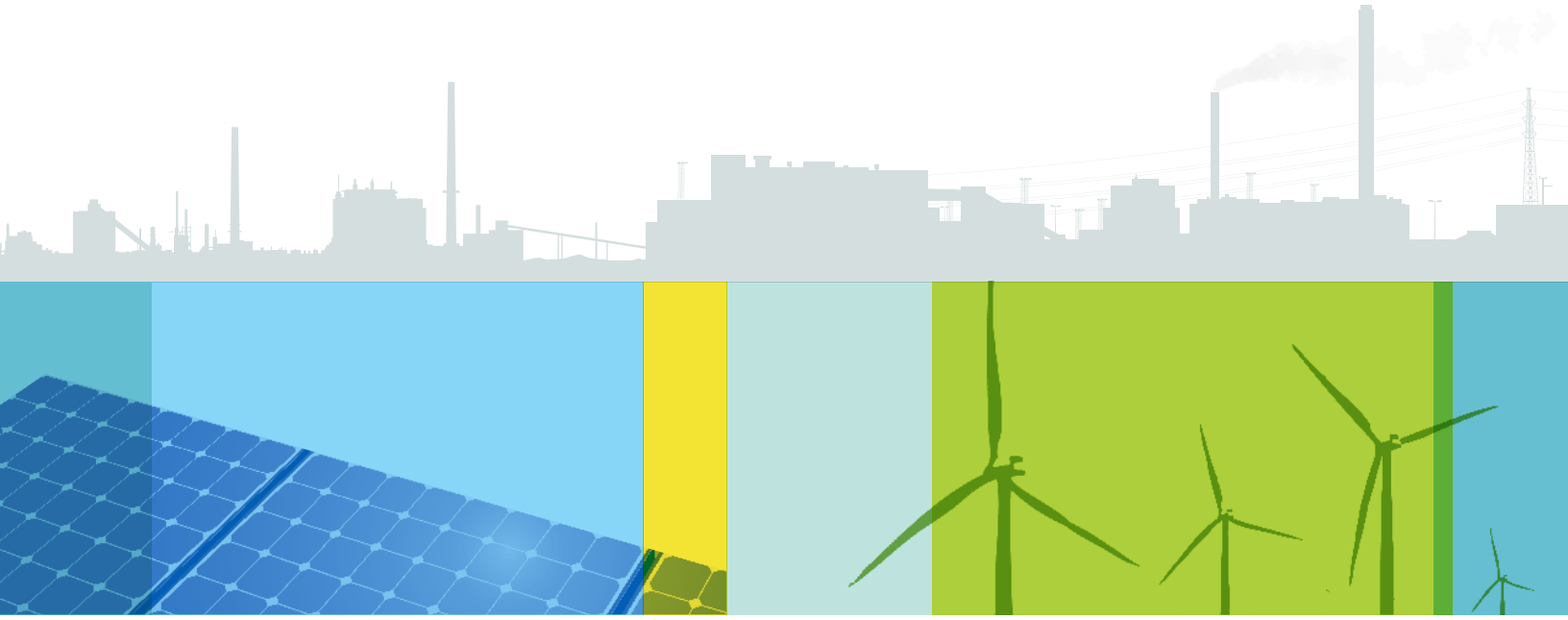

Cultivating Green Energy on Brownfields

A Nuts and Bolts Primer for Local Governments

NALGEP
National Association of Local Government Environmental Professionals

About the National Association of Local Government Environmental Professionals

Founded in 1993 by a group of local officials, NALGEP is a non-profit national organization representing local government professionals responsible for environmental compliance and the development and implementation of local environmental policy. NALGEP's membership includes more than 200 local government entities located throughout America. NALGEP brings together local environmental officials to network and share information on innovative practices, conduct environmental policy projects, promote environmental training and education, and communicate views on national environmental issues. NALGEP is conducting projects on a wide range of environmental issues including brownfields, smart growth, energy conservation, and climate change.

NALGEP launched the Brownfield Communities Network in 2004 to build connections among community leaders promoting the reuse of contaminated property. Guided by an Advisory Council of the nation's local brownfield leaders, the Network is working to harness the knowledge, expertise, and experience of the nation's leading brownfield communities and export it to their peers. The Brownfield Communities Network promotes brownfield cleanup and reuse by providing a forum for communities to overcome barriers and share lessons learned regarding tools, strategies, resources, and partnerships; providing technical assistance and training to local communities and other stakeholders; showcasing examples of successful local brownfield programs and projects; developing new approaches to overcome obstacles to brownfield reuse; and communicating the views of local communities on state and national brownfield issues. Membership in the Brownfield Communities Network is free, for more information visit: www.nalgep.org/issues/brownfields/.

NALGEP is managed by Spiegel & McDiarmid LLP, a national law firm located in Washington, DC. For more information on NALGEP, visit www.nalgep.org or contact nalgep@spiegelmcd.com.

Acknowledgments

This primer was developed by NALGEP with the assistance of Spiegel & McDiarmid LLP under a grant awarded by the U.S. Environmental Protection Agency's Office of Solid Waste and Emergency Response. The authors are grateful for the advice of the NALGEP Board of Directors and staff at the U.S. EPA. The authors would also like to thank Jesse Silverstein, Joe Bourg, Miles Ballogg, George Carico, Dave Graham, Beth Lander, Roger Register, and Ron Smedley for sharing information about their own involvement with developing renewable energy on brownfields and Angela Conroy and EPA's RE-Powering America's Land Initiative for sharing project photographs.

Disclaimer

This primer is intended for educational and information purposes only. The contents do not constitute legal advice or a legal opinion, and do not necessarily reflect the views or policies of the U.S. EPA. Mention of companies, government policies, projects, and/or commercial products does not constitute an endorsement or a recommendation for use or adoption. Readers are strongly encouraged to consult with relevant federal and state agencies and knowledgeable attorneys prior to engaging or investing in developing renewable energy on a brownfield to obtain advice with respect to any particular site, issue, or problem.

January 2012

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Exelon City Solar
Location: Chicago, Illinois, *Size:* 10 MW

Executive Summary

As many local government officials know all too well, the presence of a brownfield can have multiple negative effects in a local community—creating an eyesore, raising concerns about environmental contamination and public health, and depressing surrounding real estate values. Developers may be reluctant to redevelop brownfields because of uncertainty relating to remediation requirements and timelines, and because of the perceived onus of environmental liability. Limited redevelopment options can compound these problems, causing brownfields to remain idle for years, magnifying their negative effects in the communities where they exist. Recently, however, expanding markets for renewable energy resources have created promising new opportunities for brownfields redevelopment—opportunities that local governments are in a unique position to take advantage of.

Brownfields:
are generally defined as "real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant." Small Business Liability Relief and Brownfields Revitalization Act, 42 U.S.C. § 9601(39).

While this primer often refers generically to "brownfields," it provides information relevant to the development of renewable energy facilities on a wide variety of blighted, contaminated, or potentially contaminated sites, including petroleum brownfields, capped landfills, abandoned mines, and former commercial, industrial, or agricultural properties whether or not these sites satisfy the statutory "brownfield" definition.

This paper offers a primer for local governments interested in investigating whether renewable energy development may be the right choice for brownfields in their communities. This primer is not intended to serve as a step-by-step guide to the development of a renewable energy project on a brownfield for the simple reason that the process for developing a renewable energy project will depend on site specific factors. Rather, it provides a starting point for local governments to consider whether renewable energy facilities may be appropriate for local brownfield sites, tools to help navigate the economic issues that determine whether a particular project is feasible, and information about how permitting, zoning, siting, liability, and other regulatory issues affect the development of renewable energy on brownfield sites. Throughout, the paper provides examples of local government experiences with renewable energy on brownfield project development, resources where more information can be found, and suggestions for how local governments can foster the development of renewable energy on brownfield sites in their communities–highlighting the unique role that local governments can play.

The primer is divided into three parts. Part I provides an overview of renewable energy technology options for brownfield site development, including wind, solar, and biomass facilities, and describes considerations that will influence the kind of technology that is appropriate for a particular site. It also addresses other site-specific factors that can influence project feasibility, including the proximity of a site to existing transmission and transportation infrastructure and the status of environmental remediation. For those interested in evaluating the suitability of particular brownfield sites, Part I points local governments to existing tools and resources that can help with the site screening and assessment process, including maps, geographic information system ("GIS") screening tools, and technical assistance programs.

Part II deals with the economic feasibility of project development, which is a central issue in completing the development of a renewable energy project on a brownfield. Economic feasibility can vary substantially by state as it depends not only on the size of a project and the resource potential of a particular site, but also on the laws, markets and incentive programs that exist in the area where a project is being developed. Part II explains how these latter factors can influence the market value of the energy and renewable energy credits produced by a project, and how power purchase agreements, net metering arrangements and other transaction structures are typically utilized in the development of renewable energy projects on brownfields. Part II also discusses the landscape of federal and state renewable energy and brownfield redevelopment incentive programs, recognizing that shifting state and federal funding priorities may affect the availability of such government incentives.

Part III provides suggestions for how local governments can promote the development of renewable energy projects on brownfields in their communities. These proactive steps include ways in which local governments can become directly involved in project development, such as by spearheading projects, creating and participating in development partnerships, or purchasing renewable energy project power, as well as ways in which local governments can promote development through indirect means, such as offering tax breaks and other financial incentives, or minimizing permitting and zoning hurdles.

Finally, the Appendix to the primer provides a short guide to resources local governments can consult for more information about developing a renewable energy project on a brownfield. Entries in the Appendix range from periodical materials to links to organizations that provide technical or financial assistance. Each Appendix entry contains a description of the resource and, where applicable, website links.

Taken together, this primer and its Appendix can help local government officials get started in investigating the potential for developing renewable energy on brownfield sites and becoming active participants with the many other governmental and private partners who collaborate for the success of these projects.

Steel Winds
Location: Lackawanna, New York, *Size:* 20 MW

Fort Carson Solar Array
Location: Fort Carson, Colorado,
Size: 2 MW

Introduction

As renewable energy production has increased in popularity, the question of where new renewable energy facilities should be sited has emerged as a critical one with significant environmental consequences. Siting energy facilities on pristine or "greenfield" sites can compromise viewsheds and greenspace, impact ecosystems, and be met with strong community resistance. By encouraging development at previously-used sites instead, local governments can reduce these problems while attracting growth in already-developed areas and reducing exurban sprawl. As more state and local governments implement sustainability plans and strategies for reducing greenhouse gas emissions, renewable energy development on brownfields can also help in meeting the goals in these plans.

Against this backdrop, an emerging movement has developed to encourage the siting and construction of renewable energy facilities on brownfields and other blighted properties. As renewable energy developers discover the advantages of siting projects on brownfields (such as reduced land lease costs, pre-existing infrastructure, and nearby markets for project output), and communities seek to minimize construction in undisturbed locations, a growing number of renewable energy projects on brownfields are bringing benefits to communities around the country—including jobs, land lease and property tax revenues, royalty payments, and depending on the technology chosen, low-cost and/or emission-free electricity—as well as practical redevelopment options for otherwise idle properties.

Whether filling the role or roles of a landowner, regulator, community partner, or power purchaser, local governments are uniquely situated to encourage the growth of renewable energy projects on brownfields in their communities. This primer helps local governments navigate the considerations involved with determining the feasibility of integrating renewable energy components into brownfield redevelopment projects and provides concrete suggestions for ways in which local governments can foster the growth of these projects in their communities. For more information on any of the strategies, resources, or topics addressed in this paper, please see the attached resource guide or contact NALGEP.

Getting Started: The Decision To Develop

The decision to develop a renewable energy project at a brownfield site involves an assessment of, among other things, community needs, financial resources, and available incentives. The first step, however, is determining whether a local brownfield site is physically suitable for renewable energy development. Because each property must be analyzed individually to determine its suitability for renewable energy development, it is important for local governments to understand what kinds of renewable energy technologies are appropriate for what kinds of sites (which includes assessing the site's energy potential, i.e. the amount of energy that can be generated at a site) and how site-specific factors (such as cleanup status and proximity to existing infrastructure) can make a given site more or less attractive for renewable energy project development.

Renewable Energy at Work on Brownfields

The energy produced by a renewable energy facility on a brownfield can be used in a variety of ways. In some places, these facilities power (and reduce the costs of) ongoing site remediation, or power new buildings and other on-site development. Relatively larger brownfield sites can be home to utility-scale renewable energy plants that can supply the needs of larger customers, such as hospitals, municipal governments, or an electric utility, which can then use the power to serve its own customers. Communities across the country have integrated renewable energy facilities on brownfield sites in a variety of ways. For example:

The city of **Maywood, California,** installed a solar photovoltaic ("PV") system at a city-owned Superfund site that had been contaminated by a chemical mixing operation, and used the power generated for on-site groundwater and soil remediation. The new 3.4 kilowatt ("kW") PV system offsets approximately 3.3 tons of carbon dioxide emissions each year, and has reduced the city's electric utility bills enough to allow it to recover system costs by the end of the first year of operation.[1]

In **Lakewood, Colorado,** the state of Colorado and a coalition of seven local governments provided financial support to remediate contamination at a former shopping mall, paving the way for renewable energy development. After the environmental cleanup was complete, the developer converted the site into a new mixed-use development where parking meters are powered by solar panels, street lights are powered by wind turbines, and all of the electricity needed by the parking garages is provided by a 1.75 megawatt ("MW") array of solar PV panels installed on top of the parking structure roofs.[2]

At the Exelon City Solar project in **Chicago, Illinois,** Exelon installed more than 30,000 solar PV panels on a former industrial site in the West Pullman area that had been vacant for more than thirty years. The project generates 14,000 megawatt-hours ("MWh") of renewable electricity per year, and displaces approximately 15,000 tons of greenhouse gases. In addition to new land lease revenues for the city, the project also generates local operations, maintenance and security jobs.[3]

The development of larger projects that generate power for off-site use is a slightly more involved process, as among other things it requires securing a buyer or buyers for project output and an interconnection agreement with the owners or operators of local transmission facilities. Because municipalities may not have the in-house capability to handle these more complicated arrangements, they will often work with a renewable energy project developer that will construct, own, and/or operate the generation facility. These and other considerations for local governments evaluating the feasibility of grid-connected renewable energy facilities on brownfields are discussed in further detail below.

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1 Office of Solid Waste and Emergency Response ("OSWER"), U.S. Environmental Protection Agency ("EPA"), Pemaco Superfund Site (Nov. 2009), *available at* http://www.clu-in.org/greenremediation/profiles/subtab_d25.pdf. For more information on using renewable energy systems for remediation, visit EPA's website on Contaminated Site Cleanup Information("CLU-IN") at http://www.clu-in.org/greenremediation/.

2 OSWER, U.S. EPA, RE-Powering America's Land: Siting Renewable Energy on Potentially Contaminated Land and Mine Sites, Belmar Mixed Use Development, Lakewood, Colorado Success Story (Mar. 2009) ("Belmar Success Story"), *available at* http://www.epa.gov/oswercpa/docs/success_belmar_co.pdf.

3 Exelon City Solar, Exelon Corporation (Oct. 21, 2011), http://www.exeloncorp.com/powerplants/exeloncitysolar/Pages/Profile.aspx.

Renewable Technology Options for Brownfield Sites

WIND

The relative cost-competitiveness and widespread availability of wind makes it an attractive option for many brownfield sites.[4] Due to existing constraints in turbine technology and the effects of surrounding infrastructure on wind patterns, wind resource potential[5] tends to be higher in open spaces (although some wind projects have been sited in urban areas[6]). According to the National Renewable Energy Laboratory ("NREL"), the best locations for wind projects are in the Western half of the country, the Northern and Central Appalachian range, and the Great Lakes region.

