov/superfund/programs/recycle/pdf/rtu14-bricktownship.pdf)

EPA Green Power Partnership:

[www.epa.gov/greenpower](http://www.epa.gov/greenpower)

EPA Green Remediation Strategy:

[www.epa.gov/superfund/greenremediation](http://www.epa.gov/superfund/greenremediation) and

[www.clu-in.org/greenremediation](http://www.clu-in.org/greenremediation)

EPA's RE-Powering America's Land Initiative:

[www.epa.gov/renewableenergyland](http://www.epa.gov/renewableenergyland)

### *Solar*

U.S. Department of Energy (DOE) solar maps:

[www.nrel.gov/gis/solar.html](http://www.nrel.gov/gis/solar.html)

DOE Solar Powering America:

[www.energy.gov/eere/solarpoweringamerica/solar-powering-america-home](http://www.energy.gov/eere/solarpoweringamerica/solar-powering-america-home)

New Jersey SRECs:

<http://www.njcleanenergy.com/renewable-energy/programs/solar-renewable-energy-certificates-srec/new-jersey-solar-renewable-energy>

Renewable energy policy and incentive database:

[www.dsireusa.org](http://www.dsireusa.org)

Solar power purchase agreement information:

[www.epa.gov/greenpower/buygp/solarpower.htm](http://www.epa.gov/greenpower/buygp/solarpower.htm)

# Brick Township Goes Solar: Redevelopment of a Superfund Site

BRICK TOWNSHIP LANDFILL IN BRICK, NEW JERSEY



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