Green Remediation
&
Renewable Energy Development on Contaminated Lands and Mining Sites

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OSWER Center for Program Analysis

Overview of Available Tools

- EPA's approach to Green Remediation and Renewable Energy on Contaminated Land and Mining Sites
- Green remediation contract toolkit
- USACE MOU Update
- Renewable energy initiative and mapping

EPA is taking a multi-prong approach

- Developing tools, such as GIS-based RE and contaminated lands/mining sites mapping and State incentive sheets
- Model AOCs, comfort letters, PPAs and PLAs for RE development on contaminated lands and mining sites
- Provide technical expertise to assess siting issues such as geotechnical conditions/soil stability

EPA is taking a multi-prong approach

- Outreach and education
- Coordinate with interested parties
- Identify and work on pilot sites
- Measure results

Green Remediation Contract Toolkit
What is it?

- Quick reference guide to determine how to use the contract execution process to encourage the use of innovative approaches (e.g. green remediation technologies and practices) to site cleanup
- Guide EPA staff as they develop procurements to identify where in various contract mechanisms to include requirements or preference for innovative cleanup strategies

Green Remediation Contract Toolkit

What are some of the contract mechanisms covered in this effort?

- Remedial Action Contracts (RAC)
- Emergency and Rapid Response Services (ERRS)
- Superfund Technical Assessment & Response Team (START)
- Environmental Services Assistance Team (ESAT)
- RCRA Enforcement, Permitting and Assistance (REPA)
- US Army Corps of Engineers (USACE) contracts
- Site-specific contracts for Remedial Action
- Others….

Green Remediation Contract Toolkit
Who is the target audience?

- RPMs
- OSCs
- Contracting and Project Officers who support removal action, remedial response, and support services

Green Remediation Contract Toolkit Example contract mechanism: RAC

- Matrix showing RAC contract process to support the use of innovative/green cleanup strategies
- Provides suggestions for how to incorporate GR language at various stages of the contracting process (e.g., from pre-award process through the contract performance)

Pre-Award
- Planning & procurement
- Establishing contract type
- Writing the SOW
- Establishing contract terms and conditions
- Establishing evaluation criteria and selecting contractors

Contract performance
- Writing a Work Assignment / Task Order
  - General category of consideration
  - RI/FS, RD/RA, O&M
- Reviewing and approving work plans
- Evaluating performance
- Recognition of contractor performance

Stage of Contract Development		Potential Opportunity	Who to work with to develop contract language	Results/ Outcome
Pre-Award Activities	Planning the Procurement	- Get group of RPMs, Project Officers and Contracting Officers together a year before RFP is issued to discuss how to craft contract to encourage innovative strategies. Consider additional conversations with USACE, BLM, DOT, and other agencies. Compare notes and share ideas. - Use this team as an advisory group for all pre-award activities, listed below. - Review contracts at other agencies for similar work to see how they are written. Talk to peers at other agencies (USACE, DOD, Interior, etc.) to get ideas. - Prepare new SOW language which suggests recommended innovative technologies that can be used in various stages during the remedial activities (RI/FS, RD, RA, LTRA, and O&M.) This may be incorporated at the contract level, and may also be done at the Work Assignment (WA)/Task Order (TO) level.)	RAC Designated Lead is Angela Edwards of OSRTI. The OAM SRRP OD Service Center Manager in charge of RACs is Jeanne Poovey. Advisory group of RPMs, POs, and COs to be established.	Users of the contract will have direct influence on how the contract is structured. Field personnel can suggest ideas for encouraging the use of innovative approaches.
	Establishing Contract Type	- Consider performance-based contracts which provide incentives (positive or negative). True performance-based contracts permit contractor to decide on approach. Structure incentives to focus in part on use of innovative strategies. Consider use of Award Fee contracts and establish Award Term contracts, if the region is willing to commit the resources needed to manage such contracts. - If region has the resources to manage this approach, structure multiple award RAC contracts so contractors compete for work; use of innovative approaches can generate a higher technical score at WA level. - Make contract flexible so different types of TOs, delivery orders (DOs) or WAs can be issued. Use each type as appropriate for fostering use of alternative approaches to work. If feasible, structure contract to allow for a WA or TO-specific monetary bonus/award term to seek out and implement/use green technologies. - Consider site-specific contracts where such vehicles will enable and incentivize innovative approaches. (NOTE: It may not be possible in all situations to make these performance-based, since contractor may need to comply with design specifications.) Region may want a combination of full-service RACs and RAC lites.	Same as above.	Contracts will have built-in incentives for suggesting and utilizing innovative strategies.
	Writing the Contract SOW	- Clearly establish requirements in SOW for contractor to consider or utilize innovative approaches where appropriate. - Using Work Breakdown Structure, go through SOW task by task to identify areas where using innovative strategies is feasible. Write specific language under each task, as appropriate. (NOTE: This can also be used at the WA/TO level.) - Provide an attachment showing possible innovative technologies that can be used in various stages during the remedial activities (RI/FS, RD, RA, LTRA, and O&M.)	Same as above.	Contracts will contain specific provisions for alternative approaches in each area of SOW.

Stage of Contract Development		Potential Opportunity	Who to work with to develop contract language	Results/ Outcome
Pre-Award Activities (cont.)	Establishing Contract Terms and Conditions	- Provide for reduced burdens on contractor if they utilize innovative approaches (e.g., relieve them from some contractual requirements, if possible and appropriate e.g., certain reporting requirements). There should be specific limits on these allowances. - Relieve contractors from legal liability, if possible, when using new, untested technology. (NOTE: OGC must be consulted.) - Establish standard reporting requirements for proposed innovative strategies. Include a requirement to evaluate the success of each new strategy. - Provide contingencies affecting the exercise of optional periods of performance or increases in levels of effort that address the contractor's willingness to use innovative strategies (Award Term Options).	Same as above, plus OGC advice for liability language.	Contracts will have built-in incentives. Contractors will be more willing to take risks. EPA will have data on alternative strategies.
	Developing Evaluation Criteria and Selecting Contractors	-Request that technical proposals include various approaches for evaluating and utilizing innovative cleanup strategies. Develop evaluation criteria that consider an offeror's use of innovative technologies. Assign higher scores to contractors who have a proven track record in this area and are willing to continue to try new approaches to the work. Base selection, in part, on a firm's commitment to environmental sustainability, including the implementation of an Environmental Management System. Recognize that higher costs may be a result of alternative strategies. - Require contractors to fill out Section H of SF 330 to describe their accomplishments and results in the use of alternative strategies. - When evaluating past performance, require specific references from officials who have direct knowledge of offerors' experience with innovative approaches. - Use RPMs or other specialists who can evaluate innovative approaches as members of TEP or advisors to help evaluate this part of proposal.	Same as above, plus experts for various innovative strategies.	Higher scores will be possible for offerors that have experience, expertise, and willingness to consider alternative approaches. EPA will have a cadre of contractors who are experienced in these areas and willing to take some risks.

Stage of Contract Development			Potential Opportunity	Who to work with to develop contract language	Results/ Outcome
During Contract Performance	Writing a Work Assignment/Task Order	General	- Clearly establish a preference for contractors that consider or utilize innovative approaches. Request a section in the contractor's work plan to demonstrate how the contractor will use innovative technologies such as green remediation during the various stages of the project. - Request that contractors propose alternative approaches, where appropriate. - Request life cycle analysis for various approaches offered, where appropriate. - Be prepared to modify the statement of work (SOW), if necessary, once an approach has been selected. - Using a work-breakdown-structure approach, go through SOW task by task to identify areas where using innovative strategies is feasible. Write specific language under each task, as appropriate. - Given flexibility in the contract, develop specific monetary bonus/award terms to seek out and implement/use green technologies.	RPMs are generally responsible for writing WA SOWs and developing the IGCEs. The advisory group of RPMs, POs, and COs to be established could be useful resources to help identify the latest innovative strategies.	The individual WAs will provide the most detailed information and requirements on site level activities and can be used to outline specific requirements or state preferences for the use of innovative cleanup strategies.
		RI/FS	- Draft WA/TO to require the use of innovative approaches, like Triad or optimization, on appropriate tasks related to RIs. - Suggest remedial alternatives screening evaluate at least one innovative approach or include additional factors focused on innovation within existing evaluation criteria for all alternatives evaluation. - Highlight sustainability or other green requirements as additional factors within evaluation criteria for remedy selection. - Require life-cycle cost analyses to include cost impacts of sustainability (energy consumption and waste reduction, increased durability, reduced operations and maintenance requirements, etc.).		
		RD	- Require any specific innovative approaches in a "Design Approach". - Include reuse planning requirements to ensure long-term protectiveness and sustainability.		
		O&M	- After evaluating system/project performance and results, require a report on opportunities to include innovative strategies in any system redesign. - Amend WAs/TOs, if necessary, in cases where innovative strategy would reduce time or cost, or would be more protective.		

Stage of Contract Development		Potential Opportunity	Who to work with to develop contract language	Results/ Outcome
During Contract Performance (cont.)	Reviewing and Approving Work Plan	- Evaluate any alternative approaches. Request that contractors state how they plan to use innovative technologies, such as Green Remediation, during the various stages of the WA/TO, and have them present the pros and cons of utilizing various approaches. They should document additional costs, scheduling impacts, and potential contingencies. - Negotiate with the contractor if their approach is not acceptable. Focus on the need for the contractor to be cost efficient and practical when proposing innovative technologies. - Evaluate any tradeoffs with traditional approaches before approving. - Ensure, after negotiations, that the final work plan documents all agreements and understandings in implementing the remedial work while using practical innovative technologies.	RPMs are responsible for reviewing the technical approaches contained in work plans but the PO/COs must be intimately involved to facilitate any negotiations.	Negotiation on technical approach and cost allows refinement and EPA approval of innovative approaches.
	Evaluating Performance	- Provide recognition of contractors that use innovative strategies during the annual evaluation in the NIH Contractor Performance System or any other performance evaluation. (There is no separate NIH category for this, but the PO can include this in the overall performance ratings.) If a contractor's score is borderline between two levels, this may push them into a higher bracket. - If the contract is performance-based, measure performance and apply rewards accordingly. - If the contract is Award Fee type, evaluate the performance in accordance with established criteria, which can include the use of innovative strategies. (NOTE: Award Fee criteria can be changed unilaterally by the Government for future periods, pursuant to the clause set forth in EPAAR 1552.216-70).	RPMs complete monthly review and PO and COs are involved in annual review.	Financial incentives are persuasive way to encourage innovation.
	Recognition of Contractors	- Exercise contract options contingent upon satisfactory performance, which may include willingness to use innovative strategies. - Establish an annual Contractor's Innovation Award for contractors that implement innovative cleanup strategies use on a regional or national basis. - Write letters to contractor corporate officers commending them on their use of innovative approaches. - Send report cards to all contractors on how well the Government considers they have done in this area.	Process for individual contractor recognition differs in each Region. National recognition would be granted by advisory group of RPMs, POs, and COs.	Recognition will encourage use and provide reference for contractors' subsequent bids.

Green Remediation Contract Toolkit
Next steps

- Finalize contract tool kit for RAC
- Continue to develop tool kit for all contract mechanisms
- Continue outreach on how to use tool kit

USACE MOU Update

- In 2008, EPA renegotiated the long-standing MOU with the USACE after many years (1984!)
- Includes the following sustainability language
  - Section 4.4: "USACE and EPA are committed to incorporate, to the extent practicable, green and sustainable remediation technologies and practices, such as use of cleaner and/or more efficient energy processes, pollution prevention, and cleanup and beneficial land reuse practices that consider the lifecycle of the project, and that are protective of land, water and air resources throughout all phases of the Superfund cleanup process. Through the implementation of such remediation technologies and practices, EPA, USACE, and partners of EPA and USACE intend to further our goals to recycle wastes to the greatest extent possible, minimize or eliminate pollution at its source, and use energy and natural resources efficiently to reduce impacts on the environment. USACE will work with EPA to provide a report on the achievement of these goals at the annual joint EPA/USACE national meetings."

