Solar Power Installations on Contaminated Lands:
Community Benefits and Regulatory Considerations

Kelly Anderson

As the demand for new land rises across the United States, closed landfills and other brownfield sites[1] are becoming increasingly valued for their development potential.[2] Additionally, national requirements for renewable energy expansion are at an all-time high.[3] As recently as 2008, the U.S. Environmental Protection Agency (EPA) identified upwards of 11,000 contaminated sites nationwide, encompassing nearly 15 million acres, with potential for the development of renewable energy projects, such as solar farms.[4] Several environmentally beneficial reasons exist for developing contaminated sites, including closed landfills, into areas for harvesting renewable energy. These reasons include, but are not limited to, the encouragement of environmental sustainability, enhancement of landfill area functions, addition of renewable energy systems to the community, and reduction of greenhouse gas emissions.[5] As communities increase their awareness of the environmental impacts associated with the use of fossil fuels, the role of renewable energy technologies in future electricity production will increase.[6] Thus, identifying and effectively utilizing land in areas with high-quality renewable

[1] The term "brownfield site" refers to real property, the expansion, redevelopment, or reuse of which may be impeded by the existence or potential presence of a pollutant, contaminant, or other hazardous substance. *See* U.S. ENVIRONMENTAL PROTECTION AGENCY, *Brownfields and Land Revitalization, available at* http://epa.gov/brownfields/overview/glossary.htm.
[2] GABRIEL SAMPSON, SOLAR POWER INSTALLATIONS ON CLOSED LANDFILLS: TECHNICAL AND REGULATORY CONSIDERATIONS, (2009), *available at* http://www.clu-in.org/download/techdrct/Sampson_Solar%20Power_Sept2009.pdf.
[3] U.S. ENVIRONMENTAL PROTECTION AGENCY, *RE-Powering America's Land: Siting Clean and Renewable Energy on Contaminated Lands and Mining Sites: Solar Technologies*, *available at* http://www.epa.gov/renewableenergyland/docs/repower_technologies_solar.pdf
[4] *Id.*
[5] Berrin Tansel, *Solar Energy Harvesting at Closed Landfill Sites*, KNOVEL (Nov. 10, 2010), http://engineeringcases.knovelblogs.com/2010/11/10/solar-energy-harvesting-at-closed-landfill-sites/.
[6] U.S. ENVIRONMENTAL PROTECTION AGENCY, *Siting Clean and Renewable Energy on Potentially Contaminated Land and Mine Sites: Fact Sheet* (2008), *available at* http://www.epa.gov/renewableenergyland/docs/repower_contaminated_land_factsheet.pdf.

energy resources is an essential part of current renewable energy development.[7] The strategy of developing solar farms on formerly contaminated lands is a burgeoning modern movement with the potential to greatly impact national renewable energy output and brownfield development.

In order to better understand this new movement in the world of renewable energy development, it is important to consider the various regulatory issues and incentives relating to the construction of solar facilities on contaminated sites. Federal, state, and local regulations and land-use motivations play a substantial, constantly evolving role in the construction and implementation of these projects. Important regulatory issues to consider when developing a contaminated land site for renewable energy include site assessment and cleanup, environmental permitting of renewable energy projects, federal permitting and compliance, state requirements, local utility interconnection requirements, local land use, and local utility sector permitting and licensing of renewable energy projects.[8] Despite myriad regulatory considerations and potential obstacles, contaminated land shows considerable promise for national increase in renewable energy generation and solar energy development in particular.

I. Using Contaminated Land to Meet Increasing Renewable Energy Demands

The EPA Office of Solid Waste and Emergency Response (OSWER) encourages the use of contaminated sites for the development of new renewable energy projects.[9] As stated above, there are an estimated 15 million acres of EPA-tracked, contaminated properties nationwide, including Superfund sites, brownfields, and lands covered under the Resource Conservation and

---

[7] *Id.*
[8] *RE-Powering America's Land: Frequently Asked Questions on Renewable Energy on Contaminated Land and Mine Sites*, U.S. ENVIRONMENTAL PROTECTION AGENCY, http://www.epa.gov/renewableenergyand/faq_info.htm (last updated Nov. 4, 2011).
[9] U.S. ENVIRONMENTAL PROTECTION AGENCY, *Siting Clean and Renewable Energy on Contaminated Lands and Mining Sites*, *available at* http://www.epa.gov/renewableenergyland/docs/clean_renewable_energy.pdf.

Recovery Act (RCRA).[10] Cleanup goals have been negotiated and controls established to provide long-term protection for more than 917,000 of those 15 million acres.[11] Thus, through the coordination and cooperation of developers with federal, state, and local governments, countless renewable energy sites could be established on these potentially contaminated properties.[12]

OSWER, through their Re-Powering America's Lands Initiative, recognizes several key benefits that communities and developers may realize for constructing renewable energy facilities on contaminated lands.[13] First, contaminated properties offer thousands of acres of vacant space for solar installations that are less likely to cause concern in local communities regarding aesthetic impacts.[14] Communities suffering negative impacts from local contaminated lands are often motivated to restore those sites and are therefore less likely to reject a project idea simply for aesthetic reasons.[15] Hence, a second positive impact of these developments is the cleanup of these sites and their return to productive use, subsequently improving environmental quality for residents in the area.[16]

Economic benefits abound from the reuse of these contaminated lands. Redeveloping landfills and other brownfield sites with renewable energy systems is particularly economically viable in areas with significant cleanup costs or low demand for real estate development.[17] Without these energy projects, the land would remain vacant.[18] Because of the low demand for real estate development on brownfields, they are more economically viable for renewable energy

[10] U.S. ENVIRONMENTAL PROTECTION AGENCY, *supra* note 6.
[11] *Id.*
[12] *Id.*
[13] U.S. ENVIRONMENTAL PROTECTION AGENCY, *supra* note 8.
[14] U.S. ENVIRONMENTAL PROTECTION AGENCY, *supra* note 6.
[15] U.S. ENVIRONMENTAL PROTECTION AGENCY, *supra* note 8.
[16] *Id.*
[17] *Id.*
[18] *Id.*

development than non-contaminated areas.[19] Siting renewable energy facilities on contaminated land reduces the pressure for development on greenfields and agricultural land.[20] This decreased pressure results in the preservation of the land carbon sink[21], increased greenfield protection, and overall better environmental quality.[22] Finally, many contaminated sites already have infrastructure in place, such as transmission lines, substations, and buildings that can be reused or altered, instead of incurring the cost of new infrastructure.[23]

II. Regulatory Challenges

Electricity produced by renewable energy projects, such as solar farms, on contaminated lands can be used onsite to meet the needs of the landfill operations or sold/credited for use offsite.[24] However, solar power developers face multiple federal regulatory challenges when placing solar systems on contaminated lands, particularly on brownfields or Superfund sites.[25] Required permitting, land use ordinances, and liability uncertainties further complicate these regulatory challenges.[26] The primary national legislation that regulates and enables renewable energy development on contaminated sites is the Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).[27] These acts address contaminated properties with actual or potential impacts on

[19] U.S. ENVIRONMENTAL PROTECTION AGENCY, *supra* note 6.
[20] U.S. ENVIRONMENTAL PROTECTION AGENCY, *supra* note 8.
[21] U.S. ENVIRONMENTAL PROTECTION AGENCY, *supra* note 6.
[22] U.S. ENVIRONMENTAL PROTECTION AGENCY, *supra* note 8.
[23] *Id.*
[24] Sampson, *supra* note 2.
[25] *Id.*
[26] *Id.*
[27] *Id.*

public health or the environment, in cases where federal cleanup and restoration are likely required.[28]

Permitting is a key regulatory challenge to the successful construction of solar farms on contaminated sites.[29] The majority of landfills are subject to regulations under Subtitle D of RCRA.[30] While the EPA provides minimum national technical criteria, the planning, permitting, regulation, implementation, and enforcement of waste under Subtitle D are delegated to state and local governments.[31] As a result, permit requirements for post-closure landfill use can vary greatly from state to state.[32] Additionally, if a landfill was not appropriately closed, according to state requirements, a closure permit may be required prior to the application of a post-closure permit.[33]

For example, North Carolina permit requirements incorporate the federal rules for closure and post-closure use of hazardous waste treatment, storage, and disposal facilities (TSDFs).[34] Owners and operators of various types of TSDFs must meet the general closure and post-closure standards, as well as North Carolina standards specific to their facility.[35] Furthermore, project planners must remain cognizant of the state-specific rules and specific capacity limits imposed on small generator interconnection to the electricity grid.[36] Interconnection standards, including timelines, applications, fees, and legal agreements, can vary by state.[37] While North Carolina,

---

[28] U.S. ENVIRONMENTAL PROTECTION AGENCY, *Siting Renewable Energy on Contaminated Properties: Addressing Liability Concerns*, (March 2011), *available at* http://www.epa.gov/compliance/resources/publications/cleanup/brownfields/re-liability.pdf.
[29] Sampson, *supra* note 2.
[30] *Managing Non-Hazardous Municipal and Solid Waste (RCRA)*, U.S. ENVIRONMENTAL PROTECTION AGENCY. http://yosemite.epa.gov/r10/owcm.nsf/RCRA/nonhaz_waste (last updated Oct. 12, 2011).
[31] *Id.*
[32] *Id.*
[33] Sampson, *supra* note 2.
[34] 15A NCAC 13B.1627 (closure and post-closure requirements for MSWLF Facilities).
[35] *Environmental Permit Assistance*, NC DENR, http://portal.ncdenr.org/web/deao/ea/pa/permit-information (last visited Dec. 21, 2011).
[36] Sampson, *supra* note 2.
[37] *Id.*

along with ten other states, currently has no limit for interconnection to the grid, many other states do limit the system capacity in kilowatts (kW) for investor-owned utilities.[38]

Final regulatory considerations to look into when planning a project on a brownfield or Superfund site are the adverse impacts of potential liability under CERCLA.[39] Most contaminated lands that are currently under consideration for renewable energy development projects are subject to CERCLA requirements because they are located on brownfields or Superfund sites that have previously been cleaned up or are in the cleanup process.[40] Prior to the Small Business Liability Relief and Brownfields Revitalization Act ("Brownfields Law") of 2002, potential liability under CERCLA was a more serious consideration. Potential developers not responsible for the contamination of the land, but with an interest in redeveloping the sites, were discouraged by liability uncertainties and financing difficulties.[41] However, the Brownfields Law enacted new liability protection for certain parties, including innocent landowners, contiguous property owners, and units of state or local governments that acquire the land, seeking to develop these contaminated properties.[42]

States can also play a vital role in offering liability protection in brownfields development, particularly by aiding developers in the navigation of liability regulations laid out in CERCLA.[43] The North Carolina Brownfields Property Reuse Act of 1997 does just that, acting as legislation for a state brownfields program detailing agreements between developers

[38] *Interconnection Standards*, DSIRE SOLAR, http://www.dsireusa.org/solar/solarpolicyguide/?id=18 (last visited Dec. 21, 2011).
[39] *Brownfields and Land Revitalization: Summary of the Small Business Liability Relief and Brownfields Revitalization Act,* U.S. ENVIRONMENTAL PROTECTION AGENCY, http://www.epa.gov/brownfields/laws/2869sum.htm (last updated Oct. 4, 2011).
[40] Sampson, *supra* note 2.
[41] U.S. ENVIRONMENTAL PROTECTION AGENCY, *supra* note 28.
[42] Sampson, *supra* note 2.
[43] *Id*.

and the North Carolina Department of Environment and Natural Resources (DENR).[44] Under this agreement the prospective developer agrees to comply with DENR requirements deemed essential for the proposed reuse of the property.[45] In return DENR limits the liability of the developer to only include the actions set forth in the agreement and the developer is not liable for any previous contamination of the site.[46]

Since 2008, all states have enacted manifold procedures or policies limiting potential liability of new owners or lessees of contaminated properties.[47] State cleanup programs, such as Superfund, brownfields, and voluntary cleanup (VCP), attend to the majority of properties that require cleanup projects.[48] Additionally, many states have entered into a memorandum of agreement (MOA) with EPA detailing the suitable use of their VCPs.[49] While these MOAs do not change the legal rights and responsibilities of contaminated property owners, they do include enforcement assurances from the EPA that it will not initiate enforcement actions related to contaminated properties under state VCP programs.[50] However, as a general rule, the specific facts and circumstances of each case determine whether or not a purchaser or lessee will qualify for state or federal liability protection.[51]

III. North Carolina Implementation

A leading example of solar panel installations on a closed landfill is the Evergreen Solar Farm, located in Haywood County, North Carolina.[52] Evergreen Solar Farm is a collaborative

[44] U.S. ENVIRONMENTAL PROTECTION AGENCY, *supra* note 28.
[45] *Id.*
[46] *Id.*
[47] U.S. ENVIRONMENTAL PROTECTION AGENCY, *supra* note 28.
[48] *Id.*
[49] *Id.*
[50] *Id.*
[51] *Id.*
[52] *Western North Carolina's Largest Solar Array Is Now Online*, ELECTRICNET (March 10, 2010), http://www.electricnet.com/article.mvc/Western-North-Carolinas-Largest-Solar-Array-0001.

project between Asheville-based FLS Energy (developer), Progress Energy Carolinas (electricity purchaser), and Evergreen Packaging paper plant (landfill property owner).[53] One of the first large-scale solar panel systems in the country to occupy landfill space,[54] Evergreen Solar Farm is comprised of 2,340 solar panels on a four-acre plot of land[55] and is expected to generate approximately 800,000 kWh of electricity annually.[56] This roughly equates to the annual electricity demand of 51 average North Carolina homes.[57] Carbon dioxide emissions are expected to decline by roughly 525 tons annually, the equivalent of removing 100 vehicles from North Carolina roads, as a result of this project.[58] While the project cost approximately $5 million to set up and construct, Progress Energy contracted to buy the power generated from Evergreen Solar Farm at a fixed rate over a 20-year time period, thereby allowing for FLS to break even after the first 10 years of operation.[59]

IV. Conclusion

As energy demands and greenhouse gas levels rise in an increasingly populated world, it is becoming more important to use our resources, land and energy included, wisely. By combining the use of renewable energy sources, such as solar power, and the re-use of brownfield sites, we both decrease our reliance on non-renewable sources of energy and increase the available space for energy production. This strategy of establishing clean and renewable energy sources on previously contaminated lands is an expanding movement that is quickly

---

[53] Eric Seeger, *Evergreen Solar Farm: Western North Carolina's first solar field makes good use of wasted space*, WNC: MOUNTAIN LIVING IN NORTH CAROLINA, http://www.wncmagazine.com/feature/sustainability/evergreen_solar_farm.
[54] *Id.*
[55] Becky Johnson, *Tapping the power of the sun*, SMOKEY MOUNTAIN NEWS (March 3, 2010), http://www.smokymountainnews.com/news/item/958-tapping-the-power-of-the-sun.
[56] *Id.*
[57] *Western North Carolina's Largest Solar Array Is Now Online*, ELECTRICNET (March 10, 2010), http://www.electricnet.com/article.mvc/Western-North-Carolinas-Largest-Solar-Array-0001.
[58] *Id.*
[59] *Id.*

being recognized at all levels of government. While divergent requirements by state and local governments lead to frequent complications regarding solar energy development on landfills, projects such as the Evergreen Solar Farm are slowly springing up across the country as they are recognized for their unique and valuable energy output potential. It is imperative that federal and state governments continue to focus on effective regulatory collaboration, enabling future developers to take advantage of the current pro-development federal regulatory climate.