



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

December 10, 2008

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OSWER Center for Program Analysis

Big Picture Context



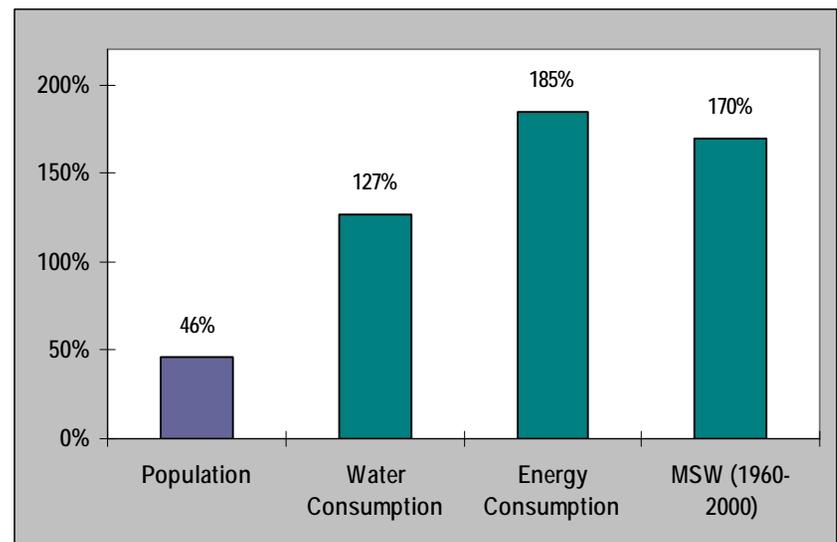
Between 1950 and 2000

- U.S. population increased 46% to 282 million people
- Water consumption increased 127% to 408 billion gallons used per day
- Energy consumption increased 185% to 98.9 quadrillion Btu

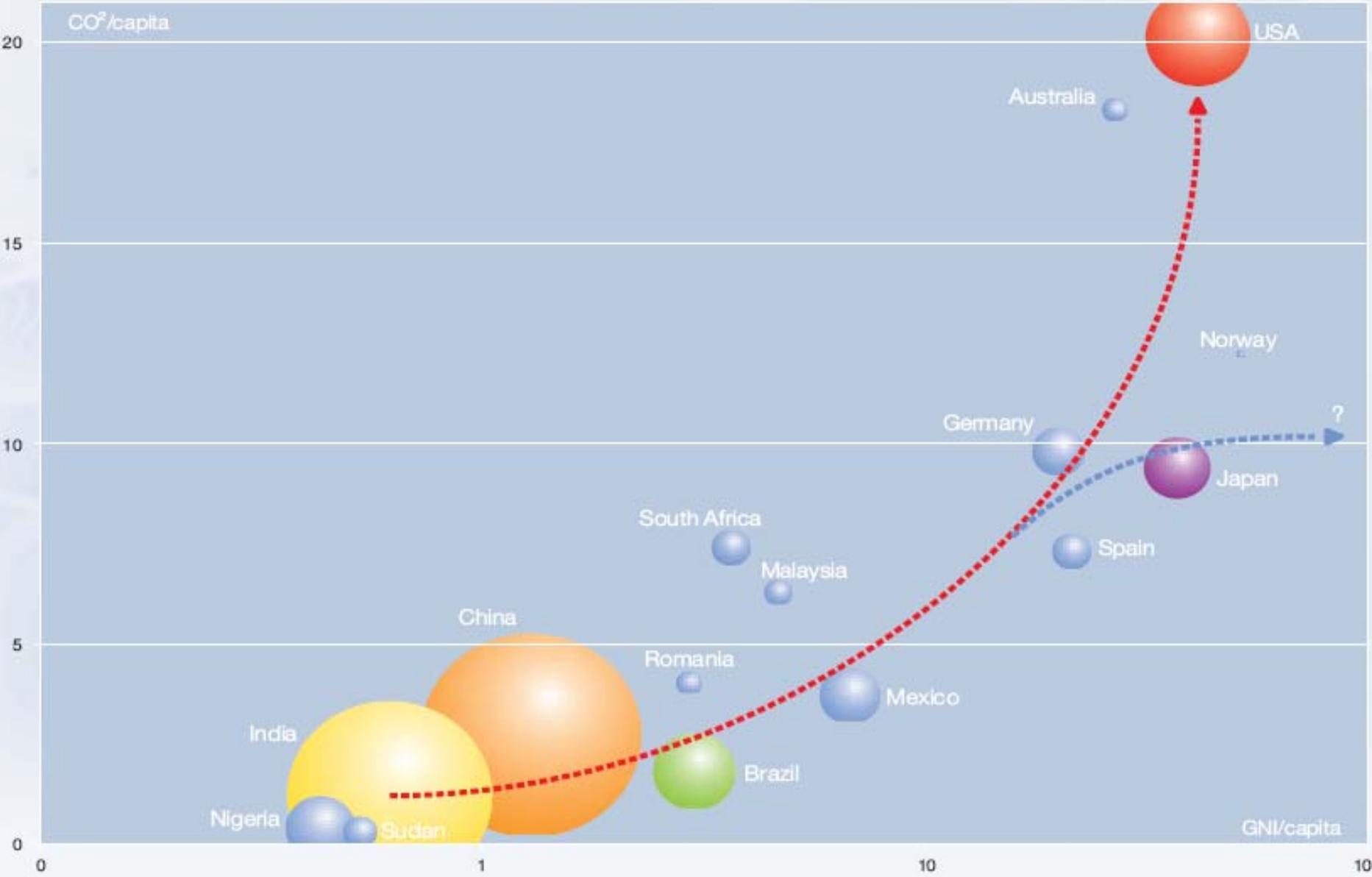
Between 1960 and 2000

- MSW generation and disposal increased 170%

The average U.S. person now consumes twice as much as they did 50 years ago, and at a rate 32 times higher than in the developing world.



CO2 Emissions vs. Gross Net Income (Per Capita)



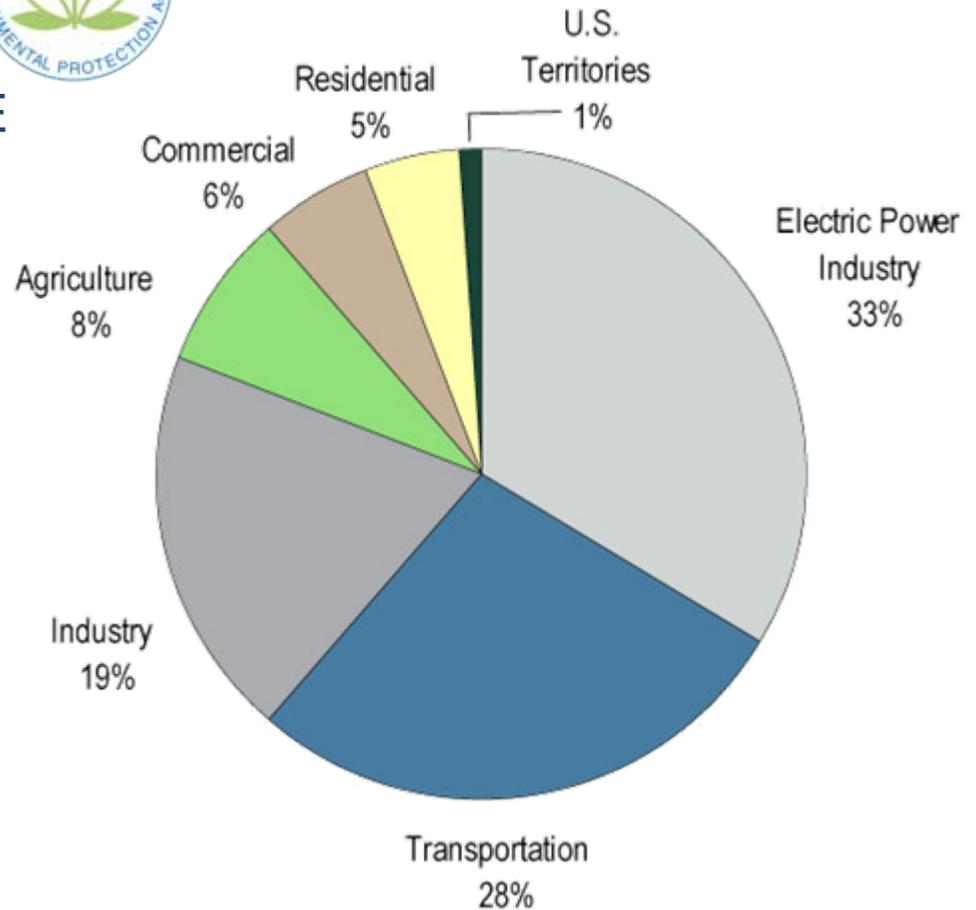
Conventional Sector-based View of U.S. GHG Emissions



2005 U.S. Emissions: 7,260 MMTCO₂E

Conventional View

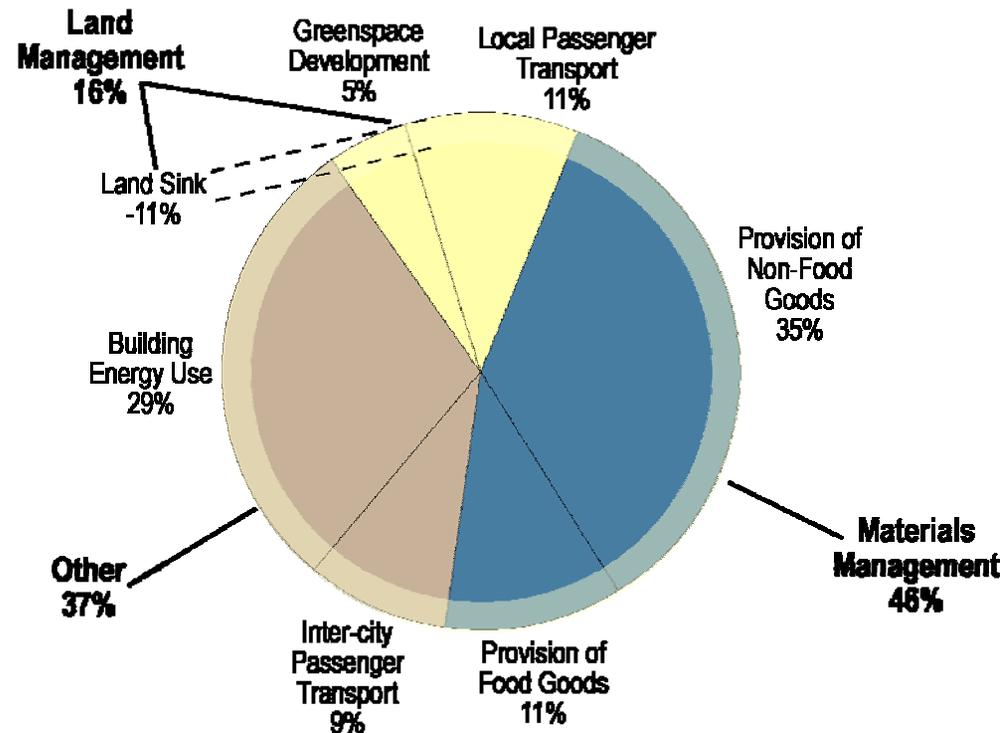
- Electricity production
- Automobiles and transportation
- Energy/electricity consumption



Systems-based View of U.S. GHG Emissions



- Total U.S. Greenhouse Gas Emissions in 2006
 - 7,260.4 MMTCO₂E
- The land mass of the U.S. provides a carbon sink
 - In 2006, U.S. land sequestered 828.5 MMTCO₂E through land use, land use change, and forestry activities
 - Sequesters approximately 11% of annual U.S. GHG emissions
- Land management equals 4% of annual U.S. GHG emissions
 - Development of green space
 - Infrastructure



An Example: Energy of Production and Consumption of Plastic Bottles

Two million plastic beverage bottles, the number used in the U.S. every five minutes.