RE-Powering America's Land: Siting Renewable Energy On Contaminated Land and Mining Sites

- New Initiative launched by OSWER
- Goal: Encourage, support and facilitate the development of renewable energy production facilities on contaminated lands and mining sites
- Focuses on renewable energy development potential on Superfund, RCRA, Brownfields and Mining Sites

RE-Powering America's Land

Benefits of Renewable Energy Development on EPA Tracked Sites

- Many Superfund, RCRA, Brownfield, Mining Sites and other blighted properties offer:
  - Offer thousands of acres
  - Existing infrastructure - transmission lines, roads and railway
  - NIMBY issues may be less prevalent
  - Adequate zoning
- Siting renewable energy on these sites may be a viable reuse option:
  - Provides economic value for property that might otherwise lack significant value
  - Furthers environmental sustainability by maximizing land use and optimizing renewable energy opportunities
  - May have lower overall transaction costs compared to greenfields
  - Reduces the stress on greenfields land for construction of new energy facilities
  - Provides clean, emission-free energy for use on-site, [illegible], and utility grid

RE-Powering America's Land

Benefits of Renewable Energy Development on EPA Tracked Sites

- Approximately 16 million acres of potentially contaminated properties (approx. 480,000 sites) across the United States are tracked by EPA
  - ~80% (13.6 million acres) are non-urban
  - ~20% (3.2 million acres) are abandoned mine land
- Cleanup goals have been achieved and controls put in place to ensure long-term protection at more than 850,000 acres
- Reintroduce local job opportunities for development, operation and maintenance of, and equipment manufacture for renewable energy facilities

Why Develop Renewable Energy Facilities on EPA Tracked Sites?

- Over 16 million acres of potentially contaminated properties (approx. 480,000 sites) across the United States are tracked by EPA
  - ~80% (13.6 million acres) are non-urban
  - ~20% (3.2 million acres) are abandoned mine land
- Cleanup goals have been achieved and controls put in place to ensure long-term protection for more than 850,000 acres
- Reintroduce local job opportunities for development, operation and maintenance of, and equipment manufacture for renewable energy facilities

How Much Energy Can EPA Tracked Lands Support?

Solar Energy Potential

- Solar Energy Generation Capacity on EPA Tracked Lands
  - 2,670,227 MW
- In 2010, EIA projects U.S. solar PV and thermal capacity at 6,100 MW

Wind Energy Potential

- Wind Energy Generation Potential on EPA Tracked Lands
  - 120,379 MW
- In 2010, EIA projects U.S. wind capacity at 25,616 MW

Google Earth Mapping Tool

- Successful EPA-NREL joint venture produced an interactive Google Earth mapping application
- Shows opportunities to site renewable energy on contaminated lands and mining sites in each state
- Using criteria, such as distance to electric transmission lines, distance to roads, renewable energy potential, and site acreage, we produced over 170 state-specific maps showing renewable energy development potential on EPA tracked sites
- Produced incentive sheets describing renewable energy development and contaminated lands redevelopment incentives in each state

Google Earth Mapping Tool

- Audience:
  - Developers
  - Environmental managers (state, federal, private)
  - Consultants
  - Private industry
  - Communities
  - Local, state, and federal energy and environment officials
  - Anyone interested in renewable energy projects on contaminated lands and mining sites

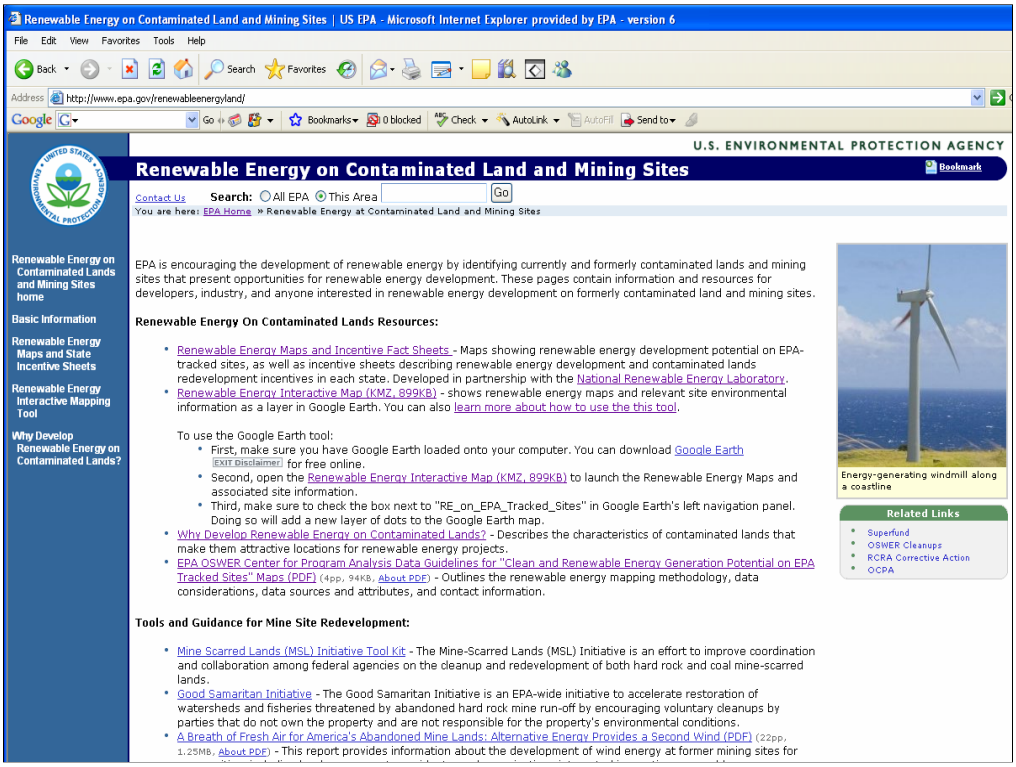
Screening Criteria
Contaminated Lands Mapping

Clean and Renewable Energy Sources

- Biomass: Biopower
  - Residues from crops, forests and mills; methane; urban wood waste and dedicated energy crops
- Biomass: Dry-Mill Corn Ethanol
- Wind: Non-Grid, Community, and Utility
- PV: Non-Grid, Community and Utility
- CSP: Community and Utility
  - Sterling, Trough and Power Tower

