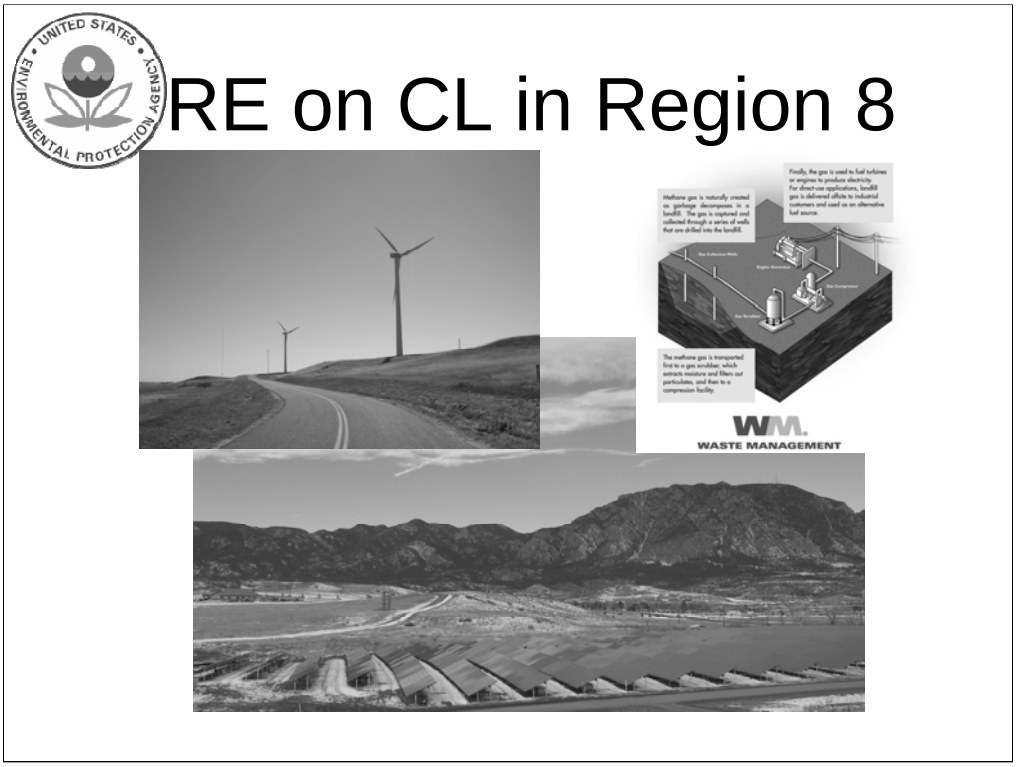



2 * 600 kilowatt turbines on former shooting range at Warren

**Landfill Gas-to-Energy Plant**

Colorado's only operational landfill gas-to-energy plant will begin operation in early 2008. Located at the Denver Arapahoe Disposal Site near Hampden Avenue and Gun Club Road in Arapahoe County, it is expected to produce 3.2 megawatts of electricity, enough energy for about 3,000 homes.

Landfill gas consists of approximately 50 percent methane, 45 percent carbon dioxide, and other gases. It is produced from the normal decomposition of organic matter. The Denver-Arapahoe site, one of the largest landfills in the nation, generates approximately 1,200 cubic feet of landfill gas per minute. The gas is currently "flared" or burned off, but now it will burned in four combustion engines and converted into electricity. This beneficial use of landfill gas will reduce the greenhouse gases produced at a coal-fired power plant through indirect offsets, and similarly reduce other air pollution emissions.

The City & County of Denver will sell the landfill gas to Waste Management of Colorado, which will construct, own, and operate the plant. Electricity from the plant will then be sold to Xcel Energy. According to the U.S. Environmental Protection Agency, landfill gas continues to be produced for twenty years or more even after a landfill is closed. The Denver-Arapahoe site could, therefore, operate for many decades to come

Casper WY, Windfarm being constructed at former Chevron Refinery

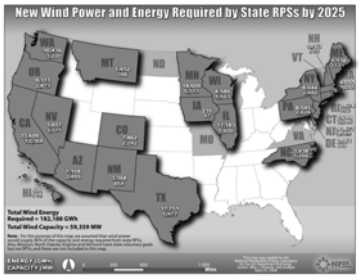
# Why Emphasize Renewable Energy on Contaminated Land