An Example: Energy of Production and Consumption of Cell Phones



- In 2005, nearly 100 million cell phones were retired
 - More than 50,000 tons of discarded material
 - 426,000 disposed of every day
- The electronics segment of the waste stream accounts for less than 5% of municipal waste, but is growing much faster than the waste stream as a whole

426,000 cell phones, the number of cell phones disposed of in the U.S. every day

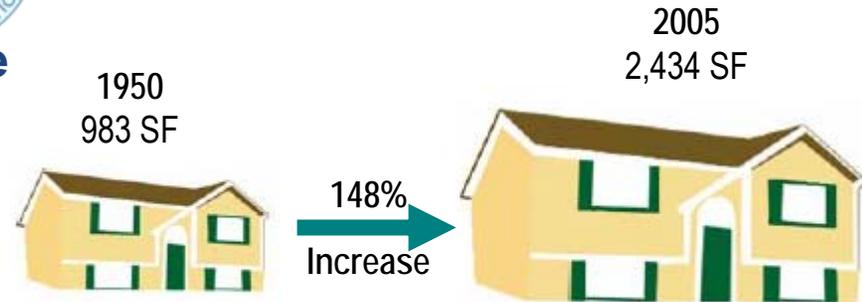
Impacts of Inefficient Land Development: Larger Homes Require More Resources



Average size of U.S. single-family home

1950	983 SF
1970	1,500 SF
2000	2,200 SF
2005	2,434 SF

148% increase from 1950



Average number of occupants per U.S. household

1950	3.37
1970	3.14
2000	2.62

22% decrease from 1950

Average area per person in a new U.S. single-family home

1950	292 SF per person
1970	478 SF per person
2000	840 SF per person

188% increase from 1950



IEA Accelerated Technology (ACT) and Blue Scenarios



- Mandate by G-8 Leaders and Energy Ministers for IEA to provide guidance on how to achieve a clean and competitive energy future
- Assumes aggressive RD&D Program
 - ACT Scenario: Reduces 2050 emissions to 2005 levels
 - Blue Scenario: Reduces 2050 emissions to ½ 2005 levels
- Assumes policies in place to encourage **technology** use in accelerated time frame to reduce GHGs to these levels by 2050
 - CO2 reduction incentives of up to **\$50 to \$200 per ton**
 - Policies include regulation, tax breaks, subsidies and trading schemes

Reference: International Energy Agency, Energy Technology Perspectives 2008, OECD-IEA, 2008

Possible Lower Cost Materials Management Approaches



“Lead-by-example” behavior-based programs

- Turning off lights, adjusting building temperature
- 1% energy savings would reduce GHG emissions by 23.78 MMTCO₂E per year
- 5% energy savings would reduce GHG emissions by 118.89 MMTCO₂E per year (1.6% of total U.S. emissions)
- Cost savings of \$37 per metric ton of CO₂ reduced

Voluntary partnerships and recognition programs

- Formal agreements and MOUs with business, industry, other institutions
- Promotes renewable energy development and GHG reduction at negligible cost

Reduce size of average new home constructed by 17%, from 2,400SF to 2,000SF

- 6.04 MMTCO₂ per year, cost savings of \$10,000 per metric ton of CO₂ reduced

Shift 10% of new development from sprawl to compact patterns

- Save 4.95 billion gallons of gasoline (\$14.85B)
- 59.5 MMTCO₂ over 10 years, cost savings of \$250 for every ton of CO₂ reduced

Possible Lower Cost Land Management Approaches



Reforest mine land (963,000 acres)

- 409 MMTCO₂E over 70 year lifespan of tree
- Cost of \$2.38 per ton, over 70 years

Early commercial forest thinning

- Forest management anticipates timber mortality, concentrate growth on better remaining timber
- Approximately \$1 per ton of CO₂ reduced

Timber harvesting to capture more anticipated mortality

- Remove standing biomass with minimal impact on forest floor and soils
- Reduces decayed wood and provides biomass feedstock.
- Estimated \$3.50 per ton of CO₂ reduced

Prevent development of 2.2 million acres of greenspace per year

- Infrastructure avoidance
 - 36.2 MMTCO₂, cost *savings* of \$837 for every ton of CO₂ reduced
- Land disturbance avoidance
 - 314 MMTCO₂E, no cost

Benefits of Reusing Contaminated Land: Green Space Preservation



- Preserves greenspace
- Requires less infrastructure than greenspace development
- Provides opportunities for climate sensitive reuse options
- Reduces U.S. GHG emissions, while preserving carbon sequestering land sink
 - The U.S. has the third largest land mass of all countries in the world.
 - ◆ Offsets the equivalent of 11% of total U.S. emissions
 - ◆ Reusing contaminated land helps preserve this carbon sink
 - On average for every acre of brownfield property redeveloped, a minimum of 4.5 acres would have been required had the same project been located in a greenfield area

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



- EPA launched *RE-Powering America's Land* initiative at the 2008 Brownfields Conference
- EPA hosted a renewable energy (RE) expert panel
 - Participants: industry, state and federal government, finance, renewable energy developers, and land owners
- EPA Administrator announced at the Environmental Council of States conference Sept. 2008



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, locally, and utility grid



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**



How Much Energy Can EPA Tracked Lands Support?



Solar Energy Total Technical Potential

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

Wind Energy Total Technical Potential

- Wind Energy Generation Potential on EPA Tracked Lands
 - 120,379 MW
- By 2010, EIA projects U.S. wind capacity at 25,610 MW

Setting the Stage for New Mexico Renewable Energy



- New Mexico Executive Order 05-033: Climate Change and Greenhouse Gas Reduction
- New Mexico Executive Order 2006-69: New Mexico Climate Change Action
- Western Climate Initiative (WCI) partner with other states and Canadian Provinces
 - AZ, MT, OR, UT, WA, British Columbia, Manitoba, Ontario, Quebec

New Mexico and Air Force Renewable Energy Agreements



- **Governor Richardson and US Air Force Assistant Secretary Anderson Announce Four Clean Energy Agreements on July 23, 2008**
 1. Air Force, City of Alamogordo and the State of New Mexico to supply solar power to Holloman Air Force Base
 2. Air Force, Southwest Biomass Cooperative, the City of Clovis, and state of New Mexico to pursue the creation of an electricity production plant using New Mexico's abundant dairy waste
 3. Air Force, City of Albuquerque and the State of New Mexico for the Air Force to pursue green power purchasing at its facilities in NM
 - ♦ piggybacking on PNM's existing solar RFP
 - ♦ exploring a thin film solar photovoltaic project as a means of supplying state and city power needs
 4. Air Force, the City of Clovis, and the State of New Mexico to pursue a wind energy project
- **\$600 - \$800M in capital investment and 145 – 245 MW of additional renewable energy in New Mexico**



Google Earth Mapping Tool



- **Successful EPA-NREL joint venture produced an interactive Google Earth mapping application**
www.epa.gov/renewableenergyland
- **Opportunities to site renewable energy on contaminated lands and mining sites in each state**
- **Produced over 170 state-specific maps showing renewable energy development potential on EPA tracked sites**
- **Produced financial incentive sheets describing renewable energy development and contaminated lands redevelopment incentives in each state**



Screening Criteria: Wind, Solar, Biomass



Utility Wind	
Wind class, measured at 50 meters above ground	≥4
Distance to transmission lines	≤10 miles
Acreage	≥2,000
Distance to graded roads	≤25 miles

Utility Solar (CSP)	
Direct normal solar resource availability	≥6 kWh/m ² /day
Distance to transmission lines	≤10 miles
Acreage (stirling engine system) ²	≥40
Acreage (trough and power tower)	≥250
Distance to graded roads	≤25 miles

Biopower Facility Siting	
Cumulative biomass resources ⁴	≥140,000 metric tons/year within 50 miles
Distance to transmission lines	≤10 miles
Acreage	≥50
Distance to graded roads	≤3 miles
Distance to rail	≤8 miles

Community Wind	
Wind class, measured at 50 meters above ground	≥3
Distance to transmission lines ¹	N/A
Acreage	100 - 1,999
Distance to graded roads	≤25 miles

Utility Solar (Photovoltaic (PV))	
Direct normal solar resource availability	≥5 kWh/m ² /day
Distance to transmission lines	≤10 miles
Acreage	≥40
Distance to graded roads	≤25 miles

Biorefinery Facility Siting	
Cumulative crop residues ⁵	≥330,000 metric tons/year within 50 miles
Acreage	≥50
Distance to graded roads	≤3 miles
Distance to rail	≤8 miles

Non-Grid-Connected Wind	
Wind class, measured at 50 meters above ground ¹	≥3

Non-Grid-Connected Solar (PV)	
There are no formal screening criteria as PV technology can be sited at all properties ³	

Google Earth Mapping Tool



- **Audience:**
 - **Developers**
 - **Environmental managers (state, federal, private)**
 - **Consultants**
 - **Renewable energy industries**
 - **Communities**
 - **Local, state, and federal energy and environment officials**
 - **Anyone interested in renewable energy projects**



Renewable Energy on Contaminated Land and Mining Sites



Contact Us Search: All EPA This Area

You are here: [EPA Home](#) » [Renewable Energy at Contaminated Land and Mining Sites](#)

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](#)

Renewable Energy on Contaminated Lands and Mining Sites home

Basic Information

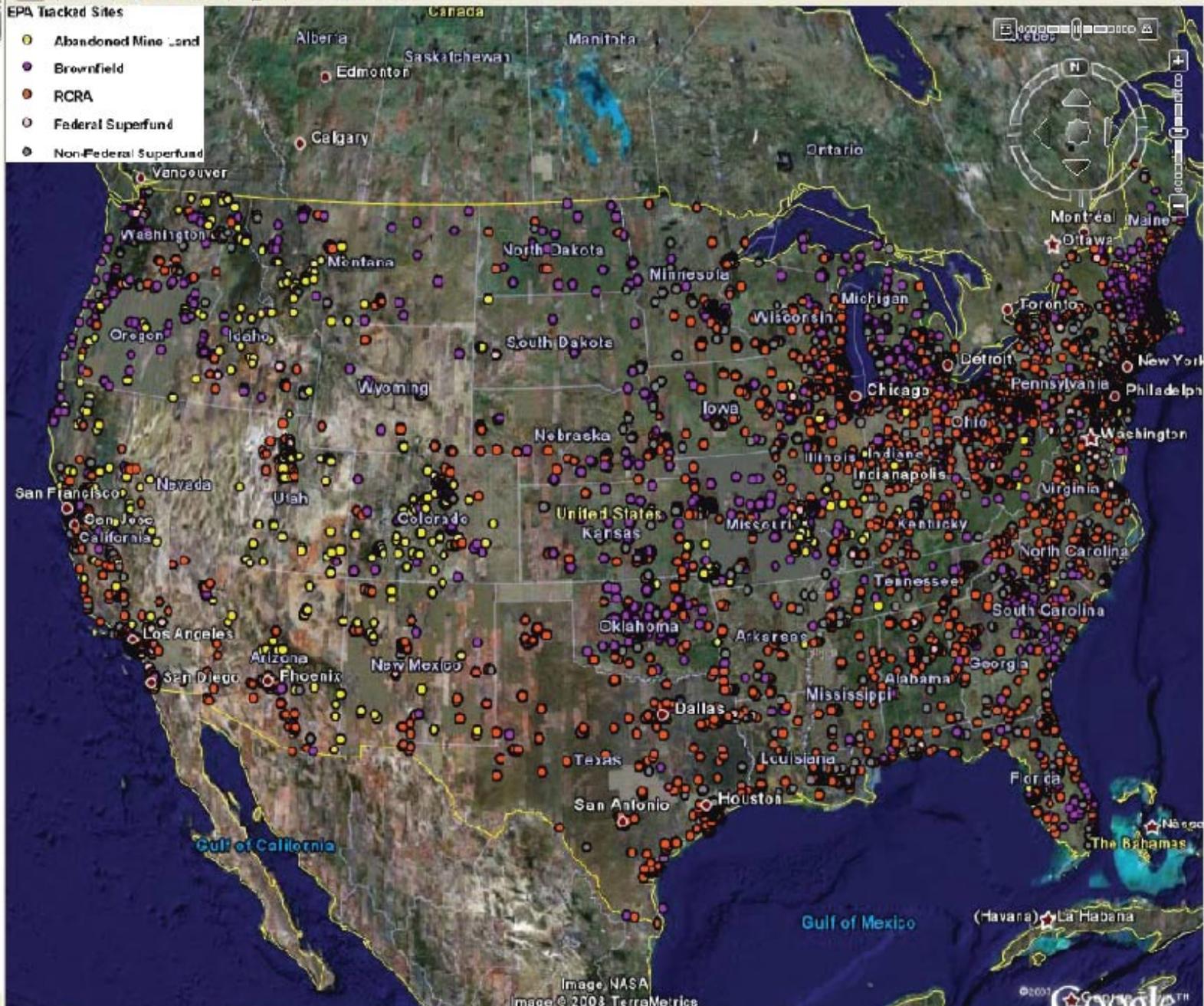
Renewable Energy Maps and State Incentive Sheets

Renewable Energy Interactive Mapping Tool

Why Develop Renewable Energy on Contaminated Lands?

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 - Community Wind
 - USP Utility Solar
 - PV Utility Solar
 - Geopower Facility
 - Bioenergy Facility
 - Gen-Grid Wind
 - Wind-PV Solar
 - Solar-Tech Installations
 - GeoGuide.nas



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Layers

- Primary Database
- Geographic Web
- Roads

EPA Tracked Sites

- Abandoned Mine Land
- Brownfield
- RCRA
- Federal Superfund
- Non-Federal Superfund



U.S. Nnsa/Doe Los Alamos National Labora

City: Los Alamos
State: NM
Mapped Acreage: 28,000.0
EPA Program: RCRA
EPA Region: 6
EPA ID: NM0890010515
Current Environmental Status of Site: [EPA Cleanup Program Information](#)

Renewable Energy Potential: Utility Wind; CSP Utility Solar; PV Utility Solar; Non-Grid Wind; Non-Grid PV Solar
Wind Power Class: 5
Wind Power Density (W/m²), at 50 Meters: 500-600
Wind Resource Potential: Excellent
Utility Solar Power Resource (kWh/m²/day): 6.86
Utility Solar Potential: Excellent
Non-Grid Connected Photovoltaic Solar Resource (kWh/m²/day): 6.23
Non-Grid Connected Photovoltaic Solar Potential: Excellent
Resources for Biopower (metric tons/year): 253,193
Biopower Resource Potential: Excellent
Resources for Biorefinery (metric tons/year): 219,432
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
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 on methodology and data considerations.



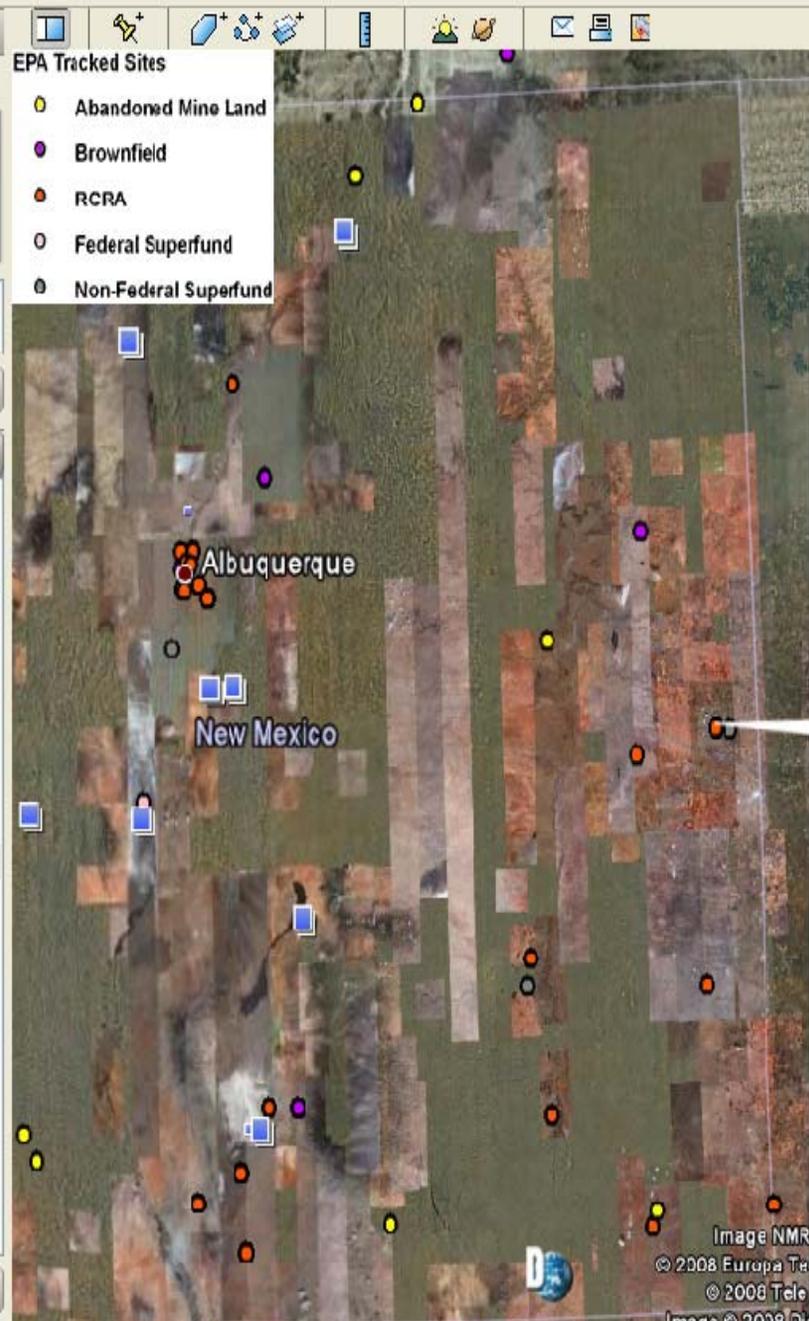

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 - Biorefinery Facility
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 - Non-Grid PV Solar
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Cannon Air Force Base New Mexico

City: Cannon Afb
 State: NM
 Mapped Acreage: 4,500.0
 EPA Program: RCRA
 EPA Region: 6
 EPA ID: NM7572124454
 Current Environmental Status of Site: [EPA Cleanup Program information](#)

Renewable Energy Potential: CSP Utility Solar; PV Utility Solar; Biopower Facility; Biorefinery Facility; Non-Grid Wind; Non-Grid PV Solar

Wind Power Class: 3
Wind Power Density (Wm²), at 50 Meters: 300-400
Wind Resource Potential: Fair
Utility Solar Power Resource (kWhm²/day): 6.55
Utility Solar Potential: Excellent
Non-Grid Connected Photovoltaic Solar Resource (kWhm²/day): 3.18
Non-Grid Connected Photovoltaic Solar Potential: Excellent
Resources for Biopower (metric tons/year): 769,779
Biopower Resource Potential: Outstanding
Resources for Biorefinery (metric tons/year): 737,754
Biorefinery Resource Potential: Outstanding

Site-Specific Renewable Energy Data: [Renewable Energy Excel spreadsheet](#)
Data and Methodology Description: [Data Guidelines document](#)

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EPA Tracked Sites

- Abandoned Mine Land
- Brownfield
- RCRA
- Federal Superfund
- Non-Federal Superfund



Holloman Air Force Base

City: Holloman Air Force Base

State: NM

Mapped Acreage: 59,639 II

EPA Program: RCRA

EPA Region: 6

EPA ID: NM6572124422

Current Environmental Status of Site: [EPA Cleanup Program information](#)

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: 1-200

Wind Resource Potential: Poor

Utility Solar Power Resource (kWh/m²/day): 6.69

Utility Solar Potential: Excellent

Non-Grid Connected Photovoltaic Solar Resource (kWh/m²/day): 6.37

Non-Grid Connected Photovoltaic Solar Potential: Excellent

Resources for Biopower (metric tons/year): 160,100

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 Exca 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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EPA Tracked Sites

Fort Wingate Depot Activity

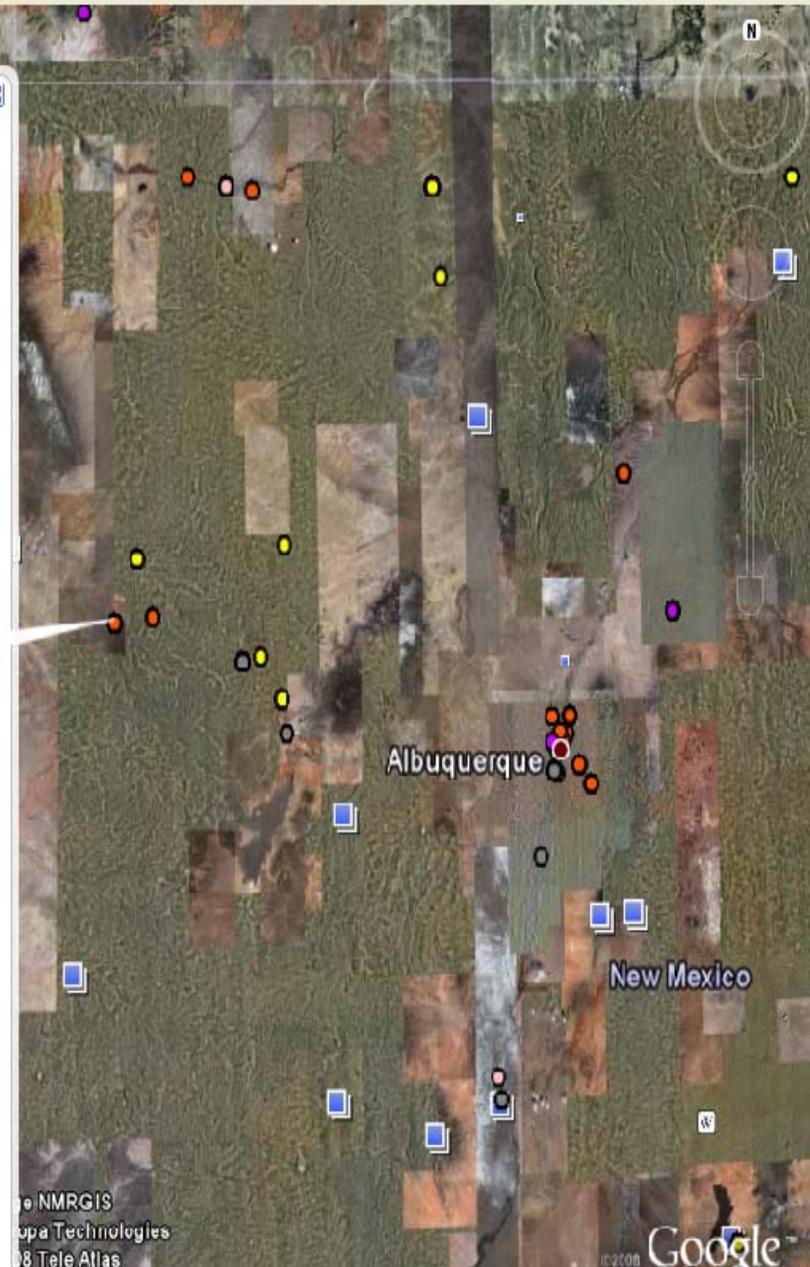
City: Gallup
 State: NM
 Mapped Acreage: 21,812.0
 EPA Program: RCRA
 EPA Region: 6
 EPA ID: NM6213820974
 Current Environmental Status of Site: [EPA Cleanup Program Information](#)

Renewable Energy Potential: CEP Utility Solar; FV Utility Solar; Non Grid Wind; Non-Grid PV Solar
Wind Power Class: 3
Wind Power Density (W/m²), at 50 Meters: 300-400
Wind Resource Potential: Fair
Utility Solar Power Resource (kWh/m²/day): 6.88
Utility Solar Potential: Excellent
Non-Grid Connected Photovoltaic Solar Resource (kWh/m²/day): 6.14
Non Grid Connected Photovoltaic Solar Potential: Excellent
Resources for Biopower (metric tons/year) : 72,993
Biopower Resource Potential: Marginal
Resources for Biorefinery (metric tons/year) : 72,380
Biorefinery Resource Potential: Marginal
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: cleanerenergy@epa.gov

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EPA Renewable Energy Sites

EPA Site Type Legend

Utility/Wind

Community/Wind

CSP Utility Solar

Utility Solar

Biopower Facility

Non-Grid/Wind

Non-Grid/PV Solar

Google Earth Instructions

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EPA Tracked Sites

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- Brownfield
- RCRA
- Federal Superfund
- Non-Federal Superfund



Us Air Force Melrose Range

City: Melrose
 State: NM
 Mapped Acreage: 66,000.0
 EPA Program: RCRA
 EPA Region: 3
 EPA ID: NM5572124458
 Current Environmental Status of Site: [EPA Cleanup Program Information](#)

Renewable Energy Potential: Non-Grid Wind Non-Grid PV Solar
 Wind Power Class: 4
 Wind Power Density (W/m²) at 50 Meters: 470-570
 Wind Resource Potential: Good
 Utility Solar Power Resource (kWh/m²/day): 6.70
 Utility Solar Potential: Excellent
 Non-Grid Connected Photovoltaic Solar Resource (kWh/m²/day): 6.20
 Non Grid Connected Photovoltaic Solar Potential: Excellent
 Resources for Biopower (metric tons/year): 477,316
 Biopower Resource Potential: Excellent
 Resources for Biorefinery (metric tons/year): 139,281
 Biorefinery Resource Potential: Excellent
 Site-Specific Renewable Energy Data: [Renewable Energy Excel spreadsheets](#)
 Data and Methodology Description: [Data Guidelines \(pdf\)](#)

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EPA Tracked Sites

- Abandoned Mine Land
- Brownfield
- RCRA
- Federal Superfund
- Non-Federal Superfund



White Sands Missile Range

City: White Sands Missile Range
 State: NM
 Mapped Acreage: 2000,000.0
 EPA Program: RCRA
 EPA Region: 6
 EPA ID: NM2750211235
 Current Environmental Status of Site: [EPA Cleanup Program Information](#)

Renewable Energy Potential: Utility/Wind; CSP; Utility Solar; PV Utility Solar
 Biopower Facility; Non-Grid Wind; Non-Grid PV Solar
Wind Power Class: 1
Wind Power Density (W/m²), at 50 Meters: >800
Wind Resource Potential: Superior
Utility Solar Power Resource (kWh/m²/day): 7.7
Utility Solar Potential: Excellent
Non-Grid Connected Photovoltaic Solar Resource (kWh/m²/day): 6.58
Non-Grid Connected Photovoltaic Solar Potential: Excellent
Resources for Biopower (metric tons/year): 238,058
Biopower Resource Potential: Excellent
Resources for Biorefinery (metric tons/year): 257,129
Biorefinery Resource Potential: Excellent
Site-Specific Renewable Energy Data: [Renewable Energy Excel spreadsheet](#)
Data and Methodology Description: [Data Guidelines document](#)

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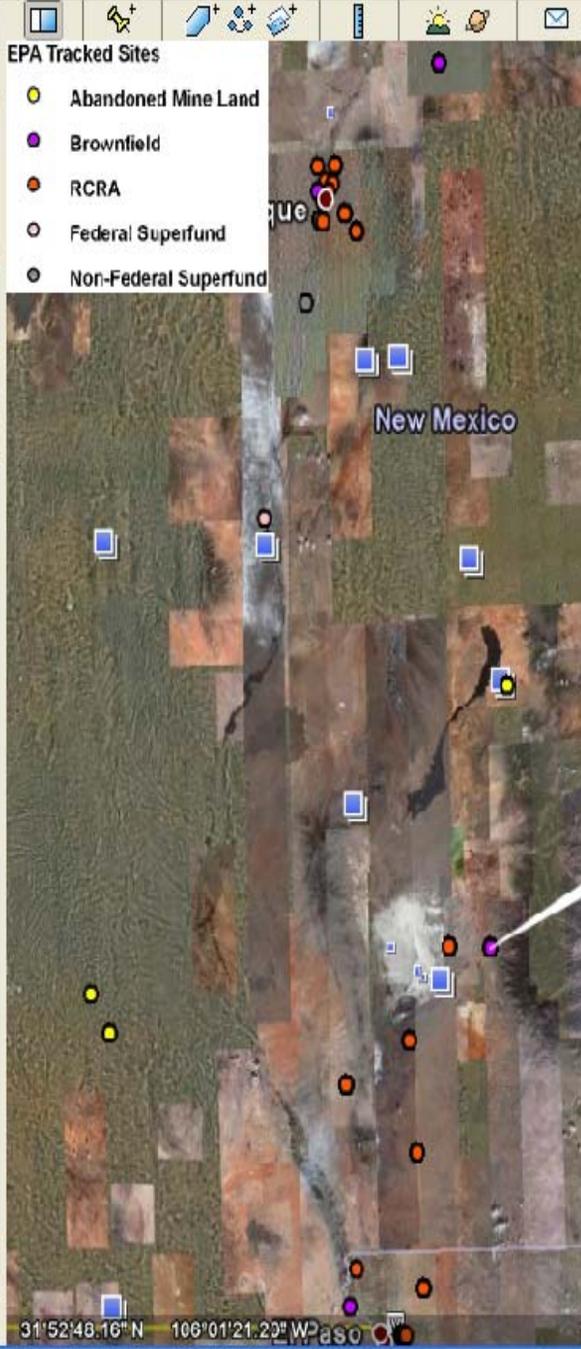
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Former Municipal Landfill

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/m^2), at 50 Meters: 0-200
Wind Resource Potential: Poor
Utility Solar Power Resource ($kWh/m^2/day$): 6.67
Utility Solar Potential: Excellent
Non-Grid Connected Photovoltaic Solar Resource ($kWh/m^2/day$): 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: [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 on methodology and data considerations.

Directions: [To here](#) - [From here](#)

Search

Fly To Find Businesses Directions

Fly to e.g., New York, NY

Search input field with a magnifying glass icon.

Places Add Content

My Places

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

EPA Tracked Sites

- Abandoned Mine Land
- Brownfields
- RCRA
- Federal
- Non-Federal

LEE ACRES LANDFILL (USDOJ)

City: FARMINGTON
 State: NM
 Mapped Acreage: 60.0
 EPA Program: Federal Superfund
 EPA Region: 6
 EPA ID: NMD680750020
 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 (kWhm²/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 end 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 on methodology and data considerations.



Other Potential Acres New Mexico Landfills



County	Permitted Landfills
Bernalillo	Cerro Colorado Landfill
Bernalillo	Southwest Landfill LLC (C & D)
Chaves	Roswell Municipal Landfill
Curry	Clovis Landfill
Dona Ana	Camino Real Landfill and Recycling Facility
Dona Ana	Corralitos Landfill
Dona Ana	Rhino Landfill
Eddy	Sand Point Landfill
Grant	Southwest NM Regional Landfill (Silver City)
Lea	Lea County Landfill
Lea	Lea Land Inc. (Industrial LF)
Luna	Butterfield Trail Landfill (Not constructed yet)
McKinley	Red Rocks Regional Landfill
Mora	Northeast NM Regional Landfill
Otero	Mesa Verde Landfill (C&D)
Otero	Otero/Lincoln County Regional Landfill
Quay	Tucumcari Landfill (New)
San Juan	San Juan County Regional Landfill
Sandoval	Rio Rancho Sanitary Landfill
Sandoval	Sandoval County Landfill
Santa Fe	Caja del Rio Landfill
Socorro	Magdalena C&D Landfill
Taos	Taos Municipal Landfill
Torrance	Torrance County/Bernalillo County Landfill
Torrance	Keers Asbestos Landfill
Valencia	Valencia County Regional Landfill and Recycle Facility



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

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

The development of clean and renewable energy on formerly used land offers many economic and environmental benefits. Converting clean and renewable energy and contaminated land cleanup initiatives 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.ernrd.state.nm.us/ercrd/

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.ernrd.state.nm.us/sercd/

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](http://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 bio-power, bio-fuels, or bio-based products in determining the amount of Compensation Tax due.

Technical Assistance and Other Incentives

Customer Solar PV Program

www.psm.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.ernrd.state.nm.us/ncrd/

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

Quick Facts

Public Benefit Fund (PBF)	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Renewable Portfolio Standard	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Investor-owned utilities: 20% by 2020	
Rural electric cooperatives: 10% by 2020	
Net Metering	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Interconnection Standards	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>

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

Petroleum-Fired	0.1%	Nuclear	-
Natural Gas-Fired	15.6%	Hydroelectric	0.5%
Coal-Fired	80.1%	Other Renewables	3.4%

Points of Contact

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

Renewable Energy Production Corporate Tax Credits
Michael McDiarmid, P.E., microdiarmid@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 Brock, jim.brock@state.nm.us, (505) 827-6982

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

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



Incentives for Development of Contaminated Land



Funding (grants, loans, bonds, etc.)

Clean Water State Revolving Fund

www.water.state.nm.us/csp/bwscf.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.ernrd.state.nm.us/gtd/New_Fagorhou_files/vrp_newBF_VRF_no.nm.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.ernrd.state.nm.us/gtd/New_Fagorhou_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, "fast 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.water.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 <input checked="" type="checkbox"/> No <input type="checkbox"/>
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 also listed may not represent all potentially contaminated sites in New Mexico.

Points of Contact

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

Voluntary Response Program
Brownfields Cleanup Revolving Loan Fund, TBA Program
VRF Program Manager, (505) 827-0754

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 purchases electricity produced from the array at a fixed rate of 5.5 cents per kW-hr for the duration of a 17-year contract
- Expected savings of \$500,000 in electricity costs during the contract life



Successes



Summitville Mine Site, Colorado

- Mico-hydroelectric plant
- Will generate 250,000-290,000 kW-hr/yr
 - enough to power about 25 households
 - prevent 250 – 275 metric tons of CO₂ 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 Xcel Energy grid through a net metering agreement and will be used to offset the cost of power usage required for water treatment



Successes



SeQuential Biofuels Station in Eugene Oregon (petroleum Brownfields site)

- Installed 244 solar panels on roof of fueling islands, providing 30 – 50 % electrical power for the station
- Installed a "living roof" of 4,800 live plants, growing in five inches 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

More Information



- RE-Powering America's Land: Renewable Energy on Contaminated Lands and Mining Sites

<http://www.epa.gov/renewableenergyland>

- Further information:

cleanenergy@epa.gov



Questions?



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