Preliminary Screening Criteria

- Availability & quality of solar, wind, biomass
- Acreage
- Distance to electric transmission lines
- Distance to graded roads
- Slope and aspect of property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U.S. ENVIRONMENTAL PROTECTION AGENCY
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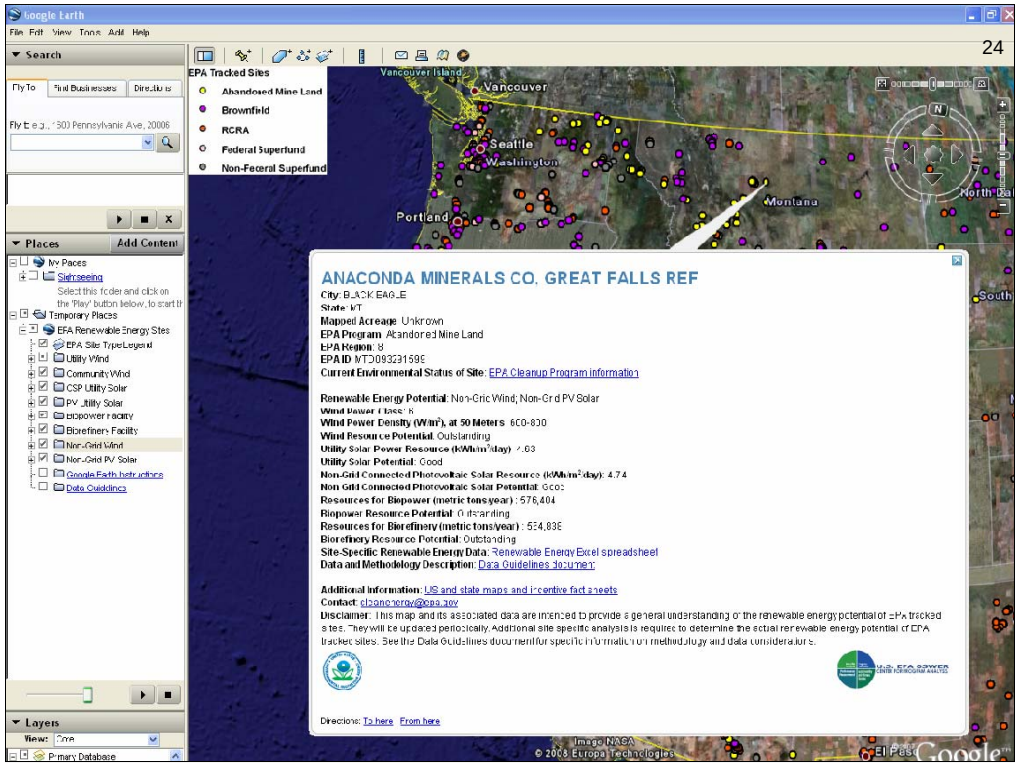
Renewable Energy on Contaminated Lands and Mining Sites home
Basic Information
Renewable Energy Maps and State Incentive Sheets
Renewable Energy Interactive Mapping Tool
Why Develop Renewable Energy on Contaminated Lands?
EPA is encouraging the development of renewable energy by identifying currently and formerly contaminated lands and mining sites that present opportunities for renewable energy development. These pages contain information and resources for developers, industry, and anyone interested in renewable energy development on formerly contaminated land and mining sites.
Renewable Energy On Contaminated Lands Resources:
Renewable Energy Maps and Incentive Fact Sheets - Maps showing renewable energy development potential on EPA-tracked sites, as well as incentive sheets describing renewable energy development and contaminated lands redevelopment incentives in each state. Developed in partnership with the National Renewable Energy Laboratory.
Renewable Energy Interactive Map (KMZ, 899KB) - shows renewable energy maps and relevant site environmental information as a layer in Google Earth. You can also learn more about how to use the this tool.
To use the Google Earth tool:
First, make sure you have Google Earth loaded onto your computer. You can download Google Earth EXIT Disclaimer for free online.
Second, open the Renewable Energy Interactive Map (KMZ, 899KB) to launch the Renewable Energy Maps and associated site information.
Third, make sure to check the box next to "RE_on_EPA_Tracked_Sites" in Google Earth's left navigation panel. Doing so will add a new layer of dots to the Google Earth map.
Why Develop Renewable Energy on Contaminated Lands? - Describes the characteristics of contaminated lands that make them attractive locations for renewable energy projects.
EPA OSWER Center for Program Analysis Data Guidelines for "Clean and Renewable Energy Generation Potential on EPA Tracked Sites" Maps (PDF) (4pp, 94KB, About PDF) - Outlines the renewable energy mapping methodology, data considerations, data sources and attributes, and contact information.
Tools and Guidance for Mine Site Redevelopment:
Mine Scarred Lands (MSL) Initiative Tool Kit - The Mine-Scarred Lands (MSL) Initiative is an effort to improve coordination and collaboration among federal agencies on the cleanup and redevelopment of both hard rock and coal mine-scarred lands.
Good Samaritan Initiative - The Good Samaritan Initiative is an EPA-wide initiative to accelerate restoration of watersheds and fisheries threatened by abandoned hard rock mine run-off by encouraging voluntary cleanups by parties that do not own the property and are not responsible for the property's environmental conditions.
A Breath of Fresh Air for America's Abandoned Mine Lands: Alternative Energy Provides a Second Wind (PDF) (22pp, 1.25MB, About PDF) - This report provides information about the development of wind energy at former mining sites for
Energy-generating windmill along a coastline
Related Links
Superfund
OSWER Cleanups
RCRA Corrective Action
OCPA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Sightseeing
Temporary Places
EPA Renewable Energy Sites
EPA Site Type Legend
Utility Wind
Community Wind
CSP Utility Solar
PV Utility Solar
Biopower Facility
Biorefinery Facility
Non-Grid Wind
Non-Grid PV Solar
Google Earth Instructions
Data Guidelines
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EPA Tracked Sites
Abandoned Mine Land
Brownfield
RCRA
Federal Superfund
Non-Federal Superfund
Vancouver Island
Vancouver
Seattle
Washington
Portland
Montana
North Dakota
South
ANACONDA MINERALS CO. GREAT FALLS REF
City: BLACK EAGLE
State: MT
Mapped Acreage: Unknown
EPA Program: Abandoned Mine Land
EPA Region: 8
EPA ID: MTD093231595
Current Environmental Status of Site: EPA Cleanup Program Information
Renewable Energy Potential: Non-Grid Wind; Non-Grid PV Solar
Wind Power Class: 6
Wind Power Density (W/m²), at 50 Meters: 600-800
Wind Resource Potential: Outstanding
Utility Solar Power Resource (kWh/m²/day): 7.03
Utility Solar Potential: Good
Non-Grid Connected Photovoltaic Solar Resource (kWh/m²/day): 4.74
Non-Grid Connected Photovoltaic Solar Potential: Good
Resources for Biopower (metric tons/year): 576,404
Biopower Resource Potential: Outstanding
Resources for Biorefinery (metric tons/year): 564,838
Biorefinery Resource Potential: Outstanding
Site-Specific Renewable Energy Data: Renewable Energy Excel spreadsheet
Data and Methodology Description: Data Guidelines document
Additional Information: US and state maps and incentive fact sheets
Contact: cleanenergy@epa.gov
Disclaimer: This map and its associated data are intended to provide a general understanding of the renewable energy potential of EPA tracked sites. They will be updated periodically. Additional site specific analysis is required to determine the actual renewable energy potential of EPA tracked sites. See the Data Guidelines document for specific information, methodology, and data considerations.
Directions: To here From here
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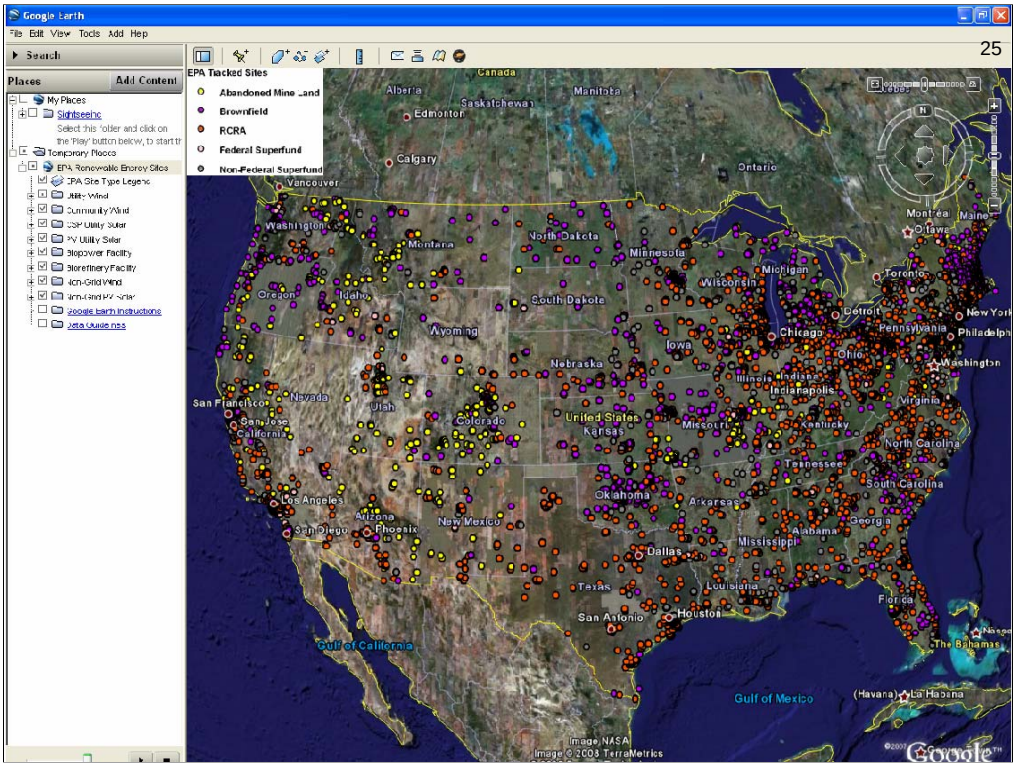
Google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EPA Renewable Energy Sites
EPA Site Type Legend
Utility Wind
Community Wind
CSP Utility Solar
PV Utility Solar
Biopower Facility
Biorefinery Facility
Non-Grid Wind
Non-Grid PV Solar
Google Earth Instructions
Data Disclaimer
EPA Tracked Sites
Abandoned Mine Land
Brownfield
RCRA
Federal Superfund
Non-Federal Superfund
Canada
Alberta
Saskatchewan
Manitoba
Edmonton
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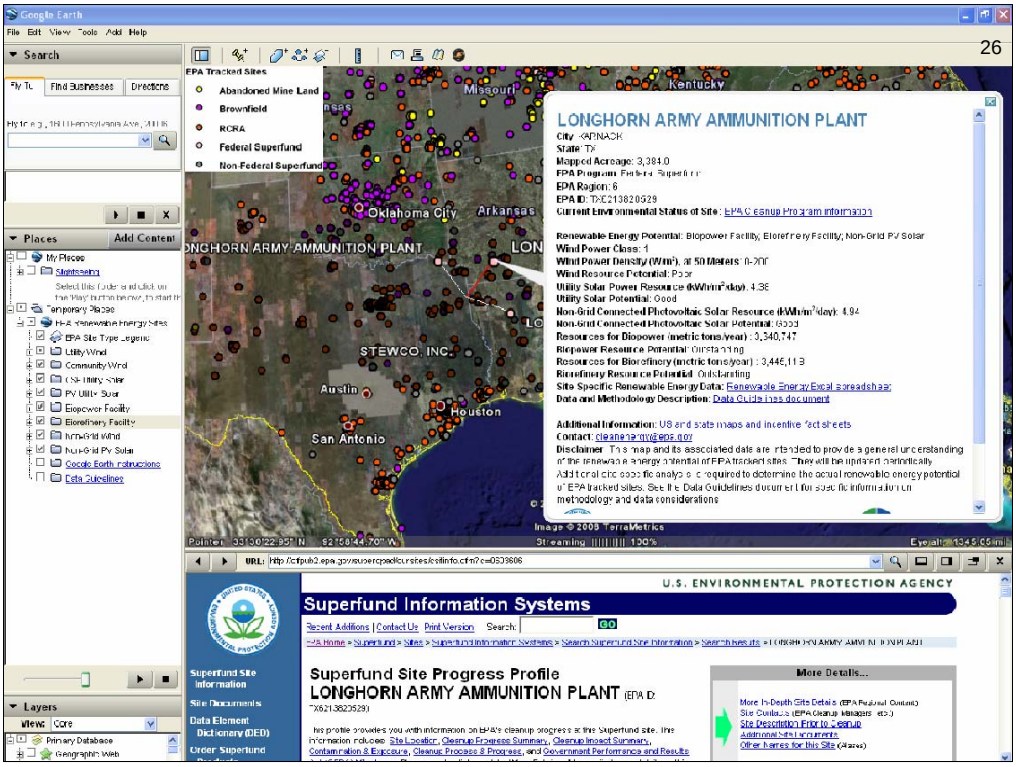
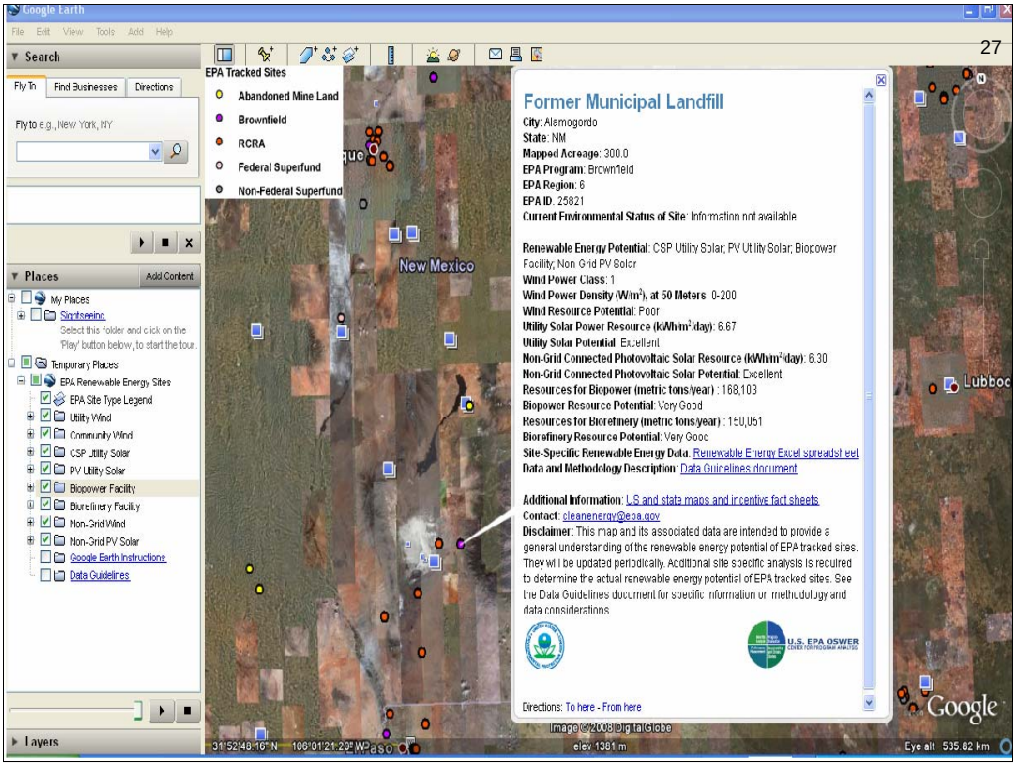