- *Many megawatts of Renewable Energy (RE) are needed to combat climate change; makes sense to locate it on compromised lands to extent possible;*
- RE can preclude inappropriate future land use: e.g. residential use on land cleaned to industrial standards;
- RE provides a short or long term beneficial reuse of land;
- *RE can reduce operation and maintenance costs*;
- Existing infrastructure (roads, transmission) at most cleanup

2

# Why Emphasize Renewable Energy on Contaminated Land

- RE creates economic redevelopment opportunities for properties where other options are limited;
- More States are adopting renewable energy standards;
- Development on CL reduces Greenfield development; and
- *Finally, siting renewable energy on contaminated land is a better way to reduce carbon footprint of cleanup actions than purchasing offsite renewable energy*



# Basic Definitions

= Power

X  = Energy

4

*Summitville Mine*

5

Summitville Mine = one of the biggest environmental disasters in Region 8
1400 gpm treatment plant

# Current Projects

- Hydro Plant at Summitville Mine

- Will provide clean energy for ongoing treatment of acid mine drainage
- Foundation and Penstock in place – expect to be generating energy early summer 2010.
- Few if any ecological concerns associated with diverting water.

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Enough energy to power 230,000 kilowatt hrs/year (reducing CO2 emissions by 190 metric tonnes/year). It'll operate 6-7 months per year.

CFS diverted (assumption 2 to 3??????)

## Anaconda Smelter Site

Region 8 will then move the met tower to another piece of contaminated property.

Region 8 installed 60m met tower to measure wind speed on county-owned property, and will make data available to potential wind developers.

7

Land owned by Anaconda Deer Lodge county sits adjacent to ARCO (main PRP) property. County land is contaminated from airborne smelter emisssions, but not to extent that requires cleanup. Wind development county land would assure contamination is not disturbed.

National Renewable Energy Lab believes up to 50 megawatts of wind generation could be constructed at the site. A wind farm of that size would be expected to produce ~ 53,700 megawatt hours/year and reduce CO2 emissions by 53,776 Metric tonnes.

(assuming 902 lbs/MWhr – EPA power profiler for zipcode 59701)


Daily Emissions of Carbon Pollution

8

# Current Projects
## Gilt Edge Green Power Pilot

- Goals:
- Erect medium sized turbines to power treatment plant
- Use project to attract utility-scale development, and sell energy to grid.


9

Additional engineering is funded to develop detailed cost estimates for constructing turbine foundations and power poles necessary to take electricity to WTP. These are the cost elements that represent the highest risk to RE developers as most aren't familiar with Superfund.

NREL believes a commercial wind farm of 40 to 50 Megawatts could be erected at Gilt Edge.

50 MW wind farm would generate ~131,400 megawatt hours/year and reduce CO2 emissions by 112,000 Metric tonnes.

(zipcode 57732 – 1883 lbs CO2/MWhr)

# Impediments to RE on CL


- Remedy Selection Criteria have not been interpreted in a way that gives preference to GR
- No policy imperative for lifecycle analysis, especially with respect to energy costs.
- Lack of incentives for greening cleanups.

- <u>Possible incentive</u>:

  - Use federal funding designated for offsite RE purchases (green tags, RECs) to help finance RE systems at our cleanups.
  - Region 8 wants to pilot this idea at Gilt Edge.

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# Greener Cleanups in Region 9

## NARPM 2009 Reprise

Harold Ball
R9 Superfund Technical Support
December 15, 2009

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# History

Cleanup – Clean Air

EPA Region IX

- Cleanup Clean Air
  - Cross Program Initiative SFund and Air
- SERG – Smart Energy Resources Guide
  - Excellent resource for RPMs
  - http://www.epa.gov/nrmrl/pubs/600r08049/600r08049.htm
- Contract Language – RAC II and ERRS
- More information at
  - http://www.epa.gov/region09/climatechange/green-sites.html

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Cleanup Clean Air Initiative. Cross program initiative between Superfund and Air Division to reduce diesel and GHG emissions at cleanup sites.