Small wind turbines (generally considered to be those that produce less than 100 kW[7] of power) can be placed on rooftops, making them good candidates for brownfield locations with on-site buildings. While less cost-effective than large turbines, small turbines have the advantage of being operable at low wind speeds and in small spaces, and are typically used to provide energy for on-site uses. Small wind projects are generally sited in areas with Class 2 wind or higher, though some locations with Class 1 winds may be suitable as well.[8]

Large wind turbines, which usually produce in excess of 100 kW (and may produce up to several megawatts of electricity), can be used either individually for on-site energy consumption, or in groups of multiple wind turbines, referred to as wind farms, to deliver power to the electrical grid or a neighboring community. Strong brownfield candidates for large-scale wind projects have more than fifty acres per MW of installed capacity, less than a twenty percent slope, and are graded at wind resource Class 4 or higher.[9]

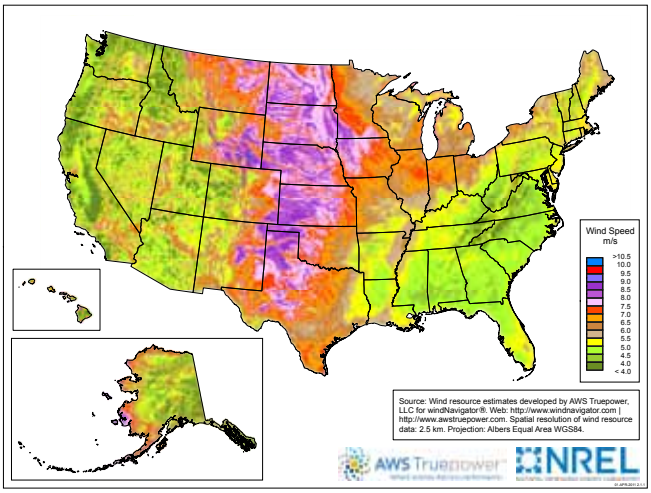

Figure 1. AWS Truepower, LLC, United States – Annual Average Wind Speed at 80 m (Apr. 1, 2011), *available at* http://www.windpoweringamerica.gov/pdfs/wind_maps/us_windmap_80meters.pdf. Individual state wind resource maps can be found at 80-Meter Wind Maps and Wind Resource Potential, NREL (Oct. 19, 2011), http://www.windpoweringamerica.gov/wind_maps.asp#us.

4 National Renewable Energy Laboratory, Report No. PO-640-40844, Renewable Energy Potential for Brownfield Redevelopment Strategies (Nov. 2006), *available at* http://www.nrel.gov/docs/fy07osti/40844.pdf.

5 *Id.* Wind power resource potential is reported based on wind speed or wind "class." Wind resource potential maps depict the wind speed or class at a particular height above the ground with wind speed measured in meters per second ("m/s") and wind class calculated based on the mean wind power density (Watts/meter squared or W/m2) at the specified height. Higher wind speeds have a greater potential to generate energy; similarly, Class 1 winds have the lowest potential to generate energy, while Class 7 winds have the highest.

6 For example, in the Belmar Mixed Use Development, wind turbines are used to power street lights in the development. *See* note 2, Belmar Success Story.

7 For a discussion on determining actual power production based on the rating (i.e. the stated kilowatts or megawatts) of a generating project, *see* Bob Bellemare, What is a Megawatt?, UtiliPoint International, Inc. (June 24, 2003), http://www.utilipoint.com/issuealert/print.asp?id=1728.

8 *See* note 5 for a discussion on wind classes.

9 *Id.*

SOLAR

Photovoltaic systems are also a popular choice for brownfield redevelopment. According to NREL, nearly all of the United States has adequate sun for PV installation.[10] PV systems consist of a series of panels[11] that can be mounted on roofs (a good fit for sites with buildings), on poles (such as on streetlights or parking meters), on the ground (anchored either in the ground or on ballasted materials), or on a geomembrane.[12] Ground-mounted PV projects typically require four to twelve acres of land per megawatt of installed capacity. PV systems can be mounted on a fixed axis, on a tilt that is adjusted to take advantage of seasonal changes in sunshine, or on single- or dual-axis trackers that automatically follow the daily path of the sun.[13] Of these options, sun-tracking systems produce the highest overall annual levels of electricity output. They are also initially more expensive[14] and require more space and maintenance. Because tracking systems tend to be heavier and require deeper foundations than fixed axis or adjustable tilt systems, they can also raise engineering complications when sited on roof-tops or closed landfills.[15] PV projects are frequently used to power the remediation of contaminated brownfields, but can also be built at utility-scale.[16]

Although PV solar power is substantially more common, Concentrating Solar Power ("CSP") facilities may be appropriate for some contaminated lands. CSP technology makes use of mirrors and reflectors to concentrate sunlight and heat a liquid medium which produces steam to generate electricity. The economic viability of CSP projects depends on sites located in high solar resource areas, at least 40 acres in size and with significant access to water resources.[17] CSP resource potential is strongest in the southwestern part of the country.

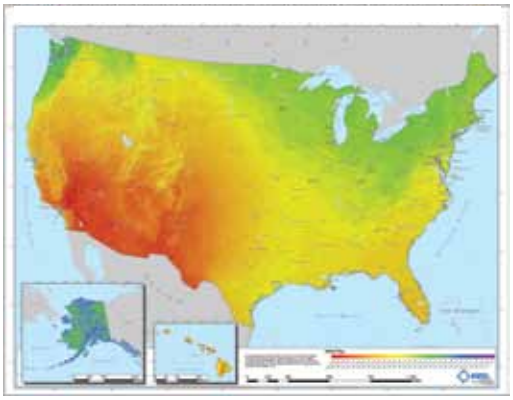

Figure 2. NREL, United States Photovoltaic Solar Resource: Flat Plate Tilted at Latitude (Jan. 23, 2008), *available at* http://www.nrel.gov/gis/images/map_pv_national_hi-res.jpg.

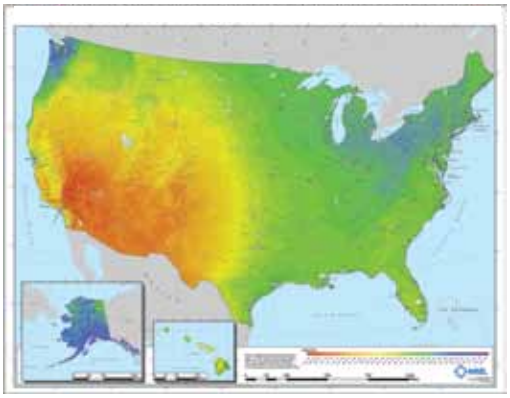

Figure 3. NREL, United States Concentrating Solar Power Resource: Direct Normal (Jan. 23, 2008), *available at* http://www.nrel.gov/gis/images/map_csp_national_hi-res.jpg.

10 The Federal Energy Management Program ("FEMP") and NREL have published cost-effectiveness maps which show the viability of solar PV projects with and without existing incentives in various regions of the country, as well as how long it will take to recover investments in solar projects against the backdrop of existing incentives. The maps can be accessed at http://www.nrel.gov/gis/femp.html. Part II of the primer provides a discussion of the economic feasibility and financing of renewable energy on brownfield projects.

11 Panels can be manufactured out of either bulk or thin-film materials. Both types of PV cells have been used for brownfield renewable energy projects.

12 Mounting PV panels directly onto a geomembrane is a relatively new solar technology that serves the dual purpose of capping a landfill while producing solar energy. For example, at the Hickory Ridge Landfill in Conley, Georgia, a 1 MW solar array was installed directly onto the landfill cover. The costs for the array were offset by a $2 million state grant. *See* Chris Meehan, *Flexible Solar Offers Georgia Landfill a Second Chance*, Clean Energy Authority (Oct. 6, 2011), *available at* http://www.cleanenergyauthority.com/solar-energy-news/flexible-solar-offers-georgia-landfill-a-second-life-100611/.

13 These options do not apply to PV systems mounted on geomembranes. *See id.*

14 Based on the rating of a system, a sun tracking system is more expensive than a comparable fixed tilt system (i.e. on a $/W basis); however, as sun tracking systems are more efficient (i.e. produce more MWh per year), the lifetime return on investment may be higher for sun trackers than for fixed tilt systems. Using the PVWatts calculator, discussed further on page 9, parties can compare the energy output and value of a fixed versus tracking systems at a specific location.

15 Gabriel Sampson, Solar Power Installations on Closed Landfills: Technical and Regulatory Considerations (Sept. 2009), *available at* http://www.clu-in.org/download/techdrct/Sampson_Solar%20Power_Sept2009.pdf.

16 *See* note 4.

17 Similar to conventional thermoelectric energy technologies (i.e. coal or nuclear), which also generate electricity through the production of steam, most CSP technologies require water for cooling purposes.

BIOMASS

Biomass generation plants convert the energy potential from once living organisms (such as crops, wood, and organic waste in landfills) into useable electricity. Biomass plants are particularly well suited for landfills, water treatment facilities, and agricultural facilities, as these sites are often contaminated by a waste source that naturally produces anaerobic gases as it decomposes. The gas produced at these sites can be captured and used to generate electricity through gas turbines or fuel cells. Brownfield sites can also be used to host biopower facilities that utilize crop or wood residues (either collected at the brownfield site or imported from surrounding areas) to be burned to produce electric power.[18]

OTHER TECHNOLOGY OPTIONS

Other renewable technology options that may be suitable for redevelopment on brownfields include small hydroelectricity projects and geothermal facilities. Hydroelectric projects, which typically capture energy from falling water in order to produce electricity, can be appropriate for brownfields that have existing hydrologic resources and elevation drops, including abandoned mines and brownfields located in hilly or mountainous areas.[19] Most brownfield hydroelectric projects are small, but can be built at utility or community-scale if the resource is sufficient.

Geothermal facilities convert heat extracted from the earth into useable electricity,[20] and can be built on brownfield sites that are located above sufficient geothermal resources. To date, geothermal power plants are most prevalent in western states such as California and Idaho; nevertheless, non-western states, including, Florida, Louisiana, and Mississippi, also have areas with useable geothermal resources. With existing technology, geothermal power plants are typically considered economically viable when geothermal resources rise above approximately 212 degrees Fahrenheit or are found at depths no greater than four kilometers.[21]

New Revenues and Reduced Costs

In addition to eliminating blight and creating opportunities for local jobs, renewable energy projects constructed on brownfields can bring local governments new revenues from land leases and/or property taxes, and provide them with protection against rising electricity costs. The Exelon City Solar project, for example, generates more than $100,000 a year in lease revenues for the **City of Chicago**. The town of **Greenfield, Massachusetts**, entered into a long-term power purchase agreement with renewable energy developer Axio Power in connection with the installation of a 2 MW photovoltaic array on a closed landfill. The town anticipates saving up to $250,000 in energy costs in the first year of the project's operations, in addition to the revenues generated by the land lease.[i] Similarly, the City of **Rifle, Colorado**, entered into a 20-year power purchase agreement with SunEdison in connection with the installation of a 1.72 MW photovoltaic system at a wastewater treatment facility. The contract rate allowed Rifle to obtain the resulting power at a fixed rate below what it was paying at the time for conventionally produced power.[ii] By entering into long-term contracts for project power, local governments can also help developers obtain financial assurances necessary to secure up-front capital from financiers, which can be helpful in getting projects off the ground.

i David Andrews and Robert Jackson, *Brownfields to Brightfields in Greenfield, Mass.*, Brownfield Renewal (Dec. 2010-Jan. 2011) ("Greenfield, Mass. Brightfields"), *available at* http://www.trcsolutions.com/Newsroom/Articles/Documents/Brownfields-Renewable-Mass.pdf.

ii OSWER, U.S. EPA, RE-Powering America's Land: Siting Renewable Energy on Potentially Contaminated Land and Mine Sites, New Rifle Uranium Mill Tailings Radiation Control Act Title I Site, Colorado (Feb. 2009), *available at* http://www.epa.gov/oswercpa/docs/success_newrifle_co.pdf.

18 *See Learning About Renewable Energy: Biomass Energy Basics*, NREL (Feb. 9, 2010), http://www.nrel.gov/learning/re_biomass.html *or Biomass Explained,* U.S. Energy Information Administration ("EIA") (June 1, 2011), http://www.eia.gov/energyexplained/index.cfm?page=biomass_home for more information.

19 For example, at the Summitville Mine Superfund site near Del Norte, Colorado, a 35 kW hydroelectric facility was completed in 2011 to partially power an onsite water treatment plant and reduce the costs of remediating legacy contaminants from the former gold and silver mining operations. OSWER, U.S. EPA, RE-Powering America's Land: Siting Renewable Energy on Potentially Contaminated Land and Mine Sites, *Summitville Mine*, Rio Grande County, Colorado Success Story (Jan. 2009), *available at* http://www.epa.gov/oswercpa/docs/success_summitvillemine_co.pdf; Summitville Mine, U.S. EPA Region 8 (Oct. 2011), http://www.epa.gov/region8/superfund/co/summitville/.

20 For more information about geothermal technologies, *see Learning About Renewable Energy: Geothermal Energy Basics*, NREL (Mar. 8, 2011), http://www.nrel.gov/learning/re_geothermal.html.

21 Under existing technology, in order for geothermal project to be economically viable, the deeper the resource is, the hotter it must be, and the cooler the resource, the closer to the surface it must be.

Site Screening Resources

A number of tools have been created that can help local governments with the renewable energy site screening process. EPA's screening tools, many of which were developed with the assistance of NREL, include EPA's RE-Powering America's Land Initiative Google Earth toold, which has mapped over 11,000 brownfields and other blighted sites across the country that could be converted into sites for renewable energy facilities of various types.[22] EPA also offers national and state-by-state maps that show both the suitability of particular geographic regions for a variety of different kinds of renewable energy technologies and the location of various brownfield sites within those regions.[23] (Note that most of these screening resources currently only provide developers and others with access to information about sites that are in EPA databases (e.g. brownfields that have received EPA grants and listed abandoned mine lands, Superfund, and Resource Conservation and Recovery Act ("RCRA") sites); EPA is working with states to add state tracked brownfield sites (e.g. sites which have entered into state voluntary cleanup programs).)

NREL has also developed several economic and performance assessment models and tools to help parties estimate the value and feasibility of installing a renewable energy project. Most of these tools can be located on the Energy Analysis Models and Tools website.[24] The website lists models and tools by the applicable renewable energy resource and includes links to the PVWatts calculator, which estimates monthly and annual energy value and output of PV systems based on the location and rating (kW) of the system, the cost of electricity, and the type of PV installation (fixed tilt versus tracking),[25] the System Advisor Model ("SAM"), which estimates hour by hour performance and electricity production costs of CSP and PV installations based on installation and operating costs, financing options, applicable tax credits and incentives, and system specifications,[26] and the Jobs and Economic Development Impact (JEDI) model, which estimates state and local economic impacts of constructing and operating, among other technologies wind, solar, and biofuels power projects.[27] Additionally NREL's "In My Backyard" ("IMBY") website uses Google Earth data to estimate the electricity that can be produced with a fixed tilt solar PV array or wind turbine at a business or residence.[28] IMBY can be helpful in providing a quick estimate of the wind or solar resource potential at a particular local site. A number of state and regional resources also provide free access to helpful GIS screening tools for renewable energy siting purposes.[29] These resource maps and assessment tools can help local governments conduct a high-level screening of

Silver Lake Solar
Location: Pittsfield, Massachusetts, *Size:* 1.8 MW

22 OSWER, U.S. EPA, RE-Powering America's Land: Renewable Energy on Potentially Contaminated Land and Mine Sites, *available at* http://www.epa.gov/renewableenergyland/docs/repower_contaminated_land_factsheet.pdf; *RE-Powering America's Land: Renewable Energy Interactive Mapping Tool*, OSWER, U.S. EPA (Apr. 5, 2011), http://www.epa.gov/renewableenergyland/mapping_tool.htm.

23 *RE-Powering America's Land: State and National Maps*, OSWER, U.S. EPA (Apr. 5, 2011), http://www.epa.gov/renewableenergyland/maps.htm.

24 *Energy Analysis Models and Tools*, NREL (Jul. 30, 2010), http://www.nrel.gov/analysis/models_tools.html. A list of additional renewable energy resource maps and screening tools compiled by the U.S. Department of Energy ("DOE") and NREL is *available at FEMP – Technologies: Renewable Energy Resource Maps and Screening Tools*, Office of Energy Efficiency and Renewable Energy ("EERE"), U.S. DOE (Sept. 1, 2011), http://www1.eere.energy.gov/femp/technologies/m/renewable_resourcemaps.html.

25 *PVWatts*, NREL (June 6, 2011), http://www.nrel.gov/rredc/pvwatts/.

26 *System Advisory Model (SAM)*, NREL (Nov. 21, 2011), https://sam.nrel.gov.

27 *Jobs and Economic Development Impact Models*, NREL (Nov. 7, 2011), http://www.nrel.gov/analysis/jedi/.

28 *In My Backyard (IMBY)*, NREL (Dec. 23, 2010), http://www.nrel.gov/eis/imby/.

29 *See, e.g., Wind Energy Site Screening Tool*, Massachusetts Executive Office of Energy and Environmental Affairs (May 5, 2011), http://maps.massgis.state.ma.us/wind/; *Great Lakes Wind Atlas*, Great Lakes Commission (Aug. 12, 2010), http://erie.glin.net/wind/.

whether brownfields in their communities are appropriate for renewable energy development and, if so, what kind. Once a high level assessment for energy resource potential has been completed, on-site assessments are a necessary follow-up. On-site assessments help determine resource potential for the particular location in light of its associated geographic characteristics (such as slope, shade, and obstructions), which can substantially affect actual energy generation. On-site assessments can vary in cost and time depending on the technology used to conduct the assessment and the renewable resource being studied. For example, meteorological towers ("Met Towers"), which are commonly used to conduct on-site assessments of wind energy, must be installed for a minimum of a year to collect reliable data. Because Met Tower costs will include the equipment, installation, maintenance, reporting and analysis, the costs may not be insignificant.[30] Certain federal, state, and non-profit agencies do offer resources to help defray the cost and expertise needed to conduct an on-site assessment.[31]

30 *See, e.g.* North Coast Wind and Power, LLC, Meteorological Tower Site Selection: Washtenaw County, Michigan at 9 (Apr. 2007) (Met Tower estimates of $86,000 for one tower to $150,000 for three towers), *available at* http://www.ewashtenaw.org/government/departments/planning_environment/planning/wind_power/assets/SiteSelection/.

31 For example, some states and Native American tribes offer anemometer loan programs to defray the cost of an on-site wind energy potential assessment. For more information, *see Anemometer Loan Programs and Data*, EERE, U.S. DOE (Sept. 22, 2011), http://www.windpoweringamerica.gov/anemometer_loans.asp.

Technical Assistance for Evaluating and Developing Brownfields

The National Renewable Energy Laboratory can provide valuable assistance to state and local governments, and Indian tribes interested in examining the feasibility of renewable energy project development in their communities. Technical assistance can include renewable energy measurement and evaluation, economic feasibility studies, policy analysis, contract assistance, and capacity building. Parties interested in technical assistance from the Department of Energy should contact 1-877-EERE-TAP (1-877-337-3827) or tech.assist@nrel.gov for more information.

Through the Technical Assistance Program ("TAP"), NREL has, in the past, provided free one-on-one site specific assistance to local governments whose requests met TAP project goals. The program includes a network of over 2,000 technical professionals who have assisted state and local governments with strategic energy planning, policy and program design and evaluation, and project development. For example, the program developed a decision matrix to help the **City of Richmond, California** and EPA Region 9 examine Richmond's entire inventory of contaminated land sites and determine which sites have the highest potential for successful renewable energy development. The matrix includes considerations such as site characteristics, economic feasibility, ownership, power demands, and system size and cost.[i] Although, as of September 2011, the TAP program has curtailed its offerings for site specific assistance, the program still hosts informational webinars and a technical assistance blog at http://www.eereblogs.energy.gov/tap/.

NREL and EPA's RE-Powering America Program are also working together to evaluate the feasibility of siting renewable energy projects on specific brownfields. In November of 2011, EPA and NREL granted 26 sites technical assistance awards, an investment that will total approximately 1 million dollars.[ii] Past sites examined by an EPA/NREL assessment grant includes the Jeddo Tunnel in Drums, Pennsylvania, which carries heavy metals and other toxic contaminants from coal mining operations into local tributaries. Through the technical assistance grant, EPA and NREL are investigating the feasibility of developing a small hydropower facility at the Tunnel in order to power a downstream sewage treatment plant and other local infrastructure.[iii]

i EPA is expanding on the Region 9 matrix to create decision trees for evaluating solar and wind potential at other sites. These decision trees are slated to be released by the end of 2011.

ii *EPA/NREL Feasibility Studies*, U.S. EPA RE-Powering America's Land (Nov. 4, 2011), http://www.epa.gov/oswercpa/studies.htm.

iii OSWER, U.S. EPA, RE-Powering America's Land: Evaluating the Feasibility of Siting Renewable Energy Production on Potentially Contaminated Land (Drums, PA), *available at* http://www.epa.gov/renewableenergyland/docs/develop_potential/drums.pdf.

Other Site-Specific Considerations

Of course, renewable energy technology is not the only consideration in site screening. A number of other factors can influence a site's suitability for renewable energy development, including cleanup status and remediation requirements, proximity to existing infrastructure, and site-specific environmental issues.

POTENTIAL FOR REUSE: ADDRESSING BROWNFIELD CONTAMINATION

One of the drawbacks to developing renewable energy on a brownfield is that regulatory requirements relating to environmental remediation can substantially add to project costs and timelines. To avoid uncertainty in this area, developers and financiers tend to look for brownfield sites that are "shovel-ready" (i.e. where there is no or minimal contamination, or cleanup is already complete) or where the extent of contamination and necessary remediation is known.[32] There are a number of steps that local governments can take to help reduce uncertainty and make project development more likely, including: (1) conducting (or supporting) Phase I environmental assessments of brownfields in their communities; (2) tailoring local regulatory remediation requirements toward renewable energy development; and (3) advertising the potential reuse status of brownfields in their community.

Summitville Mine Hydroelectric Project
Location: Rio Grande County, Colorado, *Size:* 35 kW

A Phase I environmental assessment, also referred to as an "All Appropriate Inquiry" analysis ("AAI"), is a preliminary determination of what contamination, if any, is likely to be present at a site, the source of that contamination, and potential remediation needs.[33] An AAI consists of a visual inspection of the site and research into the historical uses of the property, but does not require environmental sampling or laboratory testing. Because an AAI demonstrates that a party has conducted due diligence before purchasing or redeveloping a site, federal and state regulatory agencies often require parties to conduct an AAI as a qualification for obtaining permits needed to reuse or redevelop a brownfield site. An AAI must also be conducted to qualify for certain legal defenses against liability[34] and may be a prerequisite for receiving a brownfield grant or loan.[35]

32 EPA is developing a handbook and a fact sheet on the benefits and feasibility of installing renewable energy projects at sites where environmental contamination is in the process of being, or has not yet been, addressed. These documents are expected to be released in 2012.

33 40 C.F.R § 312. More information on AAIs is available at *All Appropriate Inquiries*, Office of Brownfields and Lands Revitalization ("OBLR"), U.S. EPA (Oct. 4, 2011), http://www.epa.gov/brownfields/aai/.

34 For example, under federal law a party wishing to assert a liability defense as an innocent purchaser, bona fide prospective purchaser, or contiguous property owner must first demonstrate that it conducted an AAI. CERCLA §§ 101(35)(A) & (B), 101(40), 107(r) & (q), 42 U.S.C. § 9601(35)(A) & (B), 9601(40), 9607(r) & (q).

35 OSWER, U.S. EPA, Pub. No. 560-F-09-026, EPA Brownfields Grants, CERCLA Liability, and All Appropriate Inquiries (Apr. 2009), *available at* http://epa.gov/brownfields/aai/aaicerclafs.pdf; OSWER, U.S. EPA, Pub. No. 560-F-07-234, CERCLA, Brownfields, and Lender Liability (Apr. 2007), *available at* http://www.epa.gov/brownfields/aai/lenders_factsheet.pdf.

Steel Winds

Managing Liability: A Key to Encouraging Brownfield Redevelopment

When hazardous substances, pollutants, and/or contaminants are present at a brownfield site, federal and state law may impose liability, subjecting any potentially responsible party to the threat of litigation or regulatory enforcement for the assessment and cleanup of that contamination. All brownfield redevelopment projects, including renewable energy projects, have the *potential* to give rise to liability concerns. However, whether a particular brownfield or party involved in redevelopment will be affected by liability issues is a highly fact-specific question. Local governments can play a pivotal role in mitigating fears associated with liability by understanding and educating others about the types of activities that give rise to liability, the parties that may potentially be held liable, the consequences of liability, and ways to structure a brownfield redevelopment project to reduce uncertainty and provide liability relief.

In particular, parties interested in brownfields redevelopment should be aware that in addition to the various defenses and exemptions allowed by federal and state law, there are a number of "ancillary mechanisms" available for managing potential brownfield liability. These include entering the brownfield site into a state voluntary cleanup program ("VCP"), acquiring liability insurance, negotiating indemnification and cost-sharing provisions into development and operational contracts, and obtaining a property-specific document from the EPA such as a prospective purchaser or lessee agreement or a comfort and status letter.

Some parties have made innovative use of these ancillary mechanisms to limit their liability exposure and enable development of renewable energy on brownfields. For example, the New York State VCP was instrumental in supporting the transformation of a former steel plant, which had sat vacant for decades, into a 20 MW wind farm. To make the Steel Winds project possible, the developers worked with the **City of Lackawanna,** the EPA, the State of New York, and the brownfield site owner to parcel eighty acres from a 1,600-acre RCRA site and enter that 80-acre parcel into the New York State VCP. By complying with the VCP and conducting limited remediation on the 80-acre parcel, the developers qualified for certain forms of liability relief, limited the scope of their potential liability, and avoided the requirement to remediate the full 1,600-acre site prior to redevelopment.[i]

At the **Templeton Gap** site in Colorado, the Colorado Brownfields Foundation ("CBF") has negotiated an option to asset manage and lease a privately owned closed landfill site to a renewable energy developer for the construction and operation of methane capture and solar power units. In hopes of reducing liability-related uncertainty and attracting a developer, CBF is working with U.S. EPA Region 8 and the Colorado Department of Public Health & Environment to negotiate liability relief (the site is under a state cleanup order), which may include a bona fide prospective tenant agreement for the selected renewable energy tenant(s).

For more information on liability issues for renewable energy brownfields redevelopment, see U.S. EPA, Pub. No. 330-F-11-001, Siting Renewable Energy on Contaminated Properties: Liability Concerns (Mar. 2011), *available at* http://www.epa.gov/compliance/resources/publications/cleanup/brownfields/re-liability.pdf. Parties are encouraged to consult with a knowledgeable attorney and relevant state and federal agencies to address liability issues before engaging or investing in brownfields redevelopment.

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i Brownfields: A Comprehensive Guide to Redeveloping Contaminated Property (Todd S. Davis and Scott A. Sherman eds., 3d ed. 2010) at 77-78.

Depending on the extent and type of contamination found at a site, remediation may be necessary before a renewable energy facility can be installed.[36] Because state and local cleanup requirements differ, however, the extent of cleanup and associated cost will depend not only on the level of contamination, but on the jurisdiction in which a property is located. Although some states still require site remediation to meet a zero remaining contamination or residential standard prior to reuse, most states have now developed cleanup standards that vary based on the specific intended reuse of a property or on a site-specific risk assessment.[37] Because renewable energy development often poses a lower risk of exposing humans to contamination than residential or certain commercial purposes, compliance in states with variable cleanup standards will generally be less costly than in states with one-size-fits-all cleanup standards.

Local governments that have the resources to conduct the environmental assessments and cleanup necessary to prepare a site for a renewable energy development can position themselves well to attract development into their communities. Local governments can also benefit from being proactive about advertising the reuse potential of brownfields in their communities. EPA's "Cleanups in my Community" website, http://www.epa.gov/cimc, shows the remediation status of brownfields around the country, including whether or not brownfields sites are ready for reuse. The cleanup status of particular sites is also linked to the information on EPA's RE-Powering America Google Earth map discussed on page 9. Information about the status of cleanup for sites which have entered into state voluntary cleanup programs may be found on certain states' websites.[38] Because developers may use federal and state websites to select promising areas in which to investigate renewable energy on brownfields development, it is important that information listed about brownfields be up-to-date and accurate.

36 The EPA has developed a useful roadmap outlining the steps involved in site investigation and cleanup and introducing stakeholders to the range of remediation technology options and available resources. Office of Superfund Remediation and Technology Innovation, U.S. EPA, Pub. No. 542-B-05-001, Road Map to Understanding Innovative Technology Options for Brownfields Investigation and Cleanup (4th ed., 2005), *available at* http://www.brownfieldstsc.org/roadmap/home.cfm. EPA is expecting to release a new edition in early 2012.

37 Information on state specific cleanup standards can be found in the American Bar Association's publication Brownfields: A Comprehensive Guide to Redeveloping Contaminated Property (Todd S. Davis and Scott A. Sherman eds., 3d ed. 2010) ("ABA Brownfields").

38 *State Brownfields Programs*, OBLR, U.S. EPA (Nov. 4, 2011), http://www.epa.gov/brownfields/state_tribal/state_map.htm. Certain tribal websites may also provide information about the cleanup status of brownfields in their communities. *See Tribal Brownfields Program*, OBLR, U.S. EPA (Nov. 4, 2011), http://www.epa.gov/brownfields/state_tribal/tribe_progs.htm.

Tailoring Land Use Regulation to Renewable Energy Development

In states where they have the authority to do so, local governments can use a variety of land use mechanisms to tailor remediation standards for brownfields to the intended reuse of a site, often helping to ease the cleanup burden. Local governments have used zoning guidelines, land easements, ordinances, consent decrees and notices in land records to accomplish this goal.[i] For example, in **Pittsfield, Massachusetts**, the combination of tailored remediation standards and land use restrictions were instrumental in fostering the development of the Western Massachusetts Electric Company ("WMECo") 1.8 MW Silver Lake solar project on the site of a former manufacturing facility. Because the site was contaminated with polychlorinated biphenyls ("PCBs"), which settle deep in the soil, the cost and technical requirements for removing all contamination made it an unlikely location for residential development. However, by working with the original owner to conduct remediation of the surface soil and enter restrictions into the land deed, such as limits on permissible construction activities,[ii] the City of Pittsfield and the Pittsfield Economic Development Authority ("PEDA") were able to support WMECo's interest in constructing the 6500-panel solar array. Completed in 2011, the Silver Lake solar project not only contributes to the state's renewable energy goals, but also generates about $150,000 in annual property taxes for the city and has promoted interest in redeveloping other portions of the contaminated property.[iii]

i EPA refers to these mechanisms for tailoring remediation requirements as "institutional controls." More information on institutional controls can be found at *Superfund Institutional Controls: Guidance*, OSWER, U.S. EPA (Sept. 2011), http://www.epa.gov/superfund/policy/ic/guide/index.htm.

ii Under Massachusetts state law, sites may be developed after limited remediation (and previous owners may obtain certain liability relief) if land use restrictions are developed and recorded in land deeds. Mass. Gen. Laws ch. 21E, § 6. In this case, the original owner entered into a Grant of Environmental Restriction and Easement ("ERE") with the Massachusetts Department of Environmental Protection. A copy of the ERE for the area on which the solar panels are located can be found at http://www.epa.gov/region1/ge/thesite/geplantarea/reports/20s30s40s/30s/262883.pdf.

iii Eva Tor, Massachusetts Department of Environmental Protection, Development of the Pittsfield Solar Collector Facility - From Contamination to Renewable Energy (presentation at the June 1-3, 2011 International Sustainable Remediation Conference), *available at* http://www.umass.edu/tei/conferences/SustainableRemediation/PDF/PresentationPDFs/Tor.pdf ("Pittsfield Presentation").

Grid Interconnection: Developing Energy On-Ramps

In order to physically connect a renewable energy project to the power grid, the project will need to go through the local utility's generator interconnection process and likely be required to enter into an interconnection agreement with that utility. Interconnection procedures and agreements ensure that new power projects can be safely interconnected with the grid, evaluate whether any new facilities need to be constructed to accommodate the interconnection, and set forth the technical and legal parameters for the connection. When new facilities are necessary, interconnection procedures and agreements will govern who will pay for those facilities.

Hickory Ridge Landfill Solar Energy Cover
Location: Conley, Georgia, *Size:* 1 MW

The most important thing to know about the interconnection process is that it can, in some cases, involve significant time and money, so it is important to get the process started early in order to avoid delays and fully understand all the costs involved.[i] Interconnection processes will vary widely depending on the size of the renewable energy project and the type of power line it will connect with. Interconnection of renewable energy projects to distribution-level power lines (those that deliver electricity to end users like homes or businesses) is often governed by state law. Simplified procedures may apply to projects under a certain size, and there may be standardized agreements for the parties to execute. In addition, state or utility net metering programs often have specific interconnection processes for participating facilities. Interconnection with higher-voltage, transmission-level power lines that deliver power over longer distances (and, sometimes with distribution-level lines that are also used to transmit electricity for wholesale sales) is governed by Federal Energy Regulatory Commission ("FERC") rules.

Specific steps in the interconnection process will vary, but may include: (1) submission of an interconnection request to the utility; (2) placement in a queue (i.e. the order in which interconnection proposals will be considered); (3) technical evaluation by the utility, which may include scoping meetings and studies; and (4) development of an interconnection agreement. Costs the generator may be responsible for could include an initial application fee, the full costs of the technical studies to evaluate the impacts of the interconnection (deposits on which often need to be paid up-front), the costs of new facilities that must be constructed to accommodate the interconnection, and posting of financial security–such as cash or a letter of credit–to support the construction if not paid for in advance.

Finally, if a project is selling its power to an entity other than the utility with which it interconnects, it can also expect to incur transmission charges (i.e. charges for sending power across a utility's power lines) and will need to secure a transmission agreement, which can involve studies of its own. Early initiation of these processes also provides developers and project owners with time to address and secure financing for any additional expenses that may be identified during the course of the studies.

The Database of State Incentives for Renewables & Efficiency ("DSIRE") website includes information about state interconnection programs (http://www.dsireusa.org/), and the FERC website's Generator Interconnection page provides information on federal interconnection policies (http://www.ferc.gov/industries/electric/indus-act/gi.asp).

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i Given the complex nature of, and wide variation in, interconnection procedures, as well as their ongoing evolution through state and federal rulemaking proceedings, it is important to consult knowledgeable attorneys before becoming involved in an interconnection process.

Aerial photographs of the Exelon City Solar Project pre- and post- construction

PROXIMITY TO EXISTING TRANSMISSION AND TRANSPORTATION INFRASTRUCTURE

One of the advantages of siting renewable energy facilities on previously used sites is that there is often already existing infrastructure in place. This is particularly valuable where larger, utility-scale projects that interconnect to the electric grid are planned. Existing transmission and distribution infrastructure can help substantially reduce costs by eliminating the need to construct new facilities in order to reach renewable power plants and connect them to the grid.[39] The existence of roads, railroads, and other transportation infrastructure near brownfields is also a consideration when choosing sites or technologies. Because renewable energy project components, supplies, and maintenance equipment must be brought to the site, existing transportation infrastructure reduces construction costs and can reduce the overall capital investment in a project. For example, ten to twenty-five percent of the total cost of installing a wind turbine can be attributed to transportation expenses,[40] and biomass projects that utilize crop or other residues (whether grown on-site or purchased from an off-site location) require a regular supply of feedstock that must be transported to the generation plant. Existing roads, rail lines, and other transportation infrastructure can greatly reduce the need for additional capital to meet a project's transportation requirements.

ENVIRONMENTAL CONSIDERATIONS

Although siting renewable energy projects on brownfields has the environmental benefit of preserving greenfield sites, environmental considerations still play a role in determining whether a particular brownfield site is appropriate for renewable energy development. The project's potential impacts on, for example, water quality, wildlife and plant life, and historical/cultural resources will need to be evaluated. If federal or state permits are required for the project, an environmental impact assessment or statement ("EIA/EIS") may be required, and permitting agencies may have the power to impose conditions on the permits in order to limit environmental impacts.[41] Early assessment of potential environmental impacts of a renewable energy project, therefore, is an important part of the scoping process. Some state and federal agencies and non-profit organizations have released tools which may aid in this assessment, including regional conservation strategies and resource maps, hydrological maps, and historic preservation maps.[42]

39 For example, WMECo's interest in developing the Silver Lake solar project (discussed on page 13) was in part due to the site's location next to an existing WMECo substation. *See* Abstract for Pittsfield Presentation, *available at* http://www.umass.edu/tei/conferences/SustainableRemediation/June1Abstracts.html.

40 Suzanne Ozment and Terry Tremwel, Transportation Management in the Wind Industry: Problems and Solutions Facing the Shipment of Oversized Products in the Supply Chain (Oct. 2007) (citing Crispin Aubrey, *Supply Chain: The Race to Meet Demand*, Wind Directions, Jan./Feb. 2007, at 27).

41 Whereas an AAI looks at prior use of a parcel in order to determine if and what contamination may be likely, an EIA/EIS examines the future potential impacts of a particular project on the environment. For an example of an environmental planning document, *see Sample Documents for Power Purchase Agreements*, FEMP, U.S. DOE (Apr. 20, 2011), http://www1.eere.energy.gov/femp/financing/ppa_sampledocs.html, where the Federal Energy Management Program has posted a sample of the environmental planning document for the Fort Carson Solar project, which sited a 2 MW PV array next to a landfill.

42 *See, e.g., Interactive Online Maps*, New York Department of Environmental Conservation (Oct. 21, 2011), http://www.dec.ny.gov/pubs/42937.html; *Water Resources of the United States*, United States Geological Survey (Oct. 21, 2011), http://water.usgs.gov/.

Economic Feasibility: Factors Influencing The Financial Viability Of Projects

Tessman Road Landfill Solar Energy Cover System
Location: San Antonio, Texas *Size:* 135 kW

Economic feasibility is at the heart of the decision to develop renewable energy facilities on brownfields. The ability of developers to finance, or government entities to invest in, these projects generally turns on (1) the revenue stream and/or cost savings that the project's energy and renewable energy credits ("RECs") will produce, which will be determined by the strength of the markets for those products, and (2) economic incentives available from government sources, such as tax incentives and grant, loan, and other assistance programs. The economic feasibility of brownfield-sited renewable energy projects will therefore vary based on the particular laws, markets, and incentive programs available in the project's area. It is important for local governments to understand what market factors and governmental incentives can influence a developer's decision—or your local government's ability—to pursue renewable energy projects on brownfields in your community. This section discusses the various components that can play a part in funding, or supporting the funding of, a renewable energy project on a brownfield.

Financial Feasibility: Where to Go For More Information

There are numerous resources that can aid in the assessment of financial feasibility, many of which are discussed throughout this primer and its Appendix. One of the most comprehensive resources on federal, state, local and utility incentives and policies that promote renewable energy and energy efficiency is the Database of State Incentives for Renewables & Efficiency ("DSIRE") website. Among other things, the database includes information on renewable portfolio standards, interconnection and net metering policies, renewable energy tax incentives and grants. DSIRE can be accessed at www.dsireusa.org.

The Value of Project Output

The expected economic value of the project's output–generally, electricity and RECs–is a critical factor in determining the economic feasibility of a project. Energy and RECs can be sold together under one transaction ("bundled") or sold separately to different buyers ("unbundled").

ENERGY

The energy produced by a renewable generation facility will provide either a revenue stream for the project owner, who sells the output to a utility or consumer, or energy cost savings for the project's host site owner, who reduces the amount of electricity bought from the local utility by using the output on-site and, in some cases, may sell excess energy to the local utility. A power purchase agreement ("PPA")[43] is almost always the cornerstone of utility-scale renewable energy project financing because it provides a long-term, dependable revenue stream to repay the project's lenders and reward the project's investors. Renewable energy developers that cannot secure a long-term PPA will only be able to sell the project's electric output in the short-term market for wholesale energy (to the extent such a market exists in their region). Because of the inherent price uncertainty involved in short-term markets, obtaining financing for a project under these circumstances can be difficult, if not impossible.

Under a PPA, the project developer agrees to sell, and the buyer–usually a utility that re-sells the power to its customers, but, where allowed, sometimes a large energy user, such as a commercial facility or even a municipal government–agrees to purchase the energy output of the renewable generating facility.[44] To secure financing based on a PPA, it is critical that the buyer be a creditworthy entity, and that the term of the agreement be long enough for the project's debt to be paid off and investors to see a return (usually fifteen to twenty-five years). The power price is generally a stated rate that stays flat over the life of the contract, or escalates by prescribed amounts.[45]

Where renewable energy facilities are constructed on a site with buildings or electricity-consuming activities, such as ongoing remediation, project owners can use the energy output to offset their electricity costs. The power costs saved over time can be used to pay off debt the owner incurred in installing the generating facility. On-site use often provides the most financial benefit when the facility owner can sell excess energy to the local electric utility through a "net metering" program. Net metering customers receive credits on their power bills for the power fed back into the grid (measured by a special meter). Net metering is available in a majority of states,[46] but programs vary widely by state, and even by individual utility, so it is important to understand the details of the program in your area. Net metering is typically available to customer-owned and -sited renewable generation projects, but can be subject to various restrictions, such as the size and type of qualifying generating facilities, and fees, such as program enrollment fees.

43 In a collision of acronyms, the term "PPA" is used both in the world of energy and in brownfield redevelopment for two entirely different matters. In the energy context a PPA denotes a *power purchase agreement*; in brownfields redevelopment a PPA refers to a *prospective purchaser agreement* which EPA provides to clarify liability. To avoid confusion, in this paper the term PPA is only used to refer to power purchase agreements.

44 PPAs often also include a sale of the capacity of the generating unit–i.e. its ability to produce power–which utilities use to meet applicable regulatory requirements for maintaining adequate capacity reserves. In some regions, capacity can be sold separately from energy, so a generator may sell the energy output of a project to one party and the capacity of the project to another party (or into a capacity market).

45 An alternative to selling a renewable energy project's output under a bilaterally negotiated PPA is to sell the power to a utility under a "qualifying facility" ("QF") contract. Most renewable energy facilities under 80 MW in size are eligible to be QFs. Under federal law, utilities that have not received a waiver from FERC must agree to buy the output of QFs at the utility's "avoided costs." More information, see the FERC website's page on Qualifying Facilities, http://www.ferc.gov/industries/electric/gen-info/qual-fac.asp, or contact your state utility commission.

46 As of October 2011, forty-three states, the District of Columbia and Puerto Rico had implemented net metering policies, laws, or regulations, and three additional states had implemented voluntary net metering programs.

Because it is often difficult for site owners to fund the construction of renewable energy facilities on their brownfield even if they anticipate saving money over the life of the project by using the energy output on-site and net metering, the "third-party PPA" financing model—a hybrid of the PPA and on-site use models—has become increasingly popular.[47] In this model, the host site owner allows a third-party renewable energy project developer to install, own and operate a generation facility on the host site and agrees to purchase the power produced by that facility from the developer. If net metering is available to customers of third-party developers in a given jurisdiction, the customer will generally enter into a contract with the developer to purchase all of the output of the generating facility, and will use a portion of the energy on-site and sell the net excess energy back into the grid.[48]

This arrangement provides the host site owner with a predictably-priced supply of renewable generation without the responsibility of funding, operating, and maintaining the renewable energy facility. The developer is often able to agree to sell the power to the host site owner at an attractive price, because the developer can take advantage of federal renewable energy tax incentives and sell renewable energy credits associated with the power production, as discussed below. The Belmar Project in Lakewood, Colorado described on page 5 employed this third-party PPA model: the mixed use development's 1.7 MW PV rooftop solar array is owned by a renewable energy venture group, which contracted with the owners of the mixed use development to sell the power to the development at a cost comparable with, or lower than, the cost of electricity from its existing utility supplier.[49]

Community Solar: Neighborhood Net Metering

The "community solar" project model is a creative alternative to on-site use and conventional power purchase arrangements that allows community members to collectively invest in local solar generation facilities and, in return, receive credits on their electric bills. Legislation in Colorado, Massachusetts, and Washington promotes these community solar or "solar garden" programs. The **City of Ellensburg, Washington** installed the first phase of its Community Renewable Park in 2006– 36 kW of solar generating capacity. Community investors contribute as little as $250 and receive dollar credits on their municipal utility power bill. The Park is expanding in phases, and has plans to add small wind turbines and additional solar panels.[i]

i *See* Ellensburg Community Renewable Park, City of Ellensburg, Washington (Oct. 21, 2011), http://www.ci.ellensburg.wa.us/index.aspx?NID=310.

RENEWABLE ENERGY CREDITS

Renewable energy credits provide another revenue stream for renewable energy generation facility owners. RECs are administratively created credits, each representing one megawatt-hour of energy generated by a particular, qualified renewable energy facility; in layman's terms, a REC certifies that power was produced from a "green" resource.[50]

Utilities can use RECs to comply with state or local renewable energy standards or renewable portfolio standards ("RPS"), requirements that a specific portion of the electricity they provide to retail customers comes from renewable resources. Over half the states have some form of RPS,[51] and many have resource-type "set asides" or "carve-outs" that require a percentage of their renewable energy come from particular types of

47 *See* Katharine Kollins, Bethany Speer, and Karlynn Cory, NREL, Report No. TP-6A2-46723, Solar PV Project Financing: Regulatory and Legislative Challenges for Third-Party PPA System Owners (Feb. 2010), *available at* http://www.nrel.gov/docs/fy10osti/46723.pdf.

48 However, in some states, third-party owned systems may not meet the definition of facilities or customers that are allowed to net meter. The third-party PPA model may face a variety of other regulatory hurdles in some states, including the possibility of the project developer being considered a public utility and regulated by the state's utility commission, or of the arrangements being prohibited outright in states or localities where utilities have exclusive retail service rights. *See id.*

49 *See* note 2, Belmar Success Story. The local utility is purchasing the associated RECs from the project.

50 *Renewable Energy Certificates (RECs)*, Green Power Partnership, U.S. EPA (June 2, 2011), http://www.epa.gov/greenpower/gpmarket/rec.htm; Green Power Partnership, U.S. EPA, Renewable Energy Certificates (July 2008), *available at* http://www.epa.gov/greenpower/documents/gpp_basics-recs.pdf.

51 As of October 2011, twenty-nine states, the District of Columbia and Puerto Rico had adopted an RPS, and eight additional states had adopted renewable energy goals.

resources. For example, solar carve-outs create a sub-market for "solar renewable energy credits" or "SRECs." A state's RPS drives the value of RECs or SRECs in that state by creating demand. In addition to utilities' use of RECs to meet regulatory requirements, individuals, businesses, and companies can choose to purchase RECs to "green" their non-renewable energy supply.

The ability of a renewable energy project owner to sell the RECs associated with its project is a critical aspect of economic feasibility, but one that will vary significantly by state. A state with limited renewable resources, a high RPS requirement, and stringent standards for what type of renewable energy facilities can be used to meet the RPS—for example, some states require that the energy associated with the REC be produced in that state or deliverable into that state—will have higher REC prices than states with more abundant renewable resources or less demanding RPS requirements.[52]

The availability of RECs from net metering projects is state-dependent. In states which do allow net metering projects to generate RECs for the "excess" energy that is fed into the grid, the state will usually prescribe whether (1) the RECs belong to the customer regardless of any net metering arrangement; (2) the RECs belong directly to the utility buying the excess power; or (3) the customer owns the RECs at the point of generation but must assign them to the utility in order to get billing credit.

Because state policies shape the markets for the products of renewable energy facilities, evaluating the economic feasibility of a potential renewable energy project requires an understanding of those policies. But the output of a renewable energy facility is only one aspect of a project's economic feasibility. The other important aspect of financial viability—direct government incentives in the form of tax credits, grants and loans—is discussed in the next section.

Federal and State Government Incentives

Government incentives are another critical component of renewable energy on brownfield financing. Because renewable energy generation technologies are generally more expensive than conventional generation (i.e. coal and natural gas) technologies, incentives—such as tax credits, grants and loans—play a significant role in making renewable energy generation affordable to consumers and attractive to investors.[53] In addition, government incentives related to brownfields redevelopment can help mitigate the sometimes higher costs of preparing those sites for renewable energy development.

FEDERAL RENEWABLE ENERGY TAX INCENTIVES

The Renewable Electricity Production Tax Credit ("PTC") and the Business Energy Investment Tax Credit ("ITC") are the most well-known tax incentives for renewable energy production.[54] The PTC provides a 2.2¢/kWh payment for wind, geothermal, and closed-loop biomass and a 1.1¢/kWh payment for other eligible technologies, and, with some exceptions, applies to the first ten years of operation.[55] The ITC provides a corporate tax credit based on the value of the qualifying property: thirty percent for solar, small wind turbines, or fuel cells, ten percent for geothermal systems, microturbines, and combined heat and power systems.[56] The 2009 economic stimulus legislation, the American Reinvestment and Recovery Act ("Recovery Act"), allows a taxpayer to elect to claim either the ITC or the PTC for facilities that qualify for the PTC.[57]

52 More information on individual state RPS requirements can be found on the DSIRE website, http://www.dsireusa.org/.

53 As discussed on page 9, SAM allows interested parties to assess the economic feasibility of solar installations by comparing the effect of varied financing terms and government incentives on costs.

54 Businesses with tax liability are also eligible for accelerated or bonus depreciation tax deductions for certain renewable energy projects. *See Federal Incentives/Policies for Renewables & Efficiency, Modified Accelerated Cost-Recovery System (MACRS) + Bonus Depreciation (2008-2012)*, DSIRE (June 17, 2011), http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=US06F&re=1&ee=1.

55 *Federal Incentives/Policies for Renewables & Efficiency, Renewable Electricity Production Tax Credit (PTC)*, DSIRE (June 3, 2011), http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=US13F.

56 *Federal Incentives/Policies for Renewables & Efficiency, Business Energy Investment Tax Credit (ITC)*, DSIRE (Nov. 18, 2011), http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=US02F. Note, this credit is not available when the entity that uses the equipment is a governmental unit or a non-profit.

57 Recovery Act § 1602, 26 U.S.C. § 42 note.

The ITC and PTC are time-limited in that they have in-service date requirements. For example, to qualify for the PTC, a wind facility must be placed in service on or by December 31, 2012 and all other qualifying facilities must be placed in service on or by December 31, 2013. The ITC tax credit is available to systems placed in service on or by December 31, 2016. In the past, the ITC and PTC have been extended by Congress, but current constraints on the federal budget jeopardize the future of these programs.

The ITC and PTC cannot be used by municipal or non-profit project owners, and the inability of local governments and non-profit groups to take advantage of federal renewable energy tax incentives can be a major roadblock to their independent development of renewable energy projects. As an alternative to traditional tax incentives, the federal government has established programs intended to facilitate the development of renewable energy projects by local governments and others that cannot take advantage of the PTC or ITC. The Department of Energy's Renewable Energy Production Incentive ("REPI"), for example, is available to entities that do not pay federal corporate taxes, such as local governments, and provides payments of approximately 2¢/kWh for electricity produced by certain new renewable energy facilities for the first ten years of project operations.[58]

New Clean Renewable Energy Bonds ("New CREBs") and Qualified Energy Conservation Bonds ("QECBs") are federal tax credit bonds available for the financing of a variety of renewable energy projects, including solar thermal and photovoltaic, wind, biomass, and hydroelectric. Interest on the bonds (100 percent in the case of CREBs and seventy percent in the case of QECBs) is paid by the federal government through tax credits to bondholders, significantly reducing borrowing costs for bond issuers.[59] QECBs are available to local, state and tribal governments; CREBs are also available to municipal utilities and rural electric cooperatives. Both programs are limited by the volume of bonds authorized by Congress. The New CREBs program, which is administered by the Internal Revenue Service, is currently fully subscribed.[60] QECBs are allocated by state energy offices.[61]

FEDERAL BROWNFIELD REDEVELOPMENT TAX INCENTIVES

The federal government also provides several tax incentive programs to promote redevelopment that can be used to support brownfield-sited renewable energy projects. For example, the Brownfields Expensing Tax Incentive allows federal taxpaying owners of qualifying brownfield properties to reduce their taxable income by the costs of cleanup expenses.[62] The New Markets Tax Credit, administered by the Community Development Financial Institutions Fund within the U.S. Department of the Treasury,[63] allocates tax credits to certified Community Development Entities ("CDEs," a range of for-profit and nonprofit organizations). CDEs offer these tax credits to private-sector investors and use the investors' equity to make investments in low-income communities. More information on federal tax incentives that can support brownfield investments can be found in EPA's comprehensive guide.[64]

OTHER FEDERAL FINANCIAL INCENTIVES

In addition to tax incentives, there are federal government loan and grant programs available to assist in brownfields redevelopment activities and support development of renewable energy projects. The EPA manages a number of key brownfields redevelopment programs, including grants to cover the assessment

58 The program provides payments of 1.5¢/kWh in 1993 dollars that are indexed for inflation, subject to the availability of annual appropriations in each federal fiscal year of operation. Practically speaking, this means that only a portion of the approximately 2¢/kWh inflation-adjusted incentive level is available to qualifying facilities. *See Renewable Energy Production Incentive*, EERE, U.S. DOE (Mar. 19, 2007), http://apps1.eere.energy.gov/repi; *Federal Incentives/Policies for Renewables & Efficiency, Renewable Energy Production Incentives (REPI)*, DSIRE (Jan. 18, 2011), http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=US33F&State=Federal&currentpageid=1 for more details.

59 For those QECBs issued after March 18, 2010, the QECB issuer may choose instead to receive a direct payment from the Department of Treasury in the amount of the non-refundable tax credit that would otherwise have accrued to the bondholder.

60 *Federal Incentives/Policies for Energy Efficiency, Clean Renewable Energy Bonds (CREBs)*, DSIRE (Nov. 3, 2011), http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=US45F&re=0&ee=1.

61 *Federal Incentives/Policies for Renewables & Efficiency, Qualified Energy Conservation Bonds (QECBs)*, DSIRE (Apr. 26, 2011), http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=US51F&re=1&ee=1.

62 *Brownfields Tax Incentive*, Office of Brownfields and Land Revitalization ("OBLR"), U.S. EPA (Mar. 25, 2011), www.epa.gov/swerosps/bf/tax/index.htm.

63 *Community Development Financial Institutions Fund*, U.S. Department of the Treasury (Aug. 24, 2011), www.cdfifund.gov.

64 OSWER, U.S. EPA, Pub. No. 560-F-11-003, A Guide to Federal Tax Incentives for Brownfields Redevelopment (Apr. 2011), *available at* http://www.epa.gov/swerosps/bf/tax/tax_guide.pdf.

of brownfield sites,[65] grants for the cleanup of such sites,[66] revolving loan fund grants,[67] and brownfields-related job training grants.[68] These grants and assistance programs can provide substantial help to local governments throughout the brownfield redevelopment process, including, critically, at the outset, when local governments are looking to assess the feasibility of renewable energy projects in their communities.[69]

Federal programs designed with the specific goal of promoting renewable energy projects are also available and may be useful for renewable energy on brownfield projects. Both the U.S. Department of Energy and the U.S. Department of Agriculture ("USDA") occasionally issue solicitations for grants and loan guarantee programs that provide assistance for renewable energy-related projects.[70] In addition, for projects that will serve rural customers, the USDA Rural Development Electric Program makes renewable energy loans available to rural electric providers of any type, not just rural electric cooperatives. These loans can cover construction costs for renewable energy facilities and are available to any entity that provides electric service to rural consumers.[71]

In any given year, other federal financial incentives may be available to local governments or their private partners. The DSIRE website and the websites of the agencies listed in this section will provide up-to-date information about currently available financing programs.

Laying the Groundwork for Development: Combining Incentives and Technical Assistance to Facilitate Site Evaluation and Remediation

The combination of various incentives and/or offers of technical assistance can help make renewable energy projects on brownfields financially feasible. For example, at the Belmar Development in **Lakewood, Colorado**, discussed on page 5, a mixture of federal, state and private incentives in order to complete remediation at the former shopping mall and construct a 1.75 MW rooftop solar array. Over half of the cleanup of dry cleaning solvents, petroleum, and other hazardous chemicals was funded through a $1.95 million State Revolving Loan Fund grant and a $110,000 federal grant.[i] Further, by leveraging tax credits and incentives through the state's New Energy Economic Development program and a renewable energy rebate from Xcel Energy's Solar*Rewards Program, the developers of the solar array were able to offset construction, installation, and production costs.[ii]

The **City of St. Marks, Florida** combined federal incentives and a technical assistance grant in its quest to convert up to forty acres of a former refinery facility contaminated by underground storage tanks and other hazardous waste into a solar park. After an initial cleanup led by the State of Florida, the town council applied for and received a $400,000 grant from EPA to conduct an environmental assessment and the further environmental remediation of the site needed to make it suitable for development. The city also received $50,000 in technical assistance from EPA and NREL in the form of a renewable energy feasibility study.[iii] St. Marks is now in the process of removing the last of the underground storage tanks and is in discussions with developers to lease the site for a solar PV project.

i Colorado Department of Public Health and Environment and the Colorado Brownfields Foundation, Case Study: A Declining Mall Reborn (Jan. 2009), available at http://www.cdphe.state.co.us/hm/success/belmar.pdf.

ii *See* note 2, Belmar Success Story.

iii Lars Lisell and Gail Mosey, NREL, Report No. TP-6A2-48853, Feasibility Study of Economics and Performance of Solar Photovoltaics at the Former St. Marks Refinery in St. Marks, Florida (Feb. 2010), available at http://www.nrel.gov/docs/fy10osti/48853.pdf.

65 *Assessment Pilots/Grants*, OBLR, U.S. EPA (Sept. 29, 2010), www.epa.gov/brownfields/assessment_grants.htm.

66 *Cleanup Grants*, OBLR, U.S. EPA (Feb. 17, 2011), www.epa.gov/brownfields/cleanup_grants.htm.

67 *Revolving Loan Fund Pilot/Grants*, OBLR, U.S. EPA (Jan. 19, 2007), www.epa.gov/brownfields/rlflst.htm.

68 *Environmental Workforce Development and Job Training*, OBLR, U.S. EPA (July 11, 2011), http://www.epa.gov/brownfields/job.htm.

69 EPA's OBLR has compiled links to information on these and related programs on its Grants and Funding webpage at http://epa.gov/brownfields/grant_info/index.htm. In addition, Brownfields Economic Development Initiative grants, offered in the past by the U.S. Department of Housing and Urban Development ("HUD"), have provided helpful funds to assist cities with the redevelopment of old industrial and commercial sites. Due to funding constraints, these grants are not available in 2012, but may potentially be offered again in the future. *Brownfields Economic Development Initiative (BEDI)*, Office of Community Planning & Development, U.S. HUD (June 17, 2011), http://www.hud.gov/offices/cpd/economicdevelopment/programs/bedi/index.cfm.

70 *See EERE Financial Opportunities*, EERE, U.S. DOE (Apr. 26, 2010), http://www1.eere.energy.gov/financing/, and *Energy*, Rural Development, USDA (Aug. 18, 2011), http://www.rurdev.usda.gov/Energy.html for more information about currently available funding opportunities available through these agencies.

71 For more information, inquire with the USDA Rural Development office in your state. A list of state offices may be found at http://www.rurdev.usda.gov/recd_map.html.

Exelon-Epuron Solar Center
Location: Bucks County, Pennsylvania, *Size:* 3 MW

STATE GOVERNMENT INCENTIVES

Incentives for renewable energy and brownfields redevelopment vary considerably from state to state. The most critical feature of state policy influencing the economic feasibility of renewable energy projects (on brownfields and elsewhere), as discussed above, is the strength of a state's renewable portfolio standard, and the degree to which carve-outs exist for the kinds of renewable energy technologies, such as solar, that are appropriate for brownfields development. State policies that require or permit the net metering arrangements discussed above are also an important factor influencing the economic feasibility of renewable energy projects. In addition to these policies that shape the markets for renewable energy and RECs, many states provide a variety of incentives for renewable energy projects that can support renewable energy development on brownfields. State financial incentives include property tax relief, bond programs, revolving loan funds, and grants.

The DSIRE site, http://www.dsireusa.org, offers a map of the United States that allows users to click on a state to view all of the renewable energy incentives offered by that state, as well as any incentives offered by local governments and the state's utilities. In addition, state department of natural resources or environmental protection websites can provide information about any state programs promoting brownfields redevelopment.[72]

In the most hospitable environments for renewable energy on brownfields development, a strong market for RECs created by the state's renewable portfolio standard is coupled with robust net metering programs and other incentives, including tax benefits and streamlined regulatory processes. For example, New Jersey has been widely considered one of the most favorable economic environments in the country for solar development on brownfields. Although the state's 2011 draft

72 *See* note 38.

73 *See e.g.*, New Jersey, 2011 Draft Energy Master Plan at 7, 94 ("NJ Draft EMP"), *available at* http://nj.gov/emp/docs/pdf/2011%20Draft%20Energy%20Master%20Plan.pdf.

74 *Id.* at 7 ("Brownfield sites and landfills are well-suited for the development of large solar generation projects. Large-scale solar development can offset the costs to cap or remediate these sites and should be encouraged.").

75 *See New Jersey Incentives/Policies for Renewables & Efficiency*, DSIRE (Oct. 21, 2011), http://dsireusa.org/incentives/index.cfm?getRE=1?re=undefined&ee=1&spv=0&st=0&srp=1&state=NJ. For example, New Jersey's Renewable Energy Manufacturing Incentive ("NJREMI") program offers rebates to individuals, businesses, local governments, and non-profit organizations that purchase qualifying solar equipment, following advance application and registration with the state's SREC program. *See Renewable Energy Manufacturing Incentive,* New Jersey Clean Energy Program (Oct. 21, 2011), http://www.njcleanenergy.com/renewable-energy/programs/renewable-energy-manufacturing-incentive.

76 *See* N.J. Stat. § 54:4-3.113a *et seq.*

77 *See* N.J. Stat. § 54:32B-8.33; N.J. Admin. Code § 18:24-26.1 *et seq.*

78 *See* N.J. Stat. § 48:3-87; N.J. Admin. Code § 14:8-4.1 *et seq.*

79 *See Net Metering and Interconnection*, New Jersey Clean Energy Program (Oct. 21, 2011), http://www.njcleanenergy.com/renewable-energy/programs/net-metering-and-interconnection.

80 *See* N.J. Stat. § 46:3-24 *et seq.*

81 *SREC Registration Program*, New Jersey Clean Energy Program (Oct. 21, 2011), http://www.njcleanenergy.com/renewable-energy/programs/solar-renewable-energy-certificates-srec/new-jersey-solar-renewable-energy; *Clean Energy,* New Jersey Board of Public Utilities (Feb. 24, 2011), http://www.bpu.state.nj.us/bpu/divisions/cleanenergy/.

82 *See Clean Energy*, New Jersey Board of Public Utilities (Feb. 24, 2011), http://www.bpu.state.nj.us/bpu/divisions/cleanenergy/.

Energy Master Plan proposes to reduce the state's emphasis on solar incentives in light of economic and other concerns,[73] it continues to emphasize the importance of solar and other renewables development on brownfields in particular. For example, the draft Master Plan establishes as a goal the development of large solar projects on brownfields in order to offset brownfield remediation costs.[74]

A minimum solar requirement in New Jersey's renewable portfolio standard has created a robust SREC market and substantial stimulus for solar project development in the state. This has been bolstered by a wide array of other state incentives for the development of renewable facilities, including special financing programs for eligible solar installations, grants, tax exemptions, and rebates.[75] For example, state law has exempted from local property taxes renewable energy systems that are used to meet on-site electricity, heating, cooling, or other energy needs.[76] Solar energy equipment has been exempted from the state's sales tax.[77] Renewable energy resources are eligible for net metering,[78] and the state's interconnection procedures clarify and simplify interconnection for most residential and small commercial facilities.[79] New Jersey has also made efforts to standardize solar access easements.[80] Although changing state priorities may make its future as a leader in renewable, and particularly solar, energy development uncertain, New Jersey has an impressive track record: in 2001, New Jersey launched its Clean Energy Program with only six solar installations in place at that time, but is now second only to California in terms of installed solar capacity,[81] with over 6,000 solar projects.[82]

Already a leader in renewable energy development, Massachusetts recently announced plans to further ramp up its programs to promote renewable generation projects. Using funds from a variety of sources, including a utility systems benefits charge and federal awards, and anticipating long-term savings in the areas of avoided fuel costs, price suppression, increased economic activity in the state, and decreased pollution, Massachusetts plans to have 250 MW of solar power online by 2017, up from 3.5 MW in 2006, and 90 MW scheduled to be operational by the close of 2011.[83] A 5.6 MW solar installation will begin generating energy by the end of 2011 at a large landfill site in the town of Canton, Massachusetts, that has been closed for twenty years.[84] According to the state, in-state jobs in solar manufacturing, installation, and related services nearly tripled between 2007 and 2010.[85] Installed wind capacity also increased ten times during that period.[86]

Massachusetts's efforts to attract investments in renewable energy, as New Jersey's have been, are diverse and wide-reaching. They include a renewable portfolio standard and SREC program, together with a mixture of grants, loans, rebates, and tax incentives.[87] The state has put in place a net metering policy[88] and standardized interconnection procedures.[89] State laws also formalize solar access provisions and enable local zoning boards to issue permits that create solar access rights.[90] In combination, these programs have the potential to provide both the necessary structure and incentives to foster renewable energy investments on brownfields and elsewhere.

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83 Lisa Wood, *The Greening of Massachusetts Requires Money, Maneuvering and Moxie, New Energy Chief Finds*, Electric Utility Week (Aug. 29, 2011).

84 Kay Lazar, *Canton Dump May Soon Be a Solar Powerhouse,* Boston Globe (Jan. 31, 2011), *available at* http://articles.boston.com/2011-01-31/news/29336677_1_solar-projects-solar-panels-solar-installations.

85 Ian A. Bowles, Massachusetts Secretary of Energy and Environmental Affairs, Massachusetts Clean Energy and Climate Plan for 2020 at ES-1 (Dec. 29, 2010), *available at* http://www.mass.gov/Eoeea/docs/eea/energy/2020-clean-energy-plan.pdf.

86 *Id.*

87 *See RPS and APS Program Summaries,* Massachusetts Executive Office of Energy and Environmental Affairs (Nov. 21, 2011), http://www.mass.gov/eea/energy-utilities-clean-tech/renewable-energy/rps-aps/rps-and-aps-program-summaries.html and *About the RPS Solar Carve-Out Program*, Massachusetts Executive Office of Energy and Environmental Affairs (Nov. 21, 2011), http://www.mass.gov/eea/energy-utilities-clean-tech/renewable-energy/solar/rps-solar-carve-out/about-the-rps-solar-carve-out-program.html.

88 *See Net Metering in Massachusetts*, Massachusetts Department of Energy Resources, (Nov. 21, 2011), http://sites.google.com/site/massdgic/Home/net-metering-in-ma.

89 *See Massachusetts DG* and *Interconnection Main Page*, Massachusetts Department of Energy Resources (Nov. 21, 2011), http://sites.google.com/site/massdgic/Home.

90 *See Massachusetts Incentives/Policies for Renewables & Efficiency, Solar Easements & Rights Laws*, DSIRE (Feb. 1, 2011), http://dsireusa.org/incentives/incentive.cfm?Incentive_Code=MA02R&re=1&ee=1.

Action Items ▸ Steps Local Governments Can Take To Promote Renewable Energy Development On Brownfields In Their Communities

Although federal and state incentive programs are important, there are a number of things local governments can do to encourage renewable energy development on brownfields. From direct financial assistance, such as tax incentive, grant and rebate programs, to low- or no-cost steps that can help create an environment in which project participants encounter fewer obstacles in terms of delay, paperwork, and other constraints that discourage or forestall otherwise feasible projects, local governments across the country are implementing policies to help make these projects happen.

▸ SPEARHEAD A PROJECT OR PARTICIPATE IN A DEVELOPMENT PARTNERSHIP

Municipalities can take the lead in getting a brownfield-sited renewable energy project off the ground. Because of their unique position as the entity with a broad view of the benefits of the redevelopment, cities often have the ability and motivation to pull together various public and private resources to spur renewable energy projects on brownfields in their communities. These activities can include initial site identification and scoping, pursuit of funding, and partnering with private developers who can bring needed knowledge and capital to the project.

For example, the City of Lackawanna, New York, aggressively pursued renewable energy development for its brownfields and played a key role in making the Steel Winds project, a large wind farm located on the site of a former Bethlehem Steel plant, a reality. The City investigated the possibility of redevelopment on a number of area brownfields with funds from a $200,000 EPA brownfield assessment grant and ultimately selected the former steel mill property. Lackawanna then formed a partnership with two developers to establish a renewable energy development strategy for the site. Under the terms of the partnership, the City agreed to receive a payment in lieu of property taxes: $100,000 per year for the first fifteen years of the project's existence. Steel Winds' eight wind turbines produce enough energy to power about 9,000 homes, and an additional six turbines are planned for the site.[91]

Brockton Brightfields
Location: Brockton, Massachusetts, *Size:* 425 kW

91 *See* OSWER, U.S. EPA, Success Stories – Siting Renewable Energy on Contaminated Land Steel Winds, Lackawanna, New York, *available at* http://www.epa.gov/oswercpa/docs/success_steelwinds_ny.pdf; Jay Tokasz, *Spinning Forward for Energy*, The Buffalo News (July 30, 2011), *available at* http://www.buffalonews.com/city/communities/erie-county/article507006.ece.

PROVIDE TAX INCENTIVES

As demonstrated by the Steel Winds project, a key financial incentive that local governments can offer project developers is a "payment in lieu of taxes" arrangement in which the owner of the renewable energy facility pays an annual fixed fee to the local government instead of property taxes. This can provide certainty for developers and, in some cases, reduce the tax burden on the renewable project developer and play an important role in making a renewable energy project financially viable.

PROVIDE OTHER FINANCIAL ASSISTANCE

Any offer to contribute to the costs of cleanup or development is obviously a significant incentive to brownfields redevelopers, and a wide variety of such local grant programs exist. The New York City Brownfield Incentive Grant program, for example, provides grants of up to $100,000 for the costs of pre-development studies, environmental investigations, cleanups, and insurance, and more.[92] Many local governments also offer rebates to help offset the costs of renewable energy facilities, such as the City of Maricopa, Arizona's rebates of up to $3,000 for residential and commercial solar installations.[93]

PURCHASE THE POWER PRODUCED BY A BROWNFIELD-SITED RENEWABLE ENERGY FACILITY

Local governments in states that allow customers to choose their power supplier ("retail choice" states) can play a direct role in facilitating the development of specific renewable energy projects on brownfields in their communities by entering into a long-term arrangement to purchase the output of those projects to meet the municipal government's energy needs. As discussed on page 17, long-term PPAs can be key to getting a project off the ground. By entering into a long-term PPA for a project's power, a local government can provide the financial assurances necessary for developers to secure capital, while simultaneously locking in long-term savings on electricity costs for the local community.[94] As noted on page 8, the cities of Greenfield, Massachusetts and Rifle, Colorado were each able to enter into long-term PPAs to buy the output of brownfield-sited renewable energy facilities at prices lower than they were previously paying for conventional power supplies.[95]

OFFER RENEWABLE ENERGY DEVELOPERS LEASE DISCOUNTS ON LOCAL GOVERNMENT-OWNED BROWNFIELD SITES

If a local government owns a brownfield site appropriate for renewable energy development, it can offer to lease the land to a renewable energy developer at a discounted rent. The lower rent can help to offset the additional expenses, such as cleanup, developers may incur in developing a brownfield site, or compensate for brownfield-specific engineering complications that introduce costs or limit revenues. Reduced rent costs can also help the developer offer a lower power price to the electricity consumer, making it more likely that the developer can secure a long-term PPA. If the municipal government is the power purchaser, offering a lower rent can be part of negotiating a lower power price. Local governments that are not in the market for power supplies can still negotiate tangible benefits from offering discounted rents. For example, Sarasota County, Florida is in talks to lease a county landfill to Florida Power & Light at no cost for the development of the state's largest solar panel array; Sarasota County would have the option to buy the facility or the energy it produces after eight years.[96]

PROVIDE PERMITTING ASSISTANCE

A maze of federal, state and local permitting requirements is often a major obstacle to project development. Before a project can go forward, developers must demonstrate that a project is—and will remain—in compliance with a variety of federal, state and local regulations, including those relating to construction (e.g. materials, insurance, building practices), environmental and other resource protection (e.g. air, water, endangered species, native lands, wetlands),

92 New York City Mayor's Office of Environmental Remediation, New York City's Brownfield Incentive Grant (BIG) Program: Reducing the Cost of Cleanup and Redevelopment of NYC Brownfields (2010), *available at* http://www.nyc.gov/html/oer/downloads/pdf/BIG_Report.pdf.

93 The rebates apply to residential installations up to 10 kW and commercial installations up to 20 kW. *See Arizona Incentives/Policies for Renewables & Efficiency, City of Maricopa - Solar Rebate Program*, DSIRE (Sept. 8, 2011), http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=AZ53F&re=1&ee=1.

94 For more useful information on PPAs see NREL, Report No. FS-6A2-46668, Power Purchase Agreement Checklist for State and Local Governments (Oct. 2009), *available at* http://www.nrel.gov/docs/fy10osti/46668.pdf. PPAs are complex legal documents that often involve significant commitments of time and money; municipalities should engage knowledgeable counsel to assist in negotiating and drafting power purchase arrangements.

95 Note that the ability of a renewable generation facility owner to sell energy at prices comparable to, or even somewhat lower than, prices for energy produced by conventional generation sources (such as coal- or gas- fired generating facilities), often depends on the strength of the relevant REC market and the availability of tax incentives, each of which can offset the sometimes higher price of renewable energy.

96 Lauren Mayk, *FPL Has Sunny Spot for Solar Panel Project*, The Herald Tribune (Mar. 18, 2006), *available at* http://www.heraldtribune.com/article/20060318/BUSINESS/603180635.

and energy production (e.g. state utility commission authorizations[97]). Local governments can promote project development both by staying familiar with applicable permitting requirements, and by streamlining the permitting process to the extent possible, by setting up a "one-stop" shop for local permitting issues, or working with federal and state agencies to coordinate the various permitting processes. The City of Santa Monica, California, for example, worked with industry trainers, developers, and others to develop guidelines on the basic information necessary for photovoltaic building permits, standardizing solar installation and inspection processes and ensuring that relevant code requirements are satisfied.[98] Portland, Oregon provides expedited online permitting for residential solar installations when the applicant's contractor has received certain advance training from the city.[99] Local governments can also create incentives by waiving permitting fees for brownfield-sited renewable energy projects. Finally, as discussed on page 13, local policies that, for permitting purposes, tailor cleanup standards to the specific use of the site can promote brownfields reuse by reducing costs.

LOWER ZONING HURDLES

One of the most important ways a local government can encourage the development of renewable energy projects on brownfields is by ensuring that its zoning regulations do not place undue obstacles in the way of project development. Laws that require renewable energy developers to obtain a zoning variance in order to construct a renewable energy project can delay projects, increase costs, and stoke community opposition—producing a less friendly environment for renewable energy project development. By ensuring that zoning regulations are, from the outset, compatible with the development of renewable energy projects on brownfield sites, local governments can help reduce uncertainty. Some local governments have tried to facilitate renewable energy development by providing clear, flexible siting guidelines for particular types of renewable energy projects. For example, in Texas, the Austin City Code allows solar installations to exceed standard zoning height limits by fifteen percent or the amount necessary to comply with federal or state regulation. The code also facilitates the incorporation of renewable energy generation technologies into preservation plans for historic districts.[100]

FOSTER A LOCAL MARKET FOR RENEWABLE ENERGY

Local government policies can stimulate local markets for renewable energy. One way to increase demand for local renewable energy development is to institute a municipal green power purchasing requirement, through which a municipal government requires its agencies to purchase a certain amount of renewable energy to power their buildings and facilities. For example, a 2007 executive order issued by the mayor of Boston created a green power purchasing goal of eleven percent for that city's government, with a goal of fifteen percent green power purchases by 2012.[101] In Michigan, the cities of Ann Arbor, Grand Rapids, and Lansing all maintain green power purchasing requirements, as does Chicago, Illinois, which has achieved a twenty percent renewable energy purchasing level.[102] The City of Aspen set a goal of sourcing seventy-five percent of its municipal power from renewable resources by 2010 and met this target by 2006; by 2020, it plans to use 100 percent renewable energy.[103]

To encourage renewable energy development on brownfields in particular, green purchasing policies can establish carve-outs for renewable energy that is produced on brownfields, or for technologies (such as wind and solar) that are well-suited for local brownfields redevelopment. Alternatively, localities can provide bonus points or special consideration to power produced on a brownfield site in their requests for proposals for electricity supply.

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97 Depending on state requirements, utility-scale renewable energy projects may require a Certificate of Need from the state public utility commission before construction can begin; where applicable, this requirement is usually triggered at a certain MW threshold and is granted to projects for which there is a demonstrated need within the state for increased energy capacity or for that technology.

98 *See California Incentives/Policies for Renewables & Efficiency, City of Santa Monica - Building Permit Fee Waiver for Solar Projects*, DSIRE (Dec. 7, 2010), http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=CA129F&re=1&ee=1.

99 *Solar Permitting in Portland*, Bureau of Planning and Sustainability, City of Portland, Oregon (Nov. 2010), http://www.portlandonline.com/bps/index.cfm?c=47394&.

100 *See* Austin City Code §§ 25-2-356(c) and 25-2-531.

101 *See* Executive Order of Mayor Thomas M. Menino, An Order Relative to Climate Action in Boston (Apr. 13, 2007), *available at* http://www.cityofboston.gov/Images_Documents/Clim_Action_Exec_Or_tcm3-3890.pdf.

102 *See Michigan Incentives/Policies for Renewables & Efficiency*, DSIRE (Oct. 21, 2011), http://www.dsireusa.org/incentives/index.cfm?getRE=1?re=undefined&ee=1&spv=0&st=0&srp=1&state=MI; *Illinois Incentives/Policies for Renewables & Efficiency, City of Chicago – Green Power Purchasing*, DSIRE (Jan. 6, 2011), http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=IL05R&re=1&ee=1.

103 *See Green Initiatives: Renewable Energy*, The City of Aspen and Pitkin County (Nov. 10, 2011), www.aspenpitkin.com/Living-in-the-Valley/Green-Initiatives/Renewable-Energy/.

Municipal Utilities

Because of their expertise, authority, and local focus, municipal utilities are uniquely positioned to implement policies that can promote renewable energy development on brownfield sites in their communities. Municipal utilities have, for example:

- Implemented net metering or feed-in tariff programs that allow locally-sited generation to sell power to the utility. Examples include the Gainesville (FL) Regional Utilities' Solar Feed-In Tariff Program, which provides participants a higher rate for energy produced from PV systems installed on a roof or paved area rather than on a greenfield (https://www.gru.com/OurCommunity/Environment/GreenEnergy/solar.jsp) and Austin Energy's net metering program for retail customers with renewable energy generators up to 20 kW (http://www.austinenergy.com/about%20us/rates/distributedGenerationFromRenewableSources.htm);
- Created standard interconnection policies and agreements that allow renewable generation projects to connect to the utility's electric system, like those put in place by the Sacramento Municipal Utility District in California (http://www.smud.org/en/business/raterequirements/Pages/Interconnection.aspx) and many other municipal utilities around the country;
- Partnered with project developers and customers to play a key role in project development and operation. For example, Colorado Springs Utilities was a part of a multi-agency effort to develop a 2 MW solar facility on a landfill at the U.S. Army's Fort Carson base in Colorado (http://www.epa.gov/oswercpa/docs/success_fortcarson_co.pdf);
- Set aggressive renewable energy supply goals. In some states, renewable portfolio standard requirements do not apply to municipal utilities; however, municipally owned utilities can set their own ambitious targets for obtaining power supplies from renewable energy resources, like the San Antonio, Texas municipal utility, CPS Energy, has done through its goal of obtaining 1500 MW of renewable energy by 2020 (http://www.cpsenergy.com/files/Vision_2020.pdf); and
- Purchased power from a renewable energy facility sited on a brownfield. For example, Columbia (MO) Water and Light purchases about two percent of its power needs from a 3.2 MW landfill-gas-to-energy facility located in Jefferson City, Missouri (http://www.epa.gov/lmop/projects-candidates/profiles/jeffersoncitymorenewablee.html).

PROVIDE OR ASSIST IN PROVIDING TECHNICAL ASSISTANCE

Providing advice or technical assistance via a website or hotline, or matching interested parties with free or low-cost legal, scientific, or technical experts is another way for local governments to facilitate the development process. For example, the City of New York operates a *pro bono* environmental expert referral program to help brownfields stakeholders move their projects forward and provides technical assistance, including guidance from city science and engineering experts.[104] The city also maintains a website called the Searchable Property Environmental E-Database ("SPEED"), which brings together maps and databases of information about commercial and industrial sites in the city, their environmental characteristics, historical uses and more.[105] Making resources (such as brownfields catalogues or maps, and assessments of the suitability of sites for renewable energy projects) readily available can help make project development easier and more likely.

Chevron Casper Wind Farm
Location: Natrona County, Wyoming, *Size:* 16.5 MW

104 *NYC Brownfield Partnership*, Office of Environmental Remediation, New York City ("NYC OER") (Oct. 21, 2011), http://www.nyc.gov/html/oer/html/community/partnership.shtml; *Environmental Technical Assistance*, NYC OER (Oct. 21, 2011), http://www.nyc.gov/html/oer/html/community/assistance.shtml.

105 *SPEED*, NYC OER (Oct. 21, 2011), http://www.nyc.gov/html/oer/html/SPEED/SPEED.shtml.

ASSIST IN DETERMINING THE POTENTIAL FOR LIABILITY AND ENACTING ADEQUATE LIABILITY SHIELDS

As discussed on page 12, liability is a highly fact-specific issue that can be the cause of great uncertainty as to the final cost and potential for success of a project. Local governments can play an integral role in attracting development by taking action to limit liability concerns. A primary means of managing liability is by conducting, or encouraging parties to conduct, a thorough liability risk assessment for all parties who may be potentially involved in a renewable energy project and, if possible, actively negotiating with state/federal environmental protection agencies to clarify and issue property-specific documents for the targeted site.

Because an All Appropriate Inquiry is often a prerequisite to qualify for brownfield grants and liability defenses, local governments can also help spur development by conducting or encouraging current property owners to conduct an AAI of a site. Not only does an AAI provide interested parties with an opportunity to secure additional financing and obtain legal protections, it helps clarify the extent of contamination, allowing interested parties to obtain estimates on the cost of cleaning up a site for redevelopment. In states with voluntary cleanup programs, if contamination is found on the site, local governments that own the brownfield property can enter, or encourage the current property owner to enter, the site into the state voluntary cleanup program, which can qualify parties for liability relief.

FACILITATE INTERCONNECTION

As noted on page 14, the process of interconnecting a renewable energy project to the grid can be time-consuming and expensive. Local governments should familiarize themselves with the applicable interconnection standards in their area in order to help developers to move through this process, and encourage early action on interconnection procedures for local projects. Local governments can also incentivize project development by offering to share in the interconnection study costs.

LAY THE GROUNDWORK THROUGH COMMUNITY OUTREACH

As many local government officials are well aware, infrastructure development–especially brownfields redevelopment–can engender controversy and concern among residents and businesses. Renewable energy development on brownfields is no different. For example, community members may be concerned about a project's visual and environmental impacts, and the potential release and spread of contamination. Local government can help make these projects happen by engaging in community education and outreach to address these concerns and by publicizing the benefits of the project.

Construction of the Summitville Mine Hydroelectric Project's penstock.

Conclusion

Renewable energy development on brownfields is an involved process, but can pay a host of dividends to local communities, including bringing new life to blighted properties, green power to the grid, and revenue streams to city government. Project feasibility, however, depends on a variety of interrelated factors, from the availability of specific geographic resources to the landscape of related regulations, markets, and incentive programs in the region where a project is being considered. For local governments looking to attract developers to their regions or spearhead renewable energy projects on brownfield in their communities, education and proactivity is key. For more information on any of the strategies, resources, or topics addressed in this paper, please see the attached resource guide or contact NALGEP.

Appendix

Resources for more information on the development of renewable energy on brownfields

TABLE OF CONTENTS

General Resources

SITING RENEWABLE ENERGY ON POTENTIALLY CONTAMINATED LAND AND MINE SITES

http://www.epa.gov/renewableenergyland

U.S. Environmental Protection Agency ("EPA")
RE-Powering America's Land

EPA's RE-Powering America's Land initiative was created to encourage the development of renewable energy on "current and formerly contaminated land and mine sites when it is aligned with the community's vision for the site." The website includes technical resources for identifying renewable energy potential of potentially contaminated land and mine sites, maps, case studies, factsheets on renewable energy technologies and state-by-state incentives, information on financial and technical assistance, and links to other relevant resources.

DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY (DSIRE)

www.dsireusa.org

N.C. Solar Center and the Interstate Renewable Energy Council

The DSIRE website is a comprehensive database of information on state, local, utility, and federal incentives and policies that promote renewable energy and energy efficiency. Included on the website is information on renewable energy portfolio standards, interconnection and net metering policies, financial incentives, and rules and regulations applicable to the development of renewable energy. The website also offers a clickable map of the United States which links to information about laws, policies and incentives specific to each state.

BROWNFIELDS AND LAND REVITALIZATION

http://www.epa.gov/brownfields/index.html

U.S. EPA Office of Brownfields and Land Revitalization ("OBLR")

The U.S. EPA OBLR is the primary source of information on brownfield laws and regulations, technical assistance, grants and funding, and cleanup and redevelopment options. The OBLR website also provides links to tribal (http://www.epa.gov/brownfields/state_tribal/tribe_progs.htm) and state/ territory (http://www.epa.gov/brownfields/state_tribal/state_map.htm) brownfield programs, and a list of state voluntary cleanup programs ("VCP") Memorandums of Agreement ("MOA") and Memorandums of Understanding ("MOU") (http://www.epa.gov/brownfields/state_tribal/moa_mou.htm). MOAs and MOUs promote coordination between the EPA and state environmental programs and define the general roles of the agencies regarding the cleanup of sites.

SUPERFUND REDEVELOPMENT

http://www.epa.gov/superfund/programs/recycle/index.html

U.S. EPA Office of Solid Waste and Emergency Response ("OSWER")

U.S. EPA's Superfund Redevelopment website provides a wealth of information on options, policies, case studies, and resources for redeveloping Superfund sites. The website also offers information on redeveloping contaminated sites with renewable energy (http://www.epa.gov/superfund/programs/recycle/activities/altenergy.html).

Brownfield Redevelopment

BROWNFIELDS: A COMPREHENSIVE GUIDE TO REDEVELOPING CONTAMINATED PROPERTY (2010)

Available for purchase at http://apps.americanbar.org/abastore/index.cfm?section=main&fm =Product.AddToCart&pid=5350192

American Bar Association

This book puts brownfields redevelopment into a current context and then focuses on the most important legal, business, financial, and political issues associated with redeveloping contaminated property. The guide also offers discussions on brownfield laws and policies for each state.

UNLOCKING BROWNFIELDS: KEYS TO COMMUNITY REVITALIZATION (2004)

http://www.resourcesaver.com/file/toolmanager/CustomO93C337F65023.pdf

NALGEP and the Northeast-Midwest Institute

This report encapsulates a decade of research and experience on brownfields reuse. The report includes over fifty profiles of successful brownfields projects and programs, four comprehensive findings, and "10 Keys to Brownfield Success."

ROAD MAP TO UNDERSTANDING INNOVATIVE TECHNOLOGY OPTIONS FOR BROWNFIELDS INVESTIGATION AND CLEANUP (PUB. NO. 542-B-05-001, 2005)

http://www.brownfieldstsc.org/roadmap/home.cfm

U.S. EPA Office of Superfund Remediation and Technology Innovation

The Road Map outlines the steps involved in site investigation and cleanup and introduces stakeholders to the range of technology options and available resources. The website provides additional features to assist users in finding additional information and locating cleanup resources. A new edition of the road map is expected to be released in Winter 2012.

CONTAMINATED SITE CLEAN-UP INFORMATION (CLU-IN)

http://www.clu-in.org

U.S. EPA OSWER

CLU-IN provides information about innovative treatment and site characterization technologies and acts as a forum for waste remediation stakeholders.

SUPERFUND INSTITUTIONAL CONTROLS: GUIDANCE

http://www.epa.gov/superfund/policy/ic/guide/index.htm

U.S. EPA OSWER

This webpage provides links to EPA's publications on Institutional Controls. These publications provide brownfield and other contaminated land corrective action site managers and site attorneys an overview of EPA policies regarding the roles and responsibilities of parties involved in planning, implementing, maintaining, and enforcing institutional control activities.

Renewable Energy

RENEWABLE ENERGY

http://www.eere.energy.gov/topics/renewable_energy.html

U.S. Department Of Energy ("DOE") Office of Energy Efficiency and Renewable Energy ("EERE")

EERE provides basic information on the various renewable energy technologies and Department of Energy initiatives associated with each technology.

RENEWABLE ENERGY BASICS

http://www.nrel.gov/learning/re_basics.html

National Renewable Energy Laboratory ("NREL")

This website describes NREL's research in renewable energy technologies and provides information on various applications of renewable energy.

RENEWABLE ENERGY EXPLAINED

http://www.eia.gov/energyexplained/index.cfm?page=renewable_home

U.S. Energy Information Administration

This webpage provides general information on renewable energy and its role in the U.S., and provides links to basic information in various renewable energy technologies.

SOLAR AMERICA COMMUNITIES

http://solaramericacommunities.energy.gov

U.S. DOE EERE

Solar America Communities is a U.S. DOE initiative to accelerate the adoption of solar energy technologies by local governments. In addition to information about the Solar America Cities program (http://solaramericacommunities.energy.gov/solaramericacities/), the website also has links to DOE's Solar Energy Technologies Program (http://www1.eere.energy.gov/solar/) which provides technical and financial resources for solar energy deployment and DOE publications targeted towards local governments such as Solar Powering Your Community: A Guide for Local Governments (2011) (http://solaramericacommunities.energy.gov/resources/guide_for_local_governments/).

WIND POWERING AMERICA

http://www.windpoweringamerica.gov

U.S. DOE EERE

Wind Powering America is a DOE initiative designed to "educate, engage, and enable critical stakeholders to make informed decisions about how wind energy contributes to the U.S. electricity supply." The Wind Powering America website provides technical resources, case studies, updated data on installed wind capacity, and more. Included on the website are links to high-resolution national and individual state wind energy maps (http://www.windpoweringamerica.gov/wind_maps.asp), information on the anemometer loan program (http://www.windpoweringamerica.gov/anemometer_loans.asp), and economic assessment tools (http://www.windpoweringamerica.gov/economics.asp).

Electric Industry and Interconnection

A NEOPHYTE'S GUIDE TO THE CHANGING ELECTRIC UTILITY INDUSTRY (2D ED., MAY 2011)

http://www.publicpower.org/files/Neophytes%20Guide.pdf

American Public Power Association ("APPA")

The purpose of this guide is to provide the basic background knowledge about the electric utility industry and its institutions.

UNDERSTANDING ELECTRICITY MARKETS (2006)

Available for purchase at http://www.publicpower.org/store/ProductDetail.cfm?Item Number=27143

Gary J. Newell and Ransom E. (Ted) Davis
Thompson Coburn LLP
APPA

This booklet expands on the role of regional transmission organizations ("RTOs") in the electricity industry.

GENERATOR INTERCONNECTION

http://www.ferc.gov/industries/electric/indus-act/gi.asp

Federal Energy Regulatory Commission ("FERC")

The FERC website provides information on federal interconnection policies.

Technical Assistance

RENEWABLE ENERGY POTENTIAL FOR BROWNFIELD REDEVELOPMENT STRATEGIES (NREL/PO-640-40844, NOV. 2006)

http://www.nrel.gov/docs/fy07osti/40844.pdf

NREL

This factsheet provides information on the availability of renewable energy resources and the process for identifying suitable renewable energy technologies for a brownfield.

CONVERTING LIMBO LANDS TO ENERGY-GENERATING STATIONS: RENEWABLE ENERGY TECHNOLOGIES ON UNDERUSED, FORMERLY CONTAMINATED SITES (NREL/TP-640-41522, 2007)

http://www.nrel.gov/docs/fy08osti/41522.pdf

NREL

The report discusses reasons for considering renewable energy technologies as redevelopment options on brownfields and abandoned mine lands, describes the geographic screening process, and identifies sites with high-potential for renewable energy redevelopment.

SOLAR POWER INSTALLATIONS ON CLOSED LANDFILLS: TECHNICAL AND REGULATORY CONSIDERATIONS (SEPT. 2009)

http://www.clu-in.org/download/techdrct/Sampson_Solar%20Power_Sept2009.pdf

Gabriel Sampson

This paper examines the current nature of solar energy developments on closed landfills using the following focal areas: solar power system considerations with respect to landfill applications, landfill technical and engineering considerations, and regulatory considerations.

Brownfield Technical Assistance:

THE BROWNFIELDS AND LAND REVITALIZATION TECHNOLOGY SUPPORT CENTER

http://www.brownfieldstsc.org/index.cfm

U.S. EPA, Argonne National Laboratory, and the U.S. Army Corps of Engineers

The Brownfields and Land Revitalization Technology Support Center ("BTSC") is a cooperative effort to provide technical support to federal, state, local, and tribal officials for questions related to the use of innovative technologies and strategies for site assessment and cleanup.

EPA'S TECHNICAL ASSISTANCE TO BROWNFIELDS (TAB) COMMUNITIES PROGRAM (JAN. 2009)

http://epa.gov/brownfields/tools/tab-bifold-2-11.pdf

U.S. EPA OSWER

EPA's TAB program provides geographically-based training and technical assistance on the cleanup and revitalization of brownfields. This brochure describes the program and services offered and provides contact information for the four TAB grantees: New Jersey Institute of Technology (NJIT) (serving EPA Regions 1, 2 and 3), HOPE Enterprise Corporation (serving EPA Regions 4 and 6), Kansas State University (KSU) (serving EPA Regions 5 and 7), and the Center for Creative Land Recycling (CCLR)–(serving EPA Regions 8, 9 and 10). Contact information for the TAB program can also be found at US EPA OBLR's Tools and Technical Information website at http://epa.gov/brownfields/tools/.

Renewable Energy Technical Assistance:

DIRECT TECHNICAL ASSISTANCE FOR ENERGY PROJECTS

http://www.nrel.gov/applying_technologies/state_local_activities/technical_assistance.html

NREL

This website provides information to state and local governments, Indian tribes, and overseas U.S. territories who are interested in applying for receive technical assistance from NREL for understanding and deploying energy efficiency and renewable energy technologies.

EPA/NREL FEASIBILITY STUDIES

http://www.epa.gov/renewableenergyland/studies.htm

U.S. EPA RE-Powering America's Land

This website describes EPA and NREL's collaborative effort to evaluate the feasibility of developing renewable energy production on Superfund, brownfields, and former landfill or mining sites. The website contains links to information about sites chosen for assessment and,

when applicable, requests for applications for future renewable energy feasibility studies (requests for applications have specific deadlines—parties should verify due dates prior to submitting a request to the EPA).

TECHNICAL ASSISTANCE PROGRAM BLOG

http://www.eereblogs.energy.gov/tap

U.S. DOE EERE

The Technical Assistance Program ("TAP") Blog provides a platform for local governments "to connect with technical and programmatic experts and share best practices about their renewable energy and energy efficiency programs." The website offers articles and webinars on areas of topical interest and including information on topics such as financing renewable energy systems, partnering with utilities, and technological updates. Archived copies of past TAP webinars can also be found at the U.S. DOE EERE Solution Center at http://www1.eere.energy.gov/wip/solutioncenter/webcasts/default.html.

Assessment Resources

RENEWABLE ENERGY RESOURCE MAPS AND SCREENING TOOLS

http://www1.eere.energy.gov/femp/technologies/m/renewable_resourcemaps.html

U.S. DOE EERE

This webpage outlines renewable energy resource maps and screening tools that can be used to assess the viability of renewable energy projects.

DRAFT LAND-BASED WIND ENERGY GUIDELINES (76 FED. REG. 9590, FEB. 18, 2011)

http://www.gpo.gov/fdsys/pkg/FR-2011-02-18/pdf/2011-3699.pdf

U.S. Fish and Wildlife Service

These draft voluntary guidelines provide developers and agency staff with an iterative process to make the best possible decisions in selecting sites to avoid and minimize negative effects to fish, wildlife and their habitats resulting from construction, operation and maintenance of land-based, wind energy facilities.

Mapping Resources:

RENEWABLE ENERGY INTERACTIVE MAPPING TOOL AND STATE AND NATIONAL MAPS

http://www.epa.gov/renewableenergyland

U.S. EPA RE-Powering America's Land

EPA's Renewable Energy Interactive Mapping Tool (http://www.epa.gov/renewableenergyland/mapping_tool.htm), a Google Earth KMZ file, makes it possible to view the renewable energy potential at specific brownfields, abandoned mines, and Superfund and RCRA sites. Users may search by renewable energy type or by contaminated land type. EPA's State and National Maps webpage (http://www.epa.gov/renewableenergyland/maps.htm) was developed in partnership with NREL; the maps provide information about opportunities for renewable energy generation on contaminated lands and mine sites in all fifty states.

RENEWABLE RESOURCES MAPS AND DATA

http://www.nrel.gov/renewable_resources

NREL

This webpage provides links to high-quality renewable energy resource data for U.S. and international locations and includes dynamic maps and Geographic Information System ("GIS") data. A link is included to NREL's Dynamic Maps, GIS Data & Analysis Tools webpage (http://www.nrel.gov/gis/), which offers low-resolution, high-resolution, and Google (KML/KMZ) map files for various renewable resources.

CLEANUPS IN MY COMMUNITY

http://iaspub.epa.gov/apex/cimc/f?p=255:63:8707231673851597

U.S. EPA OSWER

This webpage provides maps and lists areas where pollution is being or has been cleaned up throughout the United States. Currently the map only covers sites, facilities and properties for which EPA collects information by law, or voluntarily via grants; however, EPA is working with its state and local partners to expand the scope of the site to include non-federally tracked sites such as those that have entered into state voluntary cleanup programs.

RENEWABLE ENERGY AND DEFENSE GEOSPATIAL DATABASE (READ-DATABASE)

http://www.nrdc.org/energy/readgdb.asp

Natural Resources Defense Council ("NRDC") and the U.S. Department of Defense ("DoD")

Developed through a partnership between the NRDC and U.S. DoD, the READ-Database is a GIS-based analytic tool to identify sites which may be appropriate

for renewable energy projects, such as utility-scale wind, solar, and geothermal energy facilities, but that are unlikely to interfere with military activities and training, and have the fewest environmental conflicts. Although the READ-Database is free, interested parties must sign a licensing agreement with the NRDC in order to access the information.

Performance and Economic Assessment Resources:

ENERGY ANALYSIS MODELS AND TOOLS

http://www.nrel.gov/analysis/models_tools.html

NREL

This webpage provides a list of models and tools that can assist in generating performance and economic estimates of renewable energy technologies. Assessment tools include the PVWatts Calculator (http://www.nrel.gov/renewable_resources), which allows users to compare monthly and annual energy and economic value of various solar photovoltaic ("PV") systems, the Jobs and Economic Development Impact ("JEDI") Model (http://www.nrel.gov/analysis/jedi/), which allows users to analyze state and local economic impacts of constructing and operating renewable energy projects, and the System Advisor Model ("SAM") (https://sam.nrel.gov/), which allows users to calculate hour-by-hour performance and economic estimates of solar PV and concentrated solar power ("CSP") systems.

IN MY BACKYARD (IMBY)

http://www.nrel.gov/eis/imby

NREL

The IMBY tool is a map based tool that allows users to estimate the electricity produced with a solar PV array or wind turbine at a home or business based on the location, system size, and other variables.

RETSCREEN CLEAN ENERGY PROJECT ANALYSIS SOFTWARE

www.retscreen.net/ang/home.php

Natural Resources Canada

The RETScreen software allows users to evaluate the energy production, savings, costs, emission reductions, financial viability, and risk for various types of renewable and energy-efficient technologies.

Energy Sales and Renewable Energy Credits

QUALIFYING FACILITIES (QFS)

http://www.ferc.gov/industries/electric/gen-info/qual-fac.asp

Federal Energy Regulatory Commission

FERC provides information on the guidelines for eligibility, the process for becoming a certified QF, and major FERC orders that impact the certification process and rate treatment of QFs.

POWER PURCHASE AGREEMENT CHECKLIST FOR STATE AND LOCAL GOVERNMENTS (NREL/FS-6A2-46668, 2009)

http://www.nrel.gov/docs/fy10osti/46668.pdf

NREL

This factsheet addresses the financial, logistical, and legal questions relevant to implementing a solar PV power purchase agreement ("PPA"), but does not examine the technical details.

RENEWABLE ENERGY CERTIFICATES (RECS)

http://www.epa.gov/greenpower/gpmarket/rec.htm

U.S. EPA Green Power Partnership

This webpage provides information on RECs and how they work, as well as links to more in-depth resources.

Financing and Incentives

INCENTIVE FACTSHEETS (BY STATE)

http://www.epa.gov/renewableenergyland/incentives.htm

U.S. EPA RE-Powering America's Land

Each factsheet includes information on available funding, tax incentives, technical assistance and other incentives offered at the state level. In addition you can find information on renewable portfolio standards, net metering, public benefits funds, electricity generation by energy source, limitations on liability, estimated number of contaminated properties, and points of contact as of November 2008.

Brownfield Assessment and Redevelopment Financing and Incentives:

GRANTS AND FUNDING
http://epa.gov/brownfields/grant_info/index.htm
U.S. EPA OBLR
OBLR's webpage for grants and funding information, including direct funding for brownfields assessment, cleanup, revolving loans, and environmental job training.

A GUIDE TO FEDERAL TAX INCENTIVES FOR BROWNFIELDS REDEVELOPMENT (PUB. NO. 560-F-11-003, APR. 2011)
http://www.epa.gov/swerosps/bf/tax/tax_guide.pdf
U.S. EPA OSWER
This guide provides an overview of the key federal tax incentives and credits that can be leveraged for brownfields cleanup, redevelopment, and reuse.

BUSINESS AND INDUSTRY (B&I) LOAN GUARANTEE PROGRAM
http://www.rurdev.usda.gov/ne/gbifsht.pdf
USDA Rural Development
This factsheet is on the Business and Industry Loan Guarantee program which guarantees loans made by eligible local lenders to businesses to benefit rural areas.

COMMUNITY DEVELOPMENT FINANCIAL INSTITUTIONS FUND ("CDFI FUND")
www.cdfifund.gov
U.S. Department of the Treasury
This webpage provides information on the CDFI Fund's programs, including the New Markets Tax Credit Program, as well as information on eligibility guidelines, applications for awards, and technical assistance resources.

Renewable Energy Projects Financing and Incentives:

DSIRE
www.dsireusa.org
N.C. Solar Center and the Interstate Renewable Energy Council
DSIRE provides information on federal, state and local policies, tax incentives and grants impacting renewable energy development. Because the DSIRE website is usually updated on a regular basis, it is a good one-stop shop for initial research on the availability of incentives in a particular state.

FINANCIAL ASSISTANCE OPPORTUNITIES
http://www1.eere.energy.gov/financing
U.S. DOE EERE
This webpage offers information on types of EERE financial assistance, opportunities available, and how to apply.

LOAN PROGRAMS OFFICE
http://www.lgprogram.energy.gov
U.S. DOE
This website contains information from the Loan Programs Office on DOE programs, applications, and projects, as well as resources to help in the application process.

RENEWABLE ENERGY PRODUCTION INCENTIVE (REPI)
http://apps1.eere.energy.gov/repi
U.S. DOE EERE
This webpage provides information on the REPI program, eligibility, and how to apply for REPI's incentive payments.

RENEWABLE ENERGY TAX INCENTIVES
www.energy.gov/additionaltaxbreaks.htm
U.S. DOE
This webpage allows you to search for renewable energy tax credits, rebates, and savings available from utilities and state and local governments.

RURAL DEVELOPMENT ENERGY PROGRAMS
http://www.rurdev.usda.gov/Energy.html
U.S. Department of Agriculture ("USDA") Rural Development
This webpage provides links to and information on several of USDA's rural development energy programs including the Rural Energy for America Program ("REAP") which offers agricultural producers and rural small businesses loan guarantees and grants for purchasing, installing and constructing renewable energy systems and conducting feasibility studies (http://www.rurdev.usda.gov/BCP_Reap.html).

FEDERAL INCENTIVES FOR DEVELOPING COMBINED HEAT AND POWER PROJECTS
http://www.epa.gov/chp/incentives
U.S. EPA Combined Heat and Power ("CHP") Partnership
This website provides information and links to more resources on financial incentives, including tax incentives and grants, that can support the development of CHP and renewable energy projects. Programs discussed on this website include Renewable Electricity Production Tax Credits, Investment Tax Credits for Microturbines and Fuel Cells, the Renewable Energy Production Incentive (REPI), and State Energy Programs (SEP).

THE MODIFIED ACCELERATED COST RECOVERY SYSTEM (MACRS)

http://www.irs.gov/publications/p946/ch04.html

Internal Revenue Service

MACRS is used to recover the basis of most business and investment property placed in service after 1986. This webpage explains how to determine which MACRS depreciation system applies to your property and what information you need to know before you can figure depreciation under MACRS.

SOLAR PV PROJECT FINANCING: REGULATORY AND LEGISLATIVE CHALLENGES FOR THIRD-PARTY PPA SYSTEM OWNERS (NREL/TP-6A2-46723, FEB. 2010)

http://www.nrel.gov/docs/fy10osti/46723.pdf

Katharine Kollins, Bethany Speer, and Karlynn Cory

This paper summarizes five regulatory challenges to third-party electricity sales, when they occur, and how they have been addressed in five states. This paper also presents alternative to the third-party ownership PPA finance model.

Liability

SITING RENEWABLE ENERGY ON CONTAMINATED PROPERTIES: ADDRESSING LIABILITY CONCERNS (PUB. NO. 330-F-11-001, MAR. 2011)

http://www.epa.gov/compliance/resources/publications/cleanup/brownfields/re-liability.pdf

U.S. EPA Office of Enforcement and Compliance Assurance ("OECA"), Office of Site Remediation Enforcement ("OSRE"), and OSWER

This factsheet provides answers to some common questions that developers of renewable energy projects on contaminated properties may have regarding potential liability for cleaning up contaminated properties.

CLEANUP ENFORCEMENT: BROWNFIELDS AND LAND REVITALIZATION

http://epa.gov/compliance/cleanup/revitalization/index.html

U.S. EPA OECA

Through fact sheets, publications and links to additional resources, OECA provides guidance on liability laws and regulations as well as potential concerns and protection mechanisms for cleaning up and developing contaminated and potentially contaminated lands. The website also offers information on state voluntary cleanup programs (http://epa.gov/compliance/cleanup/revitalization/state.html), state and local government liability protections (http://epa.gov/compliance/cleanup/revitalization/local-acquis.html), and lender liability protections (http://www.epa.gov/compliance/resources/publications/cleanup/superfund/factsheet/lender-liab-07-fs.pdf).

REVITALIZING CONTAMINATED SITES: ADDRESSING LIABILITY CONCERNS (THE REVITALIZATION HANDBOOK) (PUB. NO. 330-F-11-002, MAR. 2011)

http://www.epa.gov/compliance/resources/publications/cleanup/brownfields/handbook/index.html

U.S. EPA OSRE and OECA

The Handbook summarizes the federal statutory provisions and EPA policy and guidance documents that address potential liability concerns of parties involved in the cleanup and revitalization of contaminated sites.

REDEVELOPMENT TOOLS, LIABILITY RELIEF TOOLS

http://www.epa.gov/renewableenergyland/tools.htm

U.S. EPA RE-Powering America's Land

This webpage lists and links to several liability relief resources.

Case Studies

SUCCESS STORIES AND CASE STUDIES ON SITING RENEWABLE ENERGY ON CONTAMINATED LAND AND MINE SITES

http://www.epa.gov/renewableenergyland/successstories.htm

U.S. EPA RE-Powering America's Land

This webpage links to factsheets that highlight contaminated land and mine sites that have been revitalized as viable source of renewable energy.

CLU-IN PROFILES OF GREEN REMEDIATION

http://www.clu-in.org/greenremediation/tab_d.cfm

U.S. EPA OSWER

This website offers site-specific factsheets on projects that utilized renewable energy projects to power remediation efforts.

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