26
EPA Tracked Sites
Abandoned Mine Land
Brownfield
RCRA
Federal Superfund
Non-Federal Superfund
LONGHORN ARMY AMMUNITION PLANT
City: KAPNACK
State: TX
Mapped Acreage: 3,384.0
EPA Region: 6
Renewable Energy Potential: Biopower Facility; Biorefinery Facility; Non-Grid PV Solar
Wind Power Class: 1
Wind Resource Potential: Poor
Utility Solar Potential: Good
Biopower Resource Potential: Outstanding
Bioreinery Resource Potential: Outstanding
Oklahoma City
Arkansas
Missouri
Kentucky
STEWCO, INC.
Austin
Houston
San Antonio
U.S. ENVIRONMENTAL PROTECTION AGENCY
Superfund Information Systems
Superfund Site Progress Profile
LONGHORN ARMY AMMUNITION PLANT
More Details...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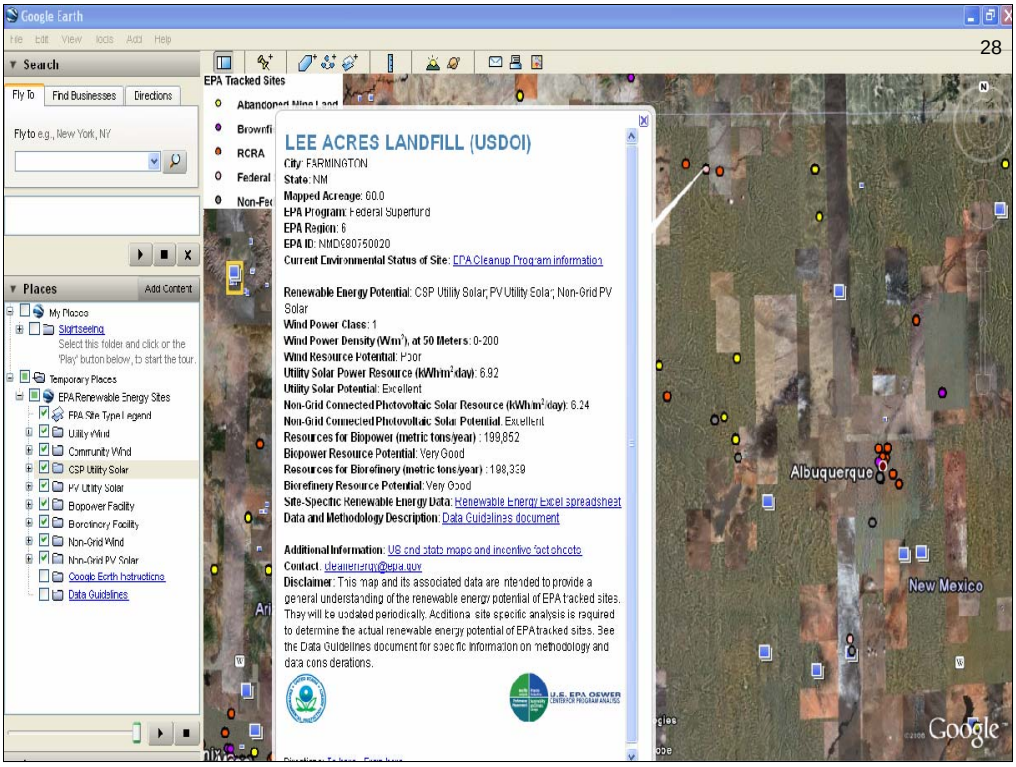
Sightseeing
Select this folder and click on the 'Play' button below, to start the tour.
Temporary Places
EPA Renewable Energy Sites
EPA Site Type Legend
Utility Wind
Community Wind
CSP Utility Solar
PV Utility Solar
Biopower Facility
Biorefinery Facility
Non-Grid Wind
Non-Grid PV Solar
Google Earth Instructions
Data Guidelines
Layers
EPA Tracked Sites
Abandoned Mine Land
Brownfield
RCRA
Federal Superfund
Non-Federal Superfund
New Mexico
Former Municipal Landfill
City: Alamogordo
State: NM
Mapped Acreage: 300.0
EPA Program: Brownfield
EPA Region: 6
EPA ID: 25821
Current Environmental Status of Site: Information not available
Renewable Energy Potential: CSP Utility Solar; PV Utility Solar; Biopower Facility; Non-Grid PV Solar
Wind Power Class: 1
Wind Power Density (W/m2), at 50 Meters: 0-200
Wind Resource Potential: Poor
Utility Solar Power Resource (kWh/m2/day): 6.67
Utility Solar Potential: Excellent
Non-Grid Connected Photovoltaic Solar Resource (kWh/m2/day): 6.30
Non-Grid Connected Photovoltaic Solar Potential: Excellent
Resources for Biopower (metric tons/year): 168,103
Biopower Resource Potential: Very Good
Resources for Biorefinery (metric tons/year): 150,051
Biorefinery Resource Potential: Very Good
Site-Specific Renewable Energy Data: Renewable Energy Excel spreadsheet
Data and Methodology Description: Data Guidelines document
Additional Information: U.S. and state maps and incentive fact sheets
Contact: cleanenergy@epa.gov
Disclaimer: This map and its associated data are intended to provide a general understanding of the renewable energy potential of EPA tracked sites. They will be updated periodically. Additional site specific analysis is required to determine the actual renewable energy potential of EPA tracked sites. See the Data Guidelines document for specific information or methodology and data considerations.
U.S. EPA OSWER
Directions: To here - From here
Image © 2008 DigitalGlobe
31°52'48.16" N 106°01'21.22" W
elev 1361 m
Eye alt 535.62 km
Google


Google Earth
Search
Fly To
Find Businesses
Directions
Places
Add Content
EPA Tracked Sites
LEE ACRES LANDFILL (USDOI)
City: FARMINGTON
State: NM
Mapped Acreage: 60.0
EPA Program: Federal Superfund
EPA Region: 6
EPA ID: NMD980750020
Current Environmental Status of Site: EPA Cleanup Program information
Renewable Energy Potential: CSP Utility Solar; PV Utility Solar; Non-Grid PV Solar
Wind Power Class: 1
Wind Power Density (Wm²), at 50 Meters: 0-200
Wind Resource Potential: Poor
Utility Solar Power Resource (kWhm²/day): 6.92
Utility Solar Potential: Excellent
Non-Grid Connected Photovoltaic Solar Resource (kWh/m²/day): 6.24
Non-Grid Connected Photovoltaic Solar Potential: Excellent
Resources for Biopower (metric tons/year) : 199,852
Biopower Resource Potential: Very Good
Resources for Biorefinery (metric tons/year) : 198,339
Biorefinery Resource Potential: Very Good
Site-Specific Renewable Energy Data: Renewable Energy Excel spreadsheet
Data and Methodology Description: Data Guidelines document
Additional Information: US and state maps and incentive fact sheets
Contact: cleanenergy@epa.gov
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Albuquerque
New Mexico
Google

Utility-Scale Solar & Wind Potential

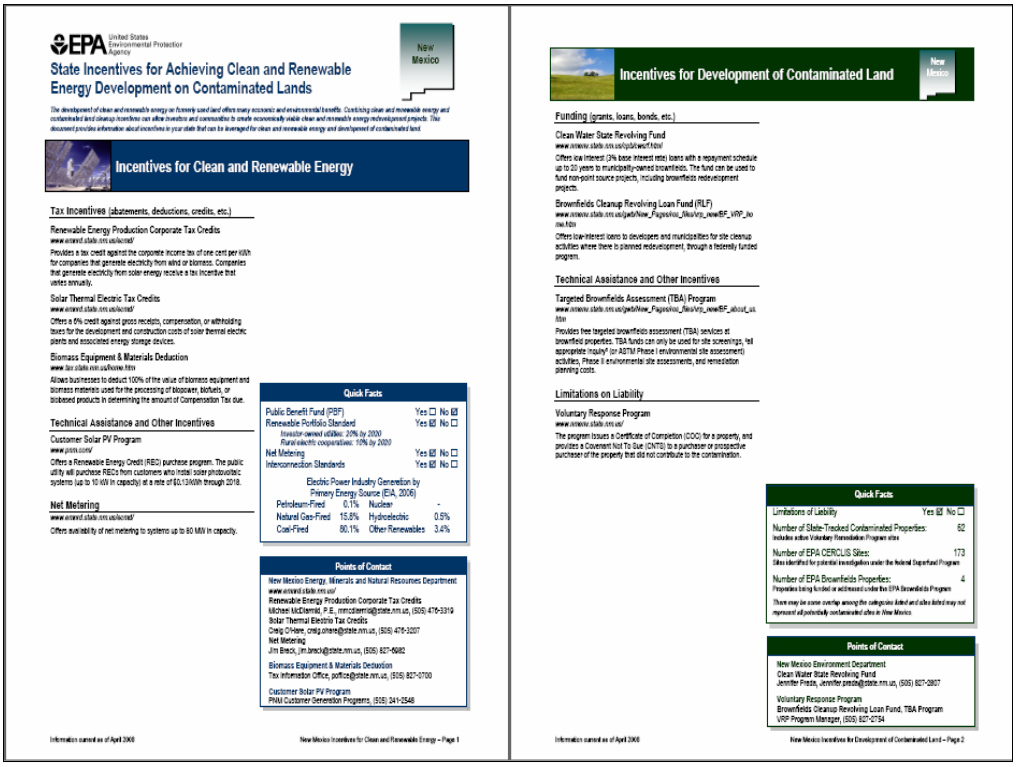
- ~ 5.2 million acres of EPA-tracked land are located in an area with the highest solar resource potential
- If developed for utility-scale photovoltaic and concentrating solar power
  - → yield an electricity capacity more than 919,000 MW and a GHG emission reduction of approximately 2,169 MMTCO2E
- ~ 580,000 acres of EPA-tracked land are located in an area with the highest wind resource potential
- If developed for utility-scale and community-scale wind power,
  - → it would yield an electricity capacity more than 17,000 MW and a GHG emission reduction of approximately 39 MMTCO2E

Incentives

- State Incentives
  - Grants and Loans
  - Tax abatements, deductions, credits
  - Net metering
  - Other incentives: equipment loan programs for wind production
- Federal incentives
  - Extended Production Tax Credit (PTC) for renewable energy for sales of electricity for the first 10 years of operation

Resource Type	In Service Deadline	Credit Amount
Wind	December 31, 2009	2.0¢/kWh
Closed-loop Biomass	December 31, 2010	2.0¢/kWh
Open-loop Biomass	December 31, 2010	1.0¢/kWh
Geothermal Energy	December 31, 2010	2.0¢/kWh
Landfill Gas	December 31, 2010	1.0¢/kWh
Municipal Solid Waste	December 31, 2010	1.0¢/kWh
Qualified Hydroelectric	December 31, 2010	1.0¢/kWh
Marine and Hydrokinetic (150 kW or larger)*	December 31, 2011	1.0¢/kWh

  - Solar - Businesses and individuals who buy solar energy systems are eligible to receive the 30% investment tax credit (ITC) for solar energy. Tax credit has been extended until Dec. 31, 2016.
  - Federal grants and loans
- Up to date Database of State Incentives for REs and EE
  - www.dsireusa.org



EPA United States Environmental Protection Agency

State Incentives for Achieving Clean and Renewable Energy Development on Contaminated Lands

New Mexico

The development of clean and renewable energy on formerly used land offers many economic and environmental benefits. Combining clean and renewable energy and contaminated land cleanup incentives can allow investors and communities to create economically viable clean and renewable energy redevelopment projects. This document provides information about incentives in your state that can be leveraged for clean and renewable energy and development of contaminated land.

Incentives for Clean and Renewable Energy

Tax Incentives (abatements, deductions, credits, etc.)

Renewable Energy Production Corporate Tax Credits
www.emnrd.state.nm.us/ecmd/

Provides a tax credit against the corporate income tax of one cent per kWh for companies that generate electricity from wind or biomass. Companies that generate electricity from solar energy receive a tax incentive that varies annually.

Solar Thermal Electric Tax Credits
www.emnrd.state.nm.us/ecmd/

Offers a 6% credit against gross receipts, compensation, or withholding taxes for the development and construction costs of solar thermal electric plants and associated energy storage devices.

Biomass Equipment & Materials Deduction
www.tax.state.nm.us/home.htm

Allows businesses to deduct 100% of the value of biomass equipment and biomass materials used for the processing of biopower, biofuels, or biobased products in determining the amount of Compensation Tax due.

Technical Assistance and Other Incentives

Customer Solar PV Program
www.pnm.com/

Offers a Renewable Energy Credit (REC) purchase program. The public utility will purchase RECs from customers who install solar photovoltaic systems (up to 10 kW in capacity) at a rate of $0.13/kWh through 2018.

Net Metering
www.emnrd.state.nm.us/ecmd/

Offers availability of net metering to systems up to 80 MW in capacity.

Quick Facts

Public Benefit Fund (PBF)	Yes ☐ No ☑
Renewable Portfolio Standard	Yes ☑ No ☐
Investor-owned utilities: 20% by 2020	
Rural electric cooperatives: 10% by 2020	
Net Metering	Yes ☑ No ☐
Interconnection Standards	Yes ☑ No ☐

Electric Power Industry Generation by Primary Energy Source (EIA, 2006)

Petroleum-Fired	0.1%	Nuclear	-
Natural Gas-Fired	15.8%	Hydroelectric	0.5%
Coal-Fired	80.1%	Other Renewables	3.4%

Points of Contact

New Mexico Energy, Minerals and Natural Resources Department
www.emnrd.state.nm.us/

Renewable Energy Production Corporate Tax Credits
Michael McDiarmid, P.E., mmcdiarmid@state.nm.us, (505) 476-3319

Solar Thermal Electric Tax Credits
Craig O'Hare, craig.ohare@state.nm.us, (505) 476-3207

Net Metering
Jim Breck, jim.breck@state.nm.us, (505) 827-6982

Biomass Equipment & Materials Deduction
Tax Information Office, pofice@state.nm.us, (505) 827-0700

Customer Solar PV Program
PNM Customer Generation Programs, (505) 241-2548

Incentives for Development of Contaminated Land

New Mexico

Funding (grants, loans, bonds, etc.)

Clean Water State Revolving Fund
www.nmenv.state.nm.us/opb/swcf.html

Offers low interest (3% base interest rate) loans with a repayment schedule up to 20 years to municipally-owned brownfields. The fund can be used to fund non-point source projects, including brownfields redevelopment projects.

Brownfields Cleanup Revolving Loan Fund (RLF)
www.nmenv.state.nm.us/gwb/New_Pages/nov_files/vrp_newBF_WP_how.htm

Offers low-interest loans to developers and municipalities for site cleanup activities where there is planned redevelopment, through a federally funded program.

Technical Assistance and Other Incentives

Targeted Brownfields Assessment (TBA) Program
www.nmenv.state.nm.us/gwb/New_Pages/nov_files/vrp_newBF_about_us.htm

Provides free targeted brownfields assessment (TBA) services at brownfield properties. TBA funds can only be used for site screenings, "all appropriate inquiry" (or ASTM Phase I environmental site assessment) activities, Phase II environmental site assessments, and remediation planning costs.

Limitations on Liability

Voluntary Response Program
www.nmenv.state.nm.us/

The program issues a Certificate of Completion (COC) for a property, and provides a Covenant Not To Sue (CNTS) to a purchaser or prospective purchaser of the property that did not contribute to the contamination.

Quick Facts

Limitations of Liability	Yes ☑ No ☐
Number of State-Tracked Contaminated Properties: *Includes active Voluntary Remediation Program sites*	62
Number of EPA CERCLIS Sites: *Sites identified for potential investigation under the federal Superfund Program*	173
Number of EPA Brownfields Properties: *Properties being funded or addressed under the EPA Brownfields Program*	4

There may be some overlap among the categories listed and sites listed may not represent all potentially contaminated sites in New Mexico.

Points of Contact

New Mexico Environment Department
Clean Water State Revolving Fund
Jennifer Prestz, Jennifer.prestz@state.nm.us, (505) 827-2807

Voluntary Response Program
Brownfields Cleanup Revolving Loan Fund, TBA Program
VRP Program Manager, (505) 827-2754

Successes

Former Bethlehem Steel Site Lackawanna, NY

- 8 wind turbines
- 20 MW generation capacity – 7,000 homes
- By 2010 expansion to 18 wind turbines – 45 MW
- Domestically manufactured wind turbines (Cedar Rapids, Iowa)
- Local job creation

Successes

Fort Carson, Colorado

- 2 MW solar array on 12-acre landfill
- Produces 3,200 MW-hrs of electricity each year
- Fort Carson purchas electricity produced from the array at a fixed rate of 5.5 cent per kW-hr for the duration of a 17-year contract
- Expected savings of $500,000 in electrici costs during the contract life

Successes

Summitville Mine Site, Colorado

- Mico-hydroelectric plant
- Will generate 250,000-290,000 kV
  - enough to power about 25 households
  - prevent 250 – 275 metric tons of CO_2 from being released into the atmosphere every year
- Enough power to operate the new on-site treatment plant,
- The treatment of acid-mine drainage will be a zero-net energy operation
- Power generated by the hydro plant will be fed back into the Xc Energy grid through a net meteri agreement and will be used to o the cost of power usage required water treatment

Successes

SeQuential Biofuels Station in Eugene Oregon (petroleum Brownfields site)

- Installed 244 solar panels c
  of fueling islands, providing
  30 – 50 % electrical power f
  the station
- Installed a "living roof" of 4,
  live plants, growing in five
  of soil on the roof of the
  convenience store
  - cools the building
    during the summer

Successes

Holmes Road Landfill Solar Field, Houston TX

- Revitalization of a 300-acre former landfill site located near downtown Houston
- EPA awarded a $50k grant to assess solar energy production
  - Evaluating various environmental, engineering, and regulatory issues involved in the project
  - Conducting a solar energy production and financial feasibility study

Next Steps

- Mapping tools
  - State sites
  - Landfill methane
  - Coalbed methane
  - Transmission capacity
- Partnerships
  - Continue to develop key partnerships between Federal and State organizations, and private entities
- Resources
  - Brownfields funds
  - Office of Solid Waste and Emergency Response (OSWER) – National Renewable Energy Laboratory (NREL) Interagency Agreement
- Document ongoing and future successes
- Technical and Regulatory Guide to Siting REs on Contaminated Lands

Contacts

Contacts for Contract Toolkit

Carlos Pachon
Office of Superfund Remediation and Technology Innovation, OSWER
pachon.carlos@epa.gov
(703) 603-9904

Penelope McDaniel
Center for Program Analysis, OSWER
McDaniel.Penelope@epa.gov
(202) 566-1932

Contacts for Renewable Energy Development

Penelope McDaniel
Center for Program Analysis, OSWER
McDaniel.Penelope@epa.gov
(202) 566-1932

Stephen Hoffman
Office of Superfund Remediation and Technology Innovation, OSWER
Hoffman.Stephen@epa.gov

Or, email us at:
cleanenergy@epa.gov

More Information

- Renewable Energy on Contaminated Lands and Mining Sites:
  http://www.epa.gov/renewableenergyland

- Further information:
  cleanenergy@epa.gov

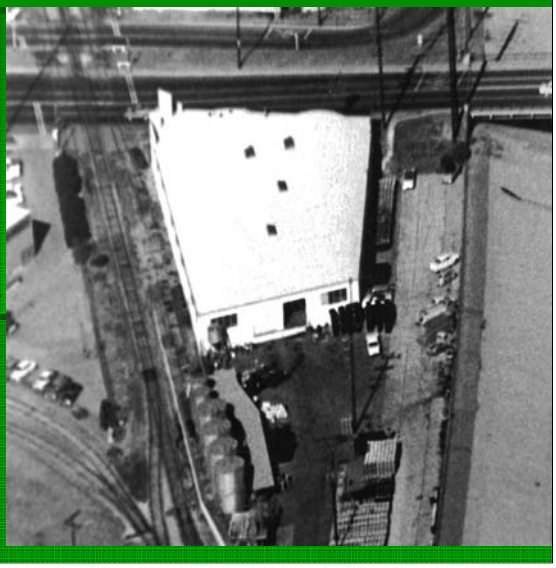
Green Remediation Technology

Solar Panels at Pemaco

Rose Marie Caraway
USEPA Region 9, San Francisco, CA

Pemaco Superfund Site

- Maywood, California, 1.4 acres
- Former custom chemical blender 1950-1991, on site storage of chemicals in drums, UST's and AST's
- 1997-EPA removed 29 underground storage tanks
- 1998- 1999 EPA installed a soil vapor extraction system and treated 144, 400 lbs of soil



The plant is located approximately 6 miles south of downtown Los Angeles in the City of Maywood. The company operated as a custom chemical blending facility from 1940s until 1991. Hazardous chemicals were stored onsite in 31 underground storage tanks, 6 aboveground tanks, and over 400 drums. Chemicals were delivered onsite via both truck and rail.

Pemaco Superfund Site

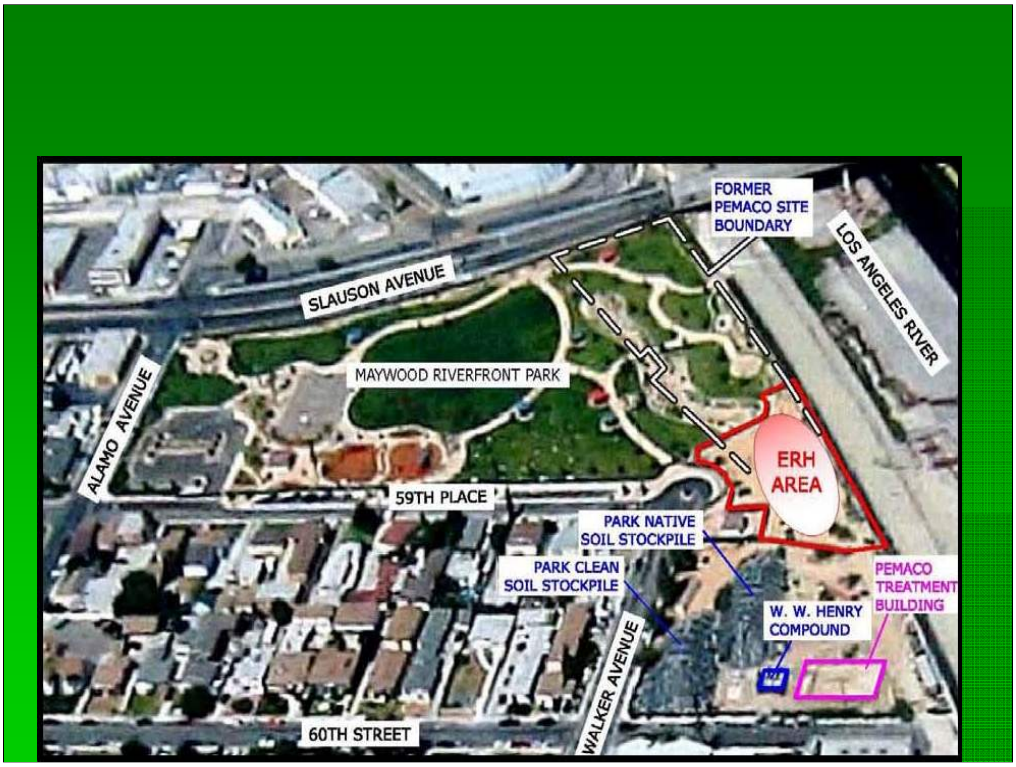
- Soil and groundwater contaminated with Chlorinated solvents(TCE) and other chemicals.
- 2005 ROD: Vapor and Groundwater P&T system and Electrical Resistance Heating (ERH) in source zone.
- Enhanced In Situ Bioremediation: stand alone for dissolved phase plume and polish for source zone if needed after ERH Treatment.

EPA conducted a removal in 1997 and Chemicals in tanks included alcohols, xylene, toluene, acetone, hexane, and other volatile organic compounds

Chemicals in tanks included alcohols, xylene, toluene, acetone, hexane, and other volatile organic compounds.

Activities to Date

- 2004- Remedial Investigation/Feasibility Study
- 2004-Public Comment (April – September 2004)
- 2005- ROD addressing public comments signed
- 2005- Construction on remedy began
  - Vapor and groundwater well installation
  - Installation of conveyance piping to treatment plant
- 2006 – Design of ERH System
  - Construction of treatment plant
  - Installation of ERH electrodes and temperature monitoring well locations

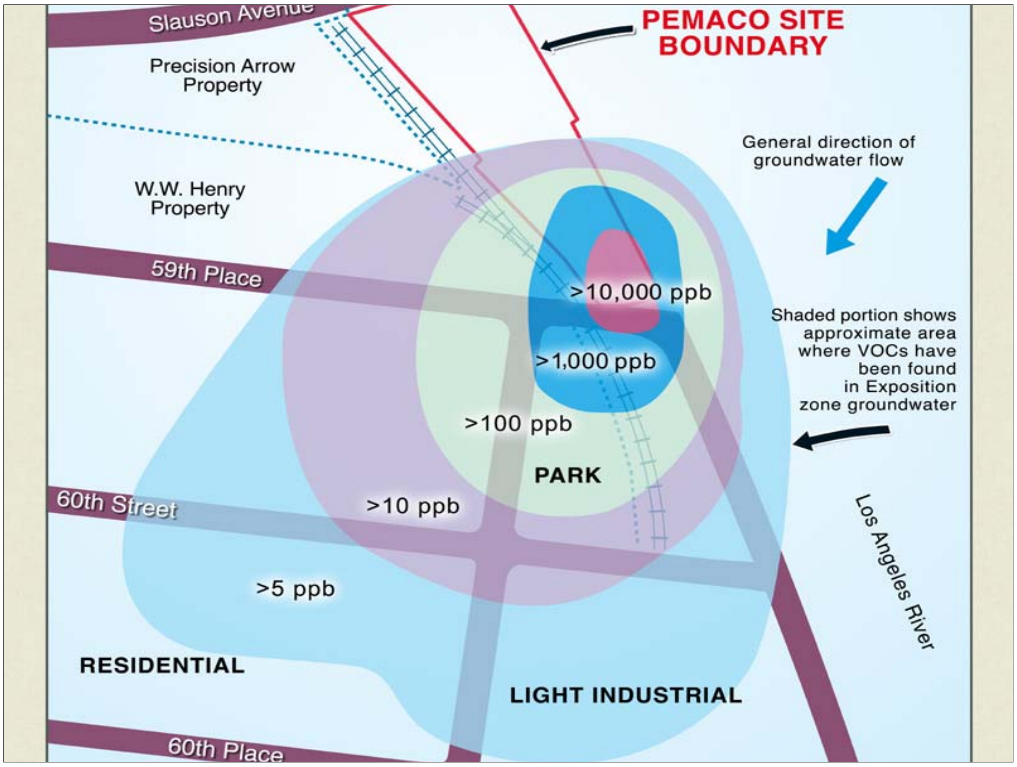

FORMER
PEMACO SITE
BOUNDARY
LOS ANGELES RIVER
SLAUSON AVENUE
MAYWOOD RIVERFRONT PARK
ALAMO AVENUE
ERH
AREA
59TH PLACE
PARK NATIVE
SOIL STOCKPILE
PARK CLEAN
SOIL STOCKPILE
PEMACO
TREATMENT
BUILDING
W. W. HENRY
COMPOUND
WALKER AVENUE
60TH STREET

Activities to Date

- Maywood Riverfront Park completed June 2006
- Feb 2007 EISB Field Pilot
- April 2007 Groundwater Treatment System turned on
- May 2007 Vapor treatment turned on

Activities to Date

- September 2007 turned on electricity to the ERH well field
- April 2008 turned off electricity in the ERH well field after 200 days of heating
- October 2008 sampled “hot soils” in the ERH well field (post-treatment sampling).



"B" zone TCE groundwater plume (~85' to 95' bgs) – extends 1200' downgradient from site

Shallow Groundwater

(25 - 35 feet below ground surface) shallow plume extends 200 ft to southwest

32 Chemicals of Concern including vinyl chloride, benezene, PCE, TCE, and 1,4 dioxane in shallow groundwaterplume extends 1100 feet southwest of site

22 contaminants which include:

TCE	22,000 ppb
vinyl chloride	780 ppb
Cis 1,2 DCE	14,000 ppb
Acetone	20,000 ppb

Dimensions of Treatment Building

- The south-facing steel roof is 81’-4” long x 27’-11” wide. The roof pitch is 4:12 and the ridge is 20’ high.
- collateral load for solar panels is 4.00 LB/SF.

System Design

- Carefully inventory all electrical equipment in your facility
- Determine the power consumption of the equipment and hourly usage within a 24 hour period
- Size a PV system that will match that energy usage based on the number of "peak sun hours per day" for your locale

www.calsolareng.com

Pemaco

- Installed 3.4 kW photovoltaic system system on July 3, 2007
- Produces about 5,600 kWh / yr
- Offset about 3.3 tons CO_2 per year
  - 2.5 acres trees
  - 7,600 car miles

Photo of the Pemaco building. It houses the Flameless Thermal Oxidation System and water and soil treatment plant. Maywood, CA in Los Angeles County.

Installation

- 2 sets of Mounting tracks on south facing roof

Installation

- 4 days to install
- 20 solar panels

Installation

- battery backup power will be used for the computers, backup lighting, and the Treatment System in the event of a power failure to keep critical loads operating.

Install Complete

Electrical Control Room

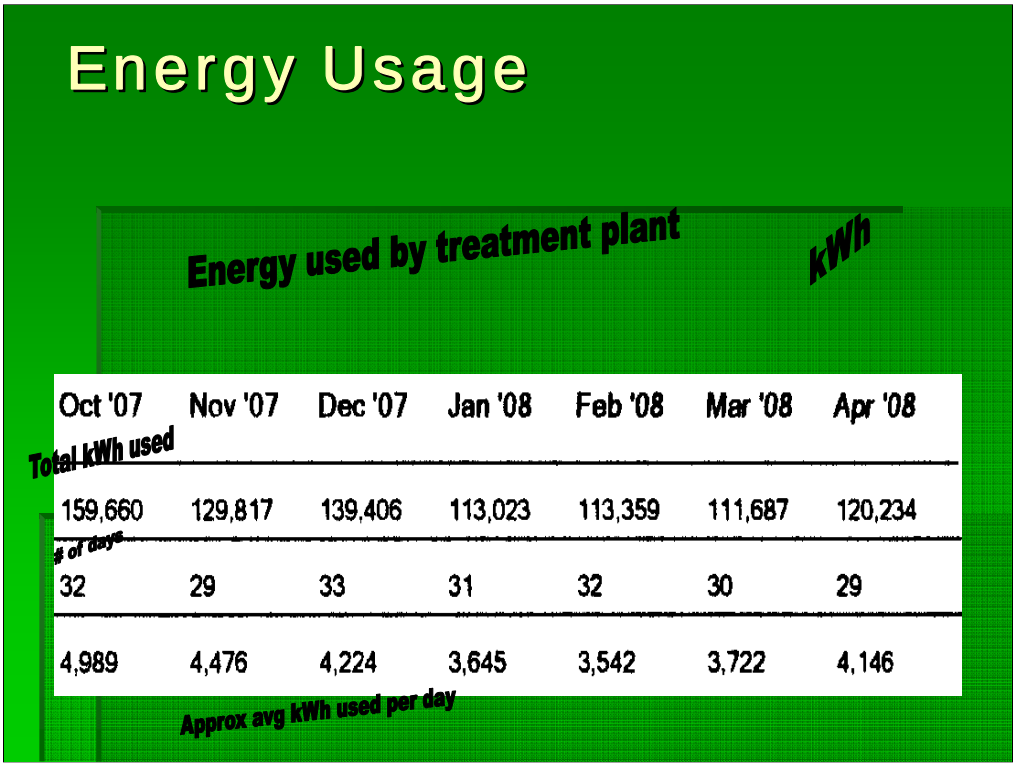
Electrical panel installed inside control room. Xantrax Grid Tie Solar Inverter owner's manual.


xantrex

utilizes most power


T-101


T-101



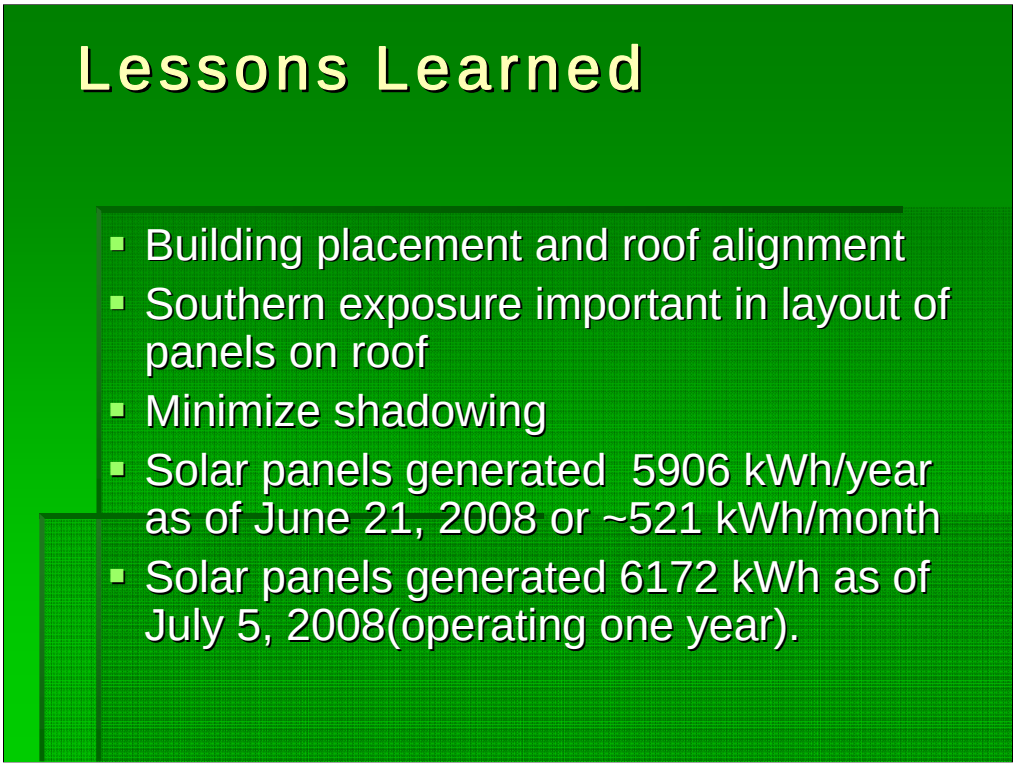
Monthly usage of electricity in the treatment plant. Solar energy has already been used by the system.

Cost of System

- **Xantrax Grid Tie Solar Inverter photovoltaic system $30,227**
- **Average $9,000 rebate for system**
- By July 5, 2008(one year operation) Solar panels generated 6172 kWh or 514 kWh per month.

Energy Estimates

- Examples from electrical bill shows the following:
  - 5440 kWh payment to SCE = $2497.08
  - ~.46/kWh so generating 6172 kWh for year saved approximately $2839 for year or $236.44 per month in energy charges.

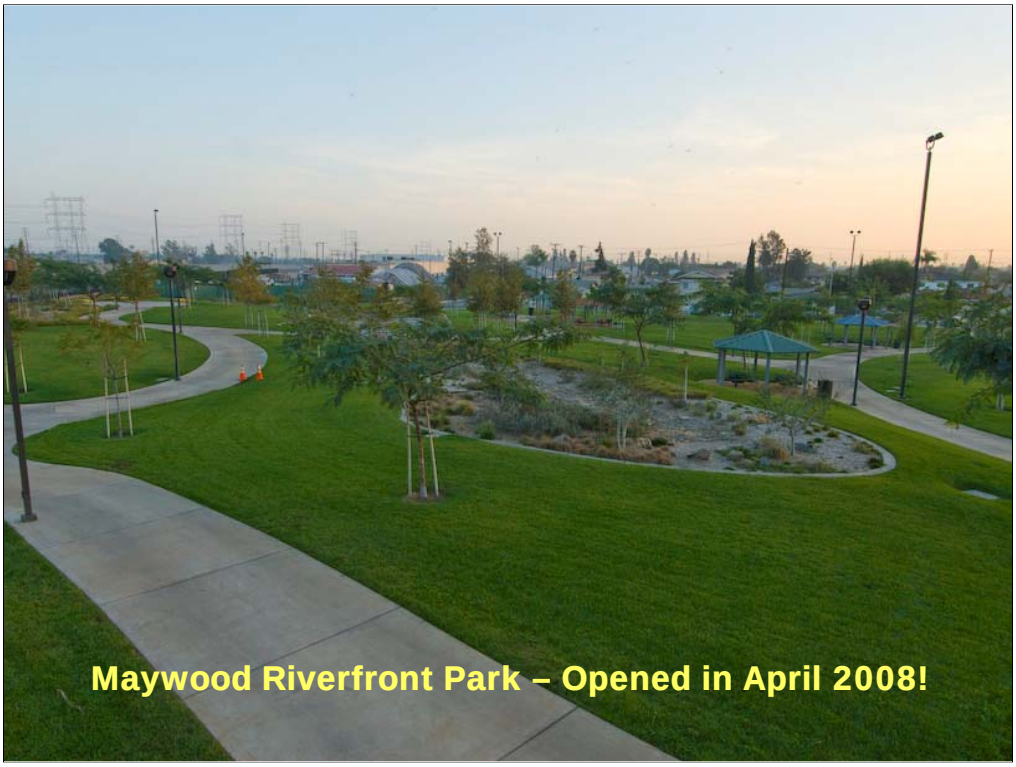


Placement of building on your site might change how you orient construction build-out on your site so that you get the best orientation to facilitate receiving the most energy into your system.

Lessons Learned

- Average usage of electricity inside the treatment plant is equal to 126,741 kWh/month
- Check eligibility of solar system for state sponsored rebates

Site Security affected decision on what type of system to install


Maywood Riverfront Park – Opened in April 2008!

PEMACO SUPERFUND SITE

- Contact Information

Rose Marie Caraway, MBA
Remedial Project Manager/Environmental Scientist
U.S. Environmental Protection Agency
75 Hawthorne Street, SFD 7-2
San Francisco, CA 94105
415 972 3158

Groundwater Pump & Treat Pilot Study Using Alternative Energy

K. David Drake,
USEPA Region 7, Kansas City, KS

Project Overview

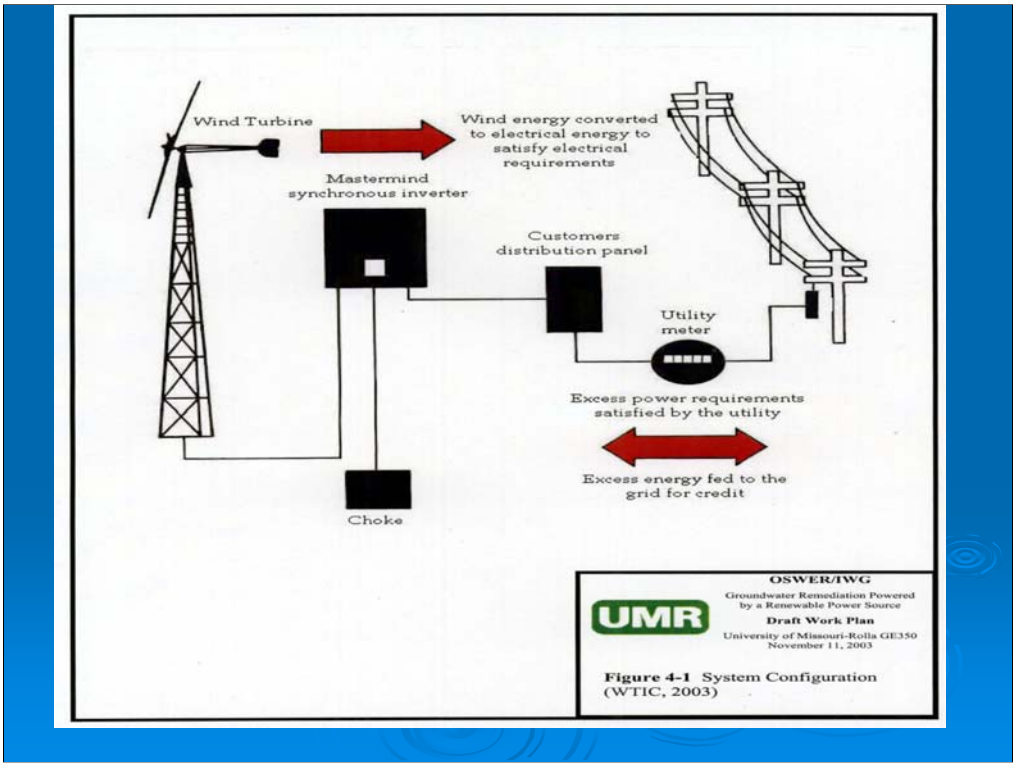
- Short-term pilot study evaluating cost savings of alternative wind power.
- Project duration of one year funded at $300,000.
- Multiple organizations participating: EPA; Army Corps of Engineers, University of Missouri-Rolla, Bergy Wind Systems, Inc.

Study Goals

- Quantify the reduction of power requirements by comparison with historic power use data.
- Calculate the mass of VOCs removed during the demonstration period.
- Identify system enhancements and recommend new follow-on studies.

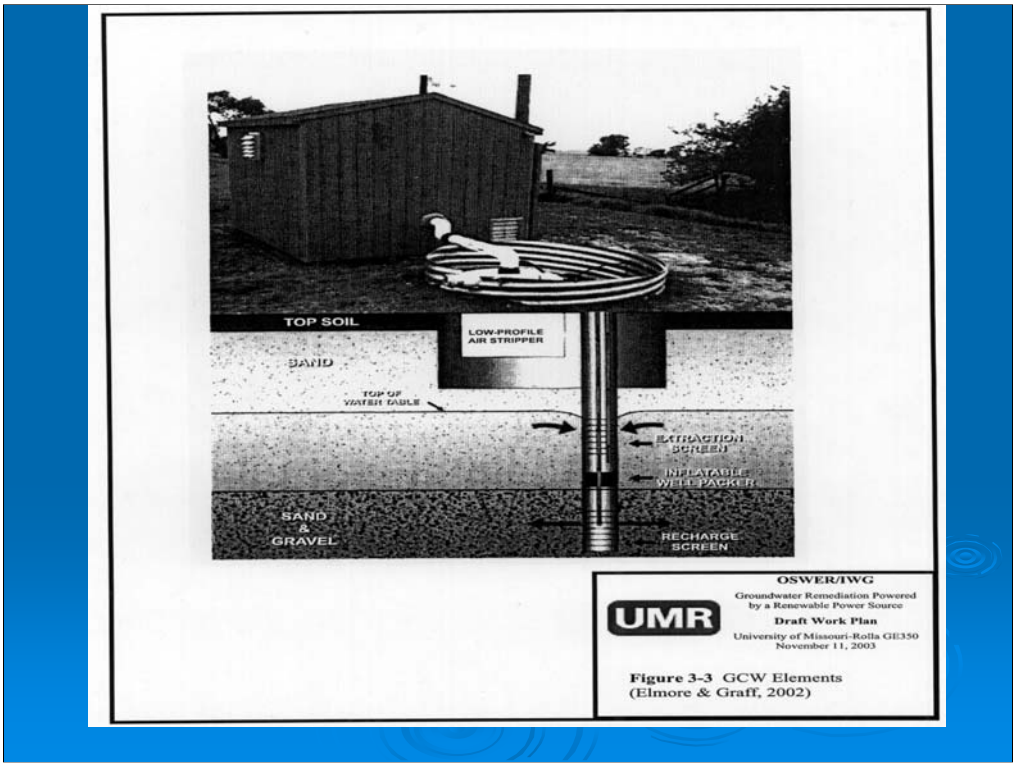
System Details

- 10 kilowatt wind turbine with grid-inter-tie system.
- 100 foot lattice tower with guy wires and warning lights.
- Groundwater circulation well (GCW) for water conservation.


Wind Turbine
Wind energy converted to electrical energy to satisfy electrical requirements
Mastermind synchronous inverter
Customers distribution panel
Utility meter
Excess power requirements satisfied by the utility
Excess energy fed to the grid for credit
Choke
OSWER/IWG
Groundwater Remediation Powered by a Renewable Power Source
Draft Work Plan
University of Missouri-Rolla GE350
November 11, 2003
Figure 4-1 System Configuration (WTIC, 2003)

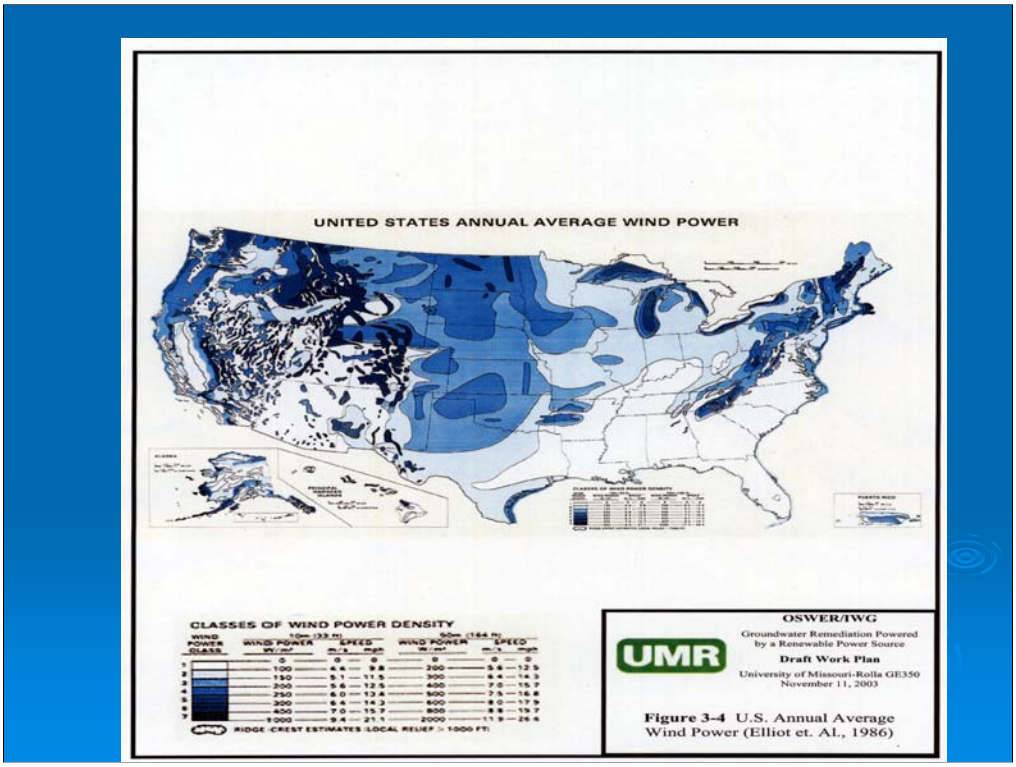
A Green Technology

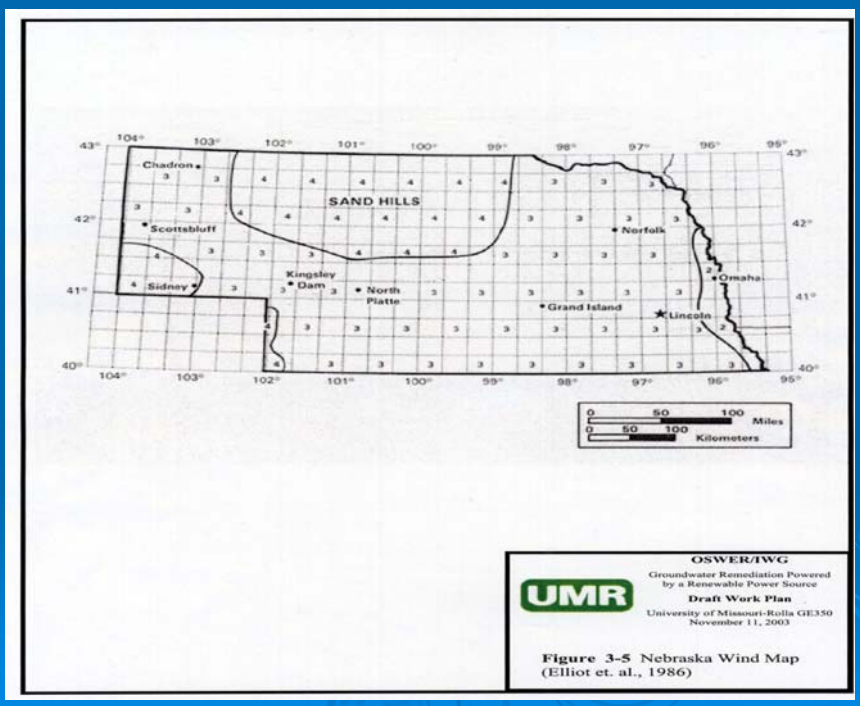
- Renewable wind energy powers the system with potential net-metering and solar/battery enhancements.
- Conservation of groundwater using GCW approach.
- Fossil fuels conserved and emissions reduced.


TOP SOIL
LOW-PROFILE
AIR STRIPPER
SAND
TOP OF
WATER TABLE
EXTRACTION
SCREEN
INFLATABLE
WELL PACKER
SAND
&
GRAVEL
RECHARGE
SCREEN
OSWER/IWG
Groundwater Remediation Powered
by a Renewable Power Source
UMR
Draft Work Plan
University of Missouri-Rolla GE350
November 11, 2003
Figure 3-3 GCW Elements
(Elmore & Graff, 2002)

Why Nebraska?

- Favorable wind conditions - 14.4 mile per hour mean intensity.
- Favorable Geology - highly transmissive Pleistocene sand and gravel deposits.
- Many contaminated sites.


UNITED STATES ANNUAL AVERAGE WIND POWER
CLASSES OF WIND POWER DENSITY
OSWER/IWG
Groundwater Remediation Powered by a Renewable Power Source
Draft Work Plan
University of Missouri-Rolla GE350
November 11, 2003
UMR
Figure 3-4 U.S. Annual Average Wind Power (Elliot et. Al., 1986)

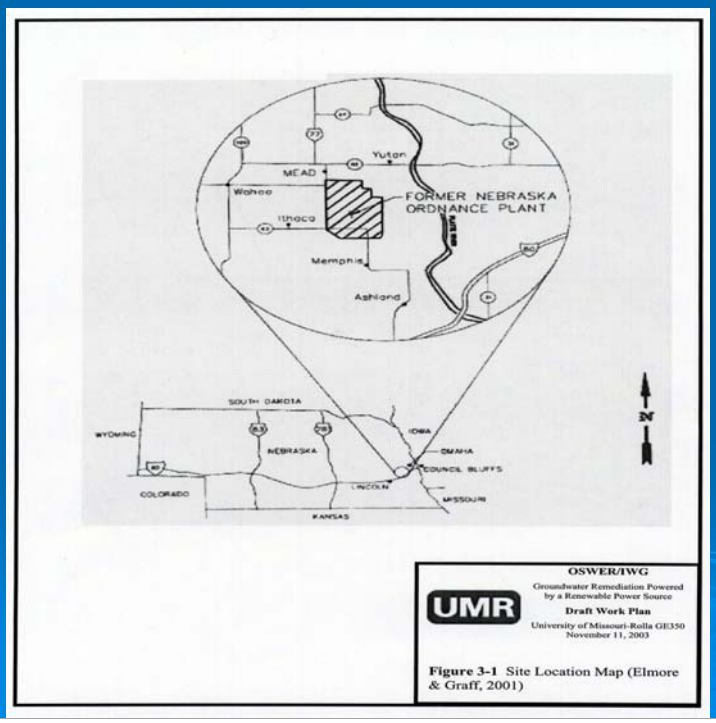

SAND HILLS
Chadron
Scottsbluff
Sidney
Kingsley Dam
North Platte
Grand Island
Lincoln
Omaha
Norfolk
104°
103°
102°
101°
100°
99°
98°
97°
96°
95°
43°
42°
41°
40°
0 50 100 Miles
0 50 100 Kilometers
OSWER/IWG
Groundwater Remediation Powered by a Renewable Power Source
Draft Work Plan
University of Missouri-Rolla GE350
November 11, 2003
UMR
Figure 3-5 Nebraska Wind Map
(Elliot et. al., 1986)

Wind Energy Facts

- Most rapid growing source of electricity and projected lowest cost within a decade.
- 1/3 rd. of the U.S. has Class 3 or higher wind intensity (Class 2 is the minimum).
- Wind energy potential is proportional to velocity cubed (2 x v = 8 x power).

Nebraska Ordnance Plant Site

- 17,000 acres in east-central Nebraska, Saunders County.
- 1942 - 1956, munitions production and storage for WWII and Korean Conflict.
- 1959 - 1964, Atlas Missile construction and maintenance.
- Four VOC and explosives plumes.


Yutan
MEAD
Wahoo
Ithaca
FORMER NEBRASKA
ORDNANCE PLANT
Memphis
Ashland
SOUTH DAKOTA
WYOMING
NEBRASKA
IOWA
OMAHA
COUNCIL BLUFFS
COLORADO
LINCOLN
MISSOURI
KANSAS
N
OSWER/IWG
Groundwater Remediation Powered by a Renewable Power Source
UMR
Draft Work Plan
University of Missouri-Rolla GE350
November 11, 2003
Figure 3-1 Site Location Map (Elmore & Graff, 2001)

Site Groundwater Facts

- 23 billion gallons of groundwater over 6,000 acres.
- 4 groundwater plumes (2 with explosives and 2 with VOCs)
- Todd Valley, ancestral Platte River Stream Channel, 81 - 157 feet of alluvial overburden Pleistocene deposits.

Historic GCW Facts

- 12 inch diameter well, 24 inch boring.
- 50 gallons per minute pump rate, 26 million gallons annually.
- Annual power usage of 28,000 kilowatt hours.
- Annual power cost of $1,800.

Estimated Versus Actual Savings

- 36 % of GCW power demands expected to be met by alternative energy, 26% actual.
- Estimated annual savings of $780 and the generation of 12,00 kWh, actual savings of $547 and 8,422 kWh generated.
- Total capital costs of $38,000 recovered in 69 years of operation versus 49 years estimated.

30 Year Environmental Gains

- 169 tons of greenhouse gasses eliminated.
- $16,400 power savings (not inflation adjusted and $0.065 per kWh assumed).
- $22,740 power savings (not inflation adjusted and $0.09 kWh assumed).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DISCONNECT
DANGER
STARTS AUTOMATICALLY
MISE EN MARCHE AUTOMATIQUE
DANGER
HIGH VOLTAGE
HAUTE TENSION
230 VOLTS
THREE PHASE


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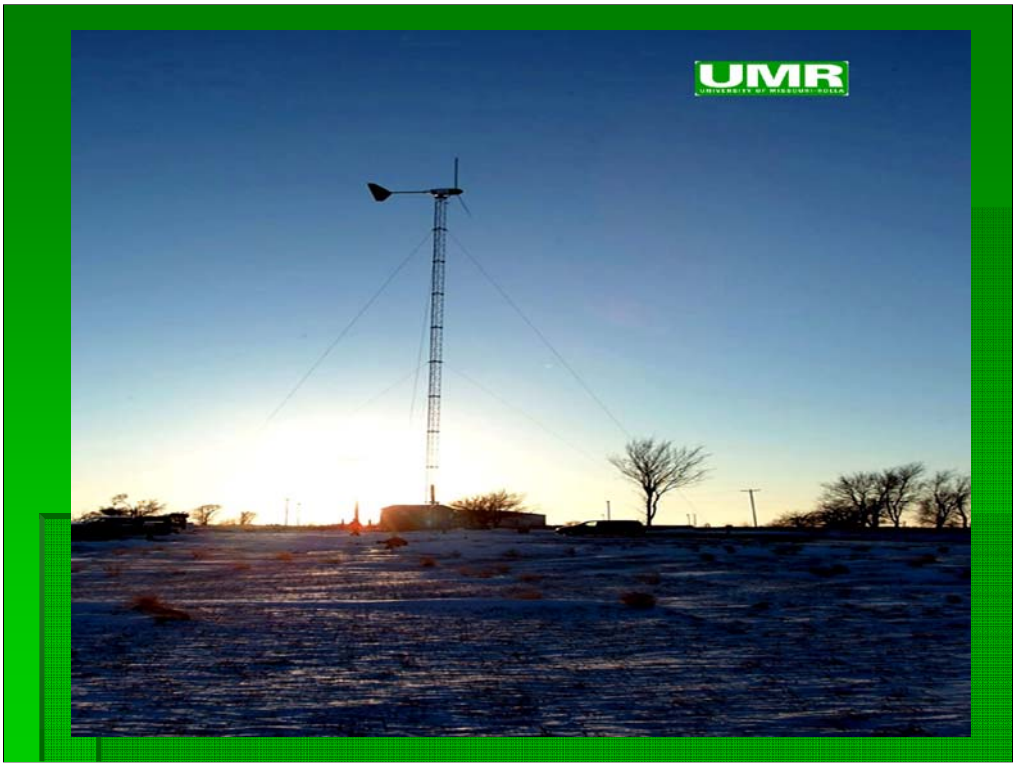
FIBERGLASS
INSULATION
DANGER


IN CASE
OF EMERGENCY CALL
403-010-2032
OR
403-010-1186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After viewing the links to additional resources, please complete our online feedback form.

Links to Additional Resources

Feedback Form