SERG (Smart Energy Resource Guide) development. Published March 2008. Jennifer Wang, Penny McDaniel, Michael Gill. This has proven to be an excellent resource for RPMs on basic technologies and concepts.

Contract Language

RAC II – Clean Air: cleaner engines, cleaner fuel and cleaner diesel control technology. Renewable Energy: evaluate renewable energy sources when selecting, constructing, and optimizing remedies.

ERRS – Clean Technologies: use clean technologies and/or fuels on all diesel equipment to the extent practicable and/or feasible.

# Current Activities

- Regional Philosophy
  - Management is very supportive
  - Clean diesel is a priority for us
  - RPMs are our main assets
- Current Highlights
  - Romic Life Cycle Analysis – Tool Development
    - Goal here is to make better informed decisions
    - Props to Karen Scheuerman and Steve Armann in our Waste Division

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Regional Philosophy

Very supportive – number 1 priority among regional SFund managers last fall

Clean diesel is a priority for us

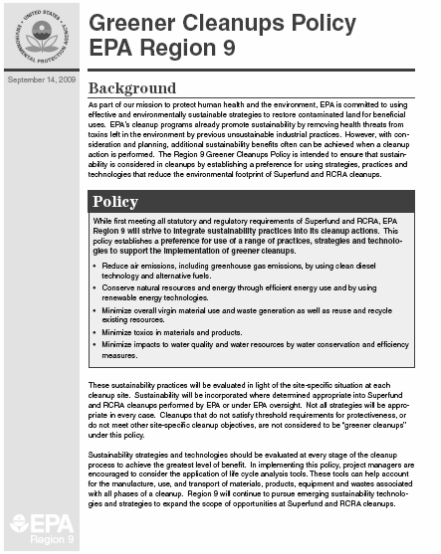
RPMs are our strength and the main assets that we bring to the issue

Romic Life Cycle Analysis

Goal here is to make better informed decisions not to let the analysis drive the decision.

Props to Karen Scheuerman and Steve Armann in our Waste Division who continue to make a contribution to developing a rational decision framework for all of us.

# R9 Greener Cleanups Policy



**Greener Cleanups Policy**
**EPA Region 9**

September 14, 2009

**Background**

As part of our mission to protect human health and the environment, EPA is committed to using effective and environmentally sustainable strategies to restore contaminated land for beneficial uses. EPA's cleanup programs already promote sustainability by removing health threats from toxins left in the environment by previous unsustainable industrial practices. However, with consideration and planning, additional sustainability benefits often can be achieved when a cleanup action is performed. The Region 9 Greener Cleanups Policy is intended to ensure that sustainability is considered in cleanups by establishing a preference for using strategies, practices and technologies that reduce the environmental footprint of Superfund and RCRA cleanups.

**Policy**

While first meeting all statutory and regulatory requirements of Superfund and RCRA, EPA Region 9 will strive to integrate sustainability practices into its cleanup actions. This policy establishes a preference for use of a range of practices, strategies and technologies to support the implementation of greener cleanups.

- Reduce air emissions, including greenhouse gas emissions, by using clean diesel technology and alternative fuels.
- Conserve natural resources and energy through efficient energy use and by using renewable energy technologies.
- Minimize overall virgin material use and waste generation as well as reuse and recycle existing resources.
- Minimize toxics in materials and products.
- Minimize impacts to water quality and water resources by water conservation and efficiency measures.

These sustainability practices will be evaluated in light of the site-specific situation at each cleanup site. Sustainability will be incorporated where determined appropriate into Superfund and RCRA cleanups performed by EPA or under EPA oversight. Not all strategies will be appropriate in every case. Cleanups that do not satisfy threshold requirements for protectiveness, or do not meet other site-specific cleanup objectives, are not considered to be "greener cleanups" under this policy.

Sustainability strategies and technologies should be evaluated at every stage of the cleanup process to achieve the greatest level of benefit. In implementing this policy, project managers are encouraged to consider the application of life cycle analysis tools. These tools can help account for the manufacture, use, and transport of materials, products, equipment and wastes associated with all phases of a cleanup. Region 9 will continue to pursue emerging sustainability technologies and strategies to expand the scope of opportunities at Superfund and RCRA cleanups.

EPA Region 9

- Focus Areas:
  - Air Emissions
  - Energy Use
  - Material Use
  - Toxic Materials
  - Water Efficiency

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Joint Policy from Superfund and Waste Divisions

Includes a preference for use of a range of practices, strategies and technologies to support the implementation of greener cleanups

We anticipate that these specific practices, strategies and technologies will be updated as emerging practices and technologies are identified.

# Challenges

- How to incorporate GR into our decisions?
- How best to use existing authorities?
- How to develop the case for PRP implementation?
- How do we incorporate into 5YRs?

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How do we incorporate GR into our existing decision framework?

How can we best apply at sites the existing authorities that we have.

PRP Lead Sites. Many R9 sites are PRP lead where our desire to incorporate GR into the remedy does not easily translate into action. We need to develop the case for implementation.

How do we incorporate into 5YRs? Current focus is on Remedy Protectiveness and not so much on optimization.

# Future Goals

- Move to Implementation
  - Green Remediation Strategy
  - RE-Power Partnerships (NREL)
  - Site Decisions
- Cross Program Consistency
  - Contribute solutions to the problem

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Move to Implementation

HQ has invested heavily in developing the “Green Remediation Strategy.”

Moving to answer policy questions

Providing funds for pilot projects

We now have to step up to the plate on implementation

RE-Power partnerships – we had 10 proposals from RPMs wanting to take advantage of pilot project opportunities with the NREL IAG. All were viable projects for NREL and it was very tough to make the cut for us.

Program Consistency:

SFund does not work in a vacuum.

LJ has made a finding that 6 GHG pose a threat to the health and welfare of Americans.

Other EPA programs are working on implementation (Air/Climate Change) and are aggressively moving to address the problem

We in SFund need to step up and be part of the solution.

# Closing Thoughts

- What help do you need?
  - HQ and regional staff are busy
  - Let us know what you need
    - tools, training, technical support
  - Share success stories with others
    - tech transfer works

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What can we do to help you?

HQ has laid out a path forward in the draft Green Remediation Strategy.

HQ pushing to answer policy questions, providing tools and technical support

Regions stepping up to the plate with training and implementation.

Plug:  share success stories to leverage your experience.

Call or write us - Let us know if we are doing it right or if there is additional support you need.


# Green Remediation

**Estimating the Environmental Footprint at a Corrective Action Clean-up**

## Pilot Study at Romic East Palo Alto

**Karen Scheuermann, US EPA Region 9**
**scheuermann.karen@epa.gov**

*3 June 2009*

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# Green Remediation

**Theory:**

**Consider all environmental effects of remedy implementation and incorporate options to maximize the net environmental benefit of cleanup actions.**

**Implementation:**

**Installation of "greener" remedies**

**Development of metrics for estimating environmental footprints**

# Overview

- **How we conducted our Pilot Study:**

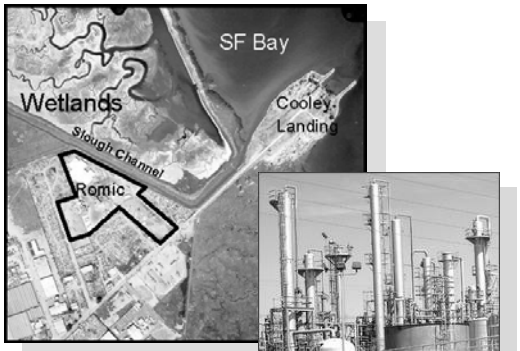
  **methodology and results**

- **Applying the results to our clean-up sites**

- **Importance of using Life-Cycle Assessment principles**

# Pilot Site: Romic East Palo Alto

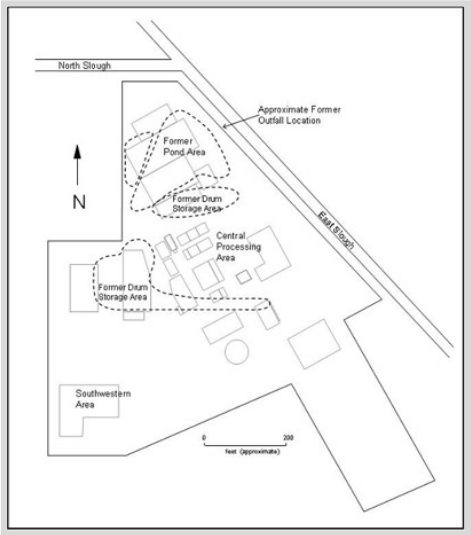
- **14-acre hazardous waste management facility**
- **Soil and ground water contaminated with VOCs (such as TCE and PCE)**
- **Contamination to a depth of 80 feet**




# Purpose of the Pilot Study

- **Compare the environmental footprints of three alternative remedies at Romic**
  - Is it possible to determine the environmental footprint of the alternative remedies?
  - Did we select the "greenest" remedy?
  - How important is off-site manufacture for the environmental footprint?
- **Develop a methodology to be used for estimating environmental footprints**

# Remedy Alternatives at Romic




**Alternative 2 (Hybrid)**

**Extraction wells *and* bioinjection wells**

**30 years to complete**

**Alternative 3 (Bioremediation)**

**Bioinjection wells only**

**10 years to complete**

**Alternative 4 (Pump and Treat)**

**Extraction wells only**

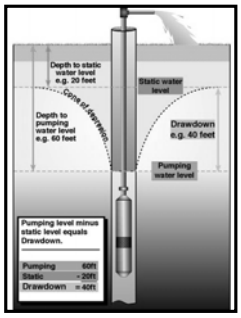
**40 years to complete**

***Alternative 3 has already been chosen for Romic, so this analysis did not affect the remedy decision.***

# Remedy Alternatives at Romic

**Bioremediation:**

**uses injections of cheese whey and molasses mixed with fresh water**




**Pump and Treat:**

**treatment of ground water in an air stripper followed by carbon filters**

# Boundaries of the Pilot Study

- **Functional Unit:**

  Ground water remediation.

- **Temporal Boundary:**

  Construction and active life of each alternative remedy.

- **System Boundary:**

  On-Site Activities (Level 1)

  Transport To and From Site (Level 2)

  Manufacture Off-Site (Level 3)

# At Romic We Evaluated…

*Resources and Energy Used*

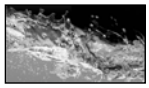
- **Water**
- **Construction Materials**
- **Electricity**
- **Fossil Fuel**

*Wastes Generated*

- **Spent Carbon**
- **Wastewater**

*Air Emissions*

- **$NO_X$, $SO_X$, PM, $CO_2$**



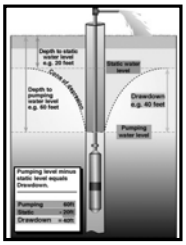




# Level 1: On-Site Activities

Well Construction

Groundwater Extraction

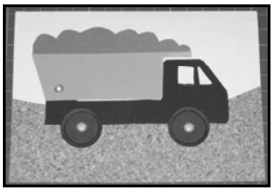



BioInjections

Groundwater Treatment

# Level 2: Transport To and From Site

Operators to Site

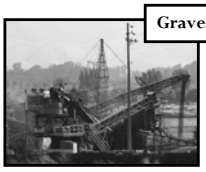


Wastes off Site

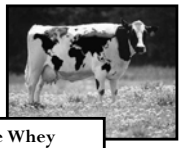
Materials to Site

# Level 3: Off-Site Manufacture

PVC Pipe Manufacture

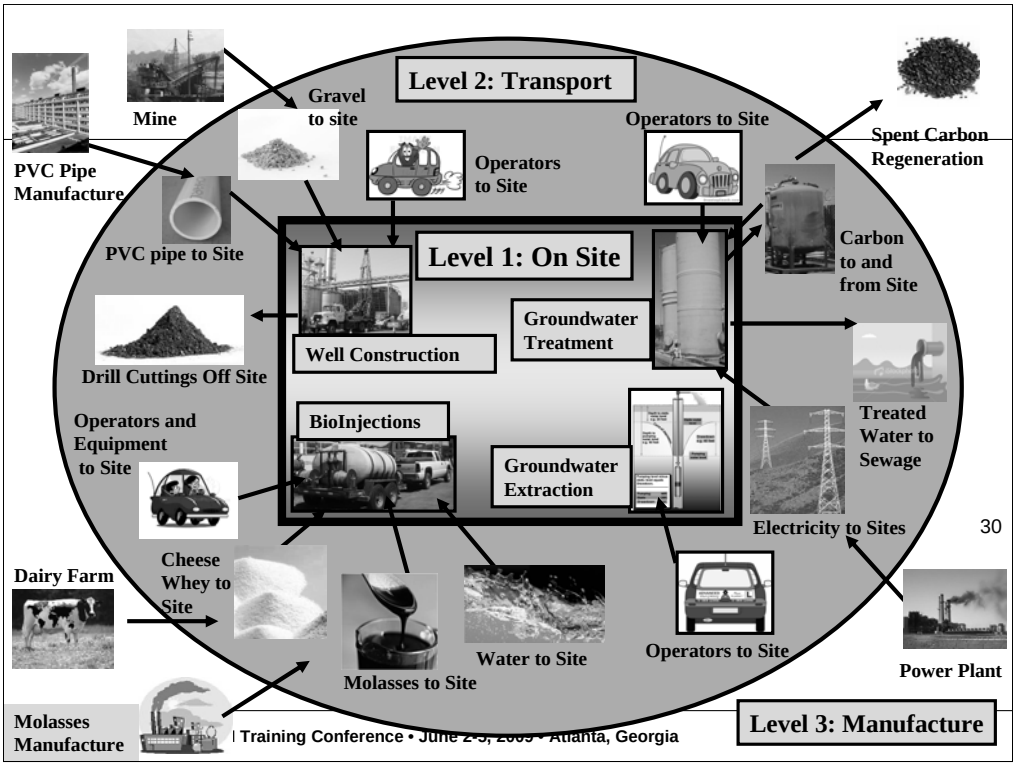


Gravel Mining



Cheese Whey Processing

Electricity Production


Level 2: Transport
Level 1: On Site
Level 3: Manufacture
Mine
Gravel to site
Operators to Site
Operators to Site
Spent Carbon Regeneration
PVC Pipe Manufacture
PVC pipe to Site
Carbon to and from Site
Well Construction
Groundwater Treatment
Drill Cuttings Off Site
Treated Water to Sewage
BioInjections
Operators and Equipment to Site
Groundwater Extraction
Electricity to Sites
30
Dairy Farm
Cheese Whey to Site
Water to Site
Operators to Site
Power Plant
Molasses to Site
Molasses Manufacture
l Training Conference • June 2-5, 2009 • Atlanta, Georgia


***Pilot study is still in progress and results at this stage are preliminary.***

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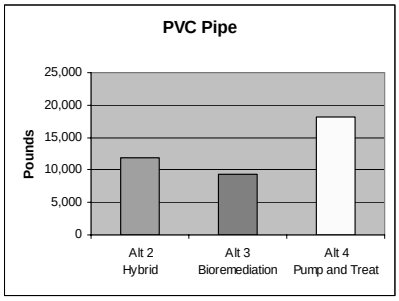
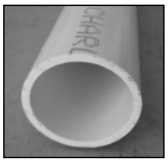
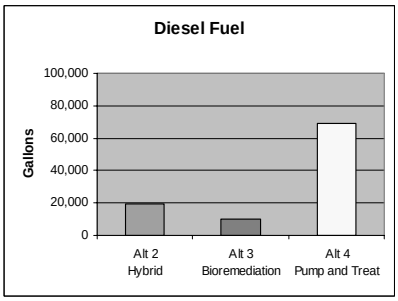
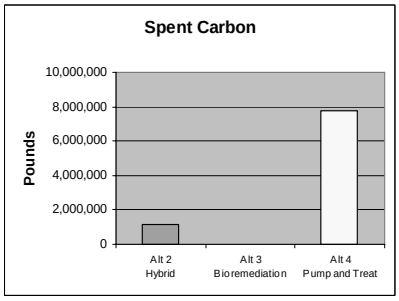
# Results – Materