

BROWNFIELDS TO BRIGHTFIELDS

Can old landfills become viable sites for renewable energy?



BY DANIEL E. JOHNSON

Historically, brownfield sites and closed landfills have been perceived as financial liabilities by their owners. However, once these sites are cleaned up, they can easily be converted to assets.

Brownfield land previously used for industrial or commercial uses may be contaminated by low concentrations of hazardous waste or pollution. Despite this, there is enormous potential for reuse once it is cleaned up.

Location is Everything

Many old landfills and brownfield sites are located in or near urban areas, most of which already have fully-developed utility infrastructures. With electrical lines nearby, particularly in the case of landfill gas to energy (LFGE) sites, they provide a cost-effective way to produce and transmit power to areas in need of renewable energy. Basically, they require far less investment in otherwise costly utility infrastructure.

Brownfield sites can be converted into income producing properties even in the face of land use development restrictions or the need for ongoing monitoring required by federal and state governments. They can also be designed and developed to convey positive attributes to communities and owners who want to take advantage of large platforms for producing alternative energy. Large sites, particularly legacy landfills, often already capture methane or landfill gas and produce electricity, but these sites often

have tremendous potential for solar production and wind energy as well.

As the brownfield and landfill remediation and redevelopment market matures, there is an increasing realization that it is not enough to simply remediate a site or bring it back into productive use. Both the remediation process, as well as the end use, should be sustainable.

The Time is Right for Solar

By now, it is obvious that solar energy is more than just a trend. According to the U.S. Department of Energy (DOE), solar energy is a rapidly expanding industry with double-digit annual growth in the United States. The DOE supports the U.S. industry's manufacture, production and distribution of solar power in order to make the technology cost competitive with conventional sources of energy. The DOE has committed approximately \$120 million in American Recovery and Reinvestment Act funding to accelerate widespread commercialization of clean solar energy technologies across America.

Once installed, a solar energy system requires no fuel, has no moving parts, produces no emissions, generates no waste products, reduces greenhouse gases, and reduces our dependence on coal and oil. Manufacturing solar power-generating equipment has minimal impact on the land. Couple solar energy's positive attributes with some of the inherent advantages of brownfield and landfill sites, and you get a perfect fit.



A solar photovoltaic facility now resides at a former landfill site in Fort Carson, CO.

The Brightfields Initiative

The DOE's Brightfields initiative specifically promotes the redevelopment of brownfields to solar technology sites to generate both clean energy and revenue for communities.

Brightfields is a revolutionary concept that addresses three of the nation's biggest challenges—urban revitalization, toxic waste cleanup and climate change—by bringing pollution-free solar energy and high-tech solar manufacturing jobs to brownfields. The Brightfields approach offers a range of opportunities to link solar energy to brownfields redevelopment, thereby transforming community hazards and eyesores into productive, green ventures.

This unprecedented campaign will help the United States put its hundreds of thousands of brownfields back into productive use. At the same time, this will create high-tech jobs in blighted urban neighborhoods, improve air quality and reduce greenhouse gas emissions.

Power and Potential

Closed landfills may be considered brownfield sites in some areas, particularly in older urban environments where the landfills are close to the city's urban core.

The characteristics of large closed landfills can often be quite advantageous for conversion to solar power production facilities. One project undertaken by the Environmental Protection Agency Brownfields Technical Assistance to Pilot Communities program involved a 300-acre closed landfill near Houston, Texas. The pilot evaluated the feasibility of installing solar panels on the closed Holmes Road landfill site with the intention of generating up to 10 megawatts of electricity from the installation. The result was a recommendation to install solar panels on 150 acres of the 300-acre site, yielding an estimated one megawatt for every 15 acres of panels installed, including space between panels and other equipment to avoid row-on-row shading.

One of the largest landfill owners and operators in the U.S., Republic Services, recently implemented a project at the active Tessman Road Landfill in San Antonio, Texas. The innovative project included covering a closed portion of the site with synthetic geo-membrane, then affixing flexible laminate solar panels. The cover with the adhered solar panels was placed on the top deck and south-facing slopes of the site. Combined with the site's already active LFGE system, the panels are producing 9 megawatts of power for onsite use to operations of the still-active portion of the landfill. This is reportedly enough electricity production to provide power to over 5,200 homes.

One Florida utility is operating a demonstration solar photovoltaic system on a closed landfill in Sarasota. Its system, which utilizes 1,200 flat panels laid directly on the landfill geo-membrane cover, provides 250 kilowatts of power to the grid and covers about 28,000 square feet.

Considerations for Converting Landfills

It is important to note that the feasibility of solar or other renewable energy projects does not hinge on the availability of large sites. While it is certainly helpful to have a large site to work with, there are a number of circumstances where smaller sites are viable and can provide power for niche or specialized uses.

When considering installing a solar system on a large brownfield or closed landfill site, there are many important issues and questions to address beforehand.

Funding Sources and Economics

First, determine the best way to finance the project and identify where the capital will come from. Identify the average cost of energy in the relevant market and see if there is an approximate grid parity between solar and conventional sources. If there is not grid parity, are there incentives or regulatory drivers that overcome parity issues?

Nature of Real Property Transaction

Is the project subject to a long-term ground lease or an actual sale? Generally large scale photovoltaic or solar power generation projects tend to focus on a negotiated power purchase agreement with an offsite utility. These types of arrangements often lead to long-term ground leases with a portion of the monies generated through the sale of the electricity given to the land owner.

Zoning and Entitlements

What are the underlying zoning requirements, and will they support a solar project without a zoning change or major use permit? What entitlements are necessary to



The former Bethlehem Steel plant in Lackawanna, NY is now home to a wind farm.

develop the project, what are their costs and what is the timing? Will an environmental analysis—such as an Environmental Impact Report, Environmental Impact Statement or a finding of no significant impact—be required? In California, the California Solar Rights Act (AB2473) could significantly reduce time spent obtaining permits and the costs of zoning and entitlements for a solar project.

Environmental Liabilities and Indemnity

How will environmental liability be addressed? For example, if a solar operator is on a long-term ground lease and an enforcement order is issued, will an indemnity be provided and how will that indemnity be guaranteed? Or if the solar operator takes ownership of the brownfield, how will they protect themselves from claims and expenses that result from agencies or third parties?

Site Characteristics

Is the size adequate? In the case of a closed landfill, determine if it is old enough to have settled sufficiently to make the project feasible or whether additional engineering will be required. Where is the site and does it have sufficient year-round sunlight to make solar feasible? (To ensure your site is in an area considered generally suitable for solar power generation, see the EPA's Re-Powering America's Lands Google Earth Tool at www.epa.gov/renewableenergyland/mapping_tool.htm)

Power Uses and Proximity to Grid

Are the potential uses of the electricity only on-site or could the power be sold to a local utility? What is the closest grid location? Is it close enough to existing power lines to tie into the local power grid? Is there a clear avenue to structure a Power Purchase Agreement with the local utility off-taker? For sites in California owned by a county or municipal agency, this type of agreement may not be required for projects that produce less than 1 MW of power.

Other Considerations

Establish the best way to coordinate the various parties, including owners, permitting agencies, cities, utilities, solar developers and installers. Are Renewable Energy Credits available, and if so, how can they be obtained? Identify the critical path and feasibility of obtaining required permits? This should be planned in advance and evaluated as part of the feasibility analysis. How the existing operating or post closure care permit will be affected should also be considered.

Lastly, if you are owner and are considering issuing a request for proposals or letters of interest for solar projects, it is recommended that a thorough feasibility study of your potential project be completed prior to taking it to market. This will help you avoid potential deal-breakers, such as lease terms insufficient to ensure projects are viable and capture necessary rates of returns, or obvious roadblocks that could result in your request for proposals failing to generate any interest.

Summary

Alternative energy production on brownfield sites and closed or partially closed landfills is an initiative with significant momentum, government support and community relations benefits. Like in the early years of brownfield development, coordinating many parties and getting stakeholder buy-in is essential to a successful project.

With the political and financial incentives now available, landowners and businesses desire to create positive community outcomes, and grow the alternative energy industry in the U.S. and abroad. Now is the right time to capitalize on “green on brown” projects by taking advantage of renewable energy projects on brownfield sites.



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