

## Legacy Management Land Prospecting for Wind and Solar Power Production

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**Abstract** – The Department of Energy (DOE) is *Energizing America for a New Century*.<sup>1</sup> DOE's Office of Legacy Management (LM), the Office of Energy Efficiency and Renewable Energy (EERE), and the National Renewable Energy Laboratory (NREL) offer land use and incentives to wind and solar power industries to meet the President's agenda goals to "Increase the supply of dependable energy by strengthening efforts to develop alternative energy, such as wind and solar power, and to fully utilize federal real properties."

### I. INTRODUCTION

LM is custodian of radioactive ore-processing and mining sites with legacy wastes disposal systems requiring long-term surveillance and maintenance (LTSM). Large sites with suitable land buffer zones, surrounding low-level radioactive waste disposal cells and monitoring systems, can offer safe usage for renewable energy power production companies.

NREL and LM analyzed 80 properties for wind and solar energy resources. So far, LM has identified seven candidate wind power sites in Wyoming and two solar power sites in New Mexico as shown on the attached maps. Several more sites will be screening for their renewable energy power production reuse potential on a case-by-case basis. Overtime, LM expects more sites to be eligible for renewable energy reuse, as technologies advance to harvest lower wind and solar resources.

### II. PROSPECTING SITES

Although some sites are undergoing reclamation, portions of sites that meet wind or solar power sector acceptance criteria can incorporate future energy production usage into cleanup and LTSM plans. For example, the NREL utilizes 275 acres of the Rocky Flats, Colorado site for wind turbine research while the DOE is conducting cleanup and planning LTSM.

As a land reuse strategy, renewable energy power production can meet LM's strategic plan goal to "...make excess lands available for private use consistent with the

tenets of sustainability and good land management practices." As a reuse alternative, renewable energy sector use of LM sites for power generation, offers the following characteristics:

- industrial site use without hazardous waste generation or chemical usage;
- on-site energy workers to augment LM's LTSM annual site inspection with continuous monitoring and reporting unusual occurrences that could affect in-place disposal systems and land controls (e.g., fire, storms, trespassing);
- jobs and alternative energy for communities; and
- limit residential population encroachment adjacent to sites used for alternative energy production (e.g., large-scale wind farms).

LM and environmental regulators will ensure renewable energy site construction and usage will be protective of workers, human health, the integrity of disposal cells, and the environment.

LM and NREL will offer their assistance to renewable energy companies for prospecting suitable lands and providing technical support for safe construction. Private site owners conducting cleanup could chose to lease or sell a portion of their land not needed for LTSM, to an energy company. For some sites, a State government may decide to exercise its rights to acquire and manage a portion of a property destined to transfer to LM and then would work with a renewable energy company to permit or lease land usage. During remediation, land reuse options should be incorporated into the public participation process and approved by the Nuclear Regulatory Commission or other environmental regulators depending on the cleanup authority for the site.

#### *II a. Sites with Solar Power Resources*

LM and NREL are working together to determine the feasibility of building concentrated solar power production facilities on LM properties. NREL used their priority *Climatologically Solar Radiation Model* to obtain each site's average annual direct normal solar value. Sites with solar values of 7 or greater, using criteria developed by the DOE and BLM<sup>2</sup> to determine candidate sites for solar power production. Land criteria to site concentrating solar power facilities include: a relatively flat terrain; low winds; at least 200 to 500 acres suitable for construction; a water source; and close proximity to natural gas and electric power lines, roads, and population centers. Also, State incentives for renewable energy are

crucial.<sup>3</sup> To date, LM has screened two high candidate solar sites located near Bluewater and Grants, New Mexico.

Concentrated solar power facilities are similar to steam power plants. A dry tower system may also be considered for locations with limited water sources and high drought frequencies. The type of solar power plant that could be sited on DOE property would produce 50 to 100 megawatts of power and require approximately 200 to 500 acres for construction of the plant and auxiliary buildings. Plant construction is estimated to employ 350 to 700 workers over a one to two year timeframe. Approximately 50 workers are needed full time for plant operation over a 20 to 30 year period.

New Mexico is working with the Western Governor's Association (WGA) and EERE to provide financial incentives to solar sector interests. Governor Richardson's goal is to have a large-scale solar plant generating power by 2006.<sup>4</sup> The State is currently conducting a feasibility study of candidate sites and solar power technologies. LM's Bluewater site is one of several candidate sites. If Bluewater is selected by the State for further solar facility siting analyses, LM will team with NREL, the solar energy company, the State of New Mexico, stakeholders, and environmental regulators to ensure site acceptability.

## *II.b Sites with Wind Power Resources*

For wind power production, 80 geo-referenced sites were compared to wind resource maps, transmission line power maps, and site-specific wind industry screening criteria.<sup>5</sup> So far, NREL and LM have identified seven high potential wind power sites screened against compatibility criteria and site information provided to LM from uranium mill owners.

Table I. Candidate Wind Power Production Sites

<b>Wyoming Sites</b>	<b>Acres</b>	<b>Wind Density</b>	<b>Site Owner Transfer to LM</b>
Bear Creek	1,000	496	Union Pacific, 05
Spook	80	513	LM/State, 1996
Highlands	400	485	Exxon, 06
Gas Hill West	600	398	ANC, 07
Gas Hill East	2,000	438	UMETCO, 07
Gas Hill North	Large	466	Pathfinder, 05
Split Rock	5,200	500+	WNI, 07

The wind power density estimates are based on 50 m (watts/m<sup>2</sup>) resource potential: Fair (300-400), Good (400-500); and Excellent (500-600).

A candidate wind power production site must undergo site-specific wind sector screening criteria. Rules of thumb used by the industry in prospecting suitable large-scale wind farm sites may include:

- ❑ Transmission line access < 20 miles (69-345 kV) with transmission capacity
- ❑ Federal and state policies support wind energy ([www.dsireusa.org](http://www.dsireusa.org))
- ❑ No specific energy development impediments: scenic areas, bird flyways, non-development or air traffic zones
- ❑ Access roads on and adjacent to sites
- ❑ Slope of the lands less than 14% grade
- ❑ Sites below 7,000 feet elevation
- ❑ Large contiguous parcels 1 square mile

Construction of a large-scale wind farm typically employs 150 construction workers for nine months. Once installed, a wind farm operates for 20 years on average and employs one to five wind smiths who maintain turbines and conduct land management on a daily basis. Typically the turbines occupy less than five percent of the land. The number of wind turbines for a large-scale wind farm always depends on the site-specific design. The number of turbines will define the number of on-site wind smiths and maintenance frequencies. Wind farm usage is compatible with cattle grazing practices.

Wyoming sites have a 150 to 250 acre uranium mill tailing containment cell and monitoring systems requiring LTSM. Most candidate sites for large-scale wind farm potential use are privately owned and undergoing reclamation with oversight by the Nuclear Regulatory Commission and in accordance with the Atomic Energy Act and associated provisions for LTSM. If a wind power company is interested in a property before the site is transferred to LM or a State for LTSM, the private land owner will need to work with the NRC to ensure wind turbine installations are compatible with uranium mill tailing containment systems, cleanup decisions and public participation, LTSM plans, and local requirements. DOE's NREL and LM programs will assist in planning efforts. A wind vendor will need to discuss site use and real estate options with LM if the site is federally owned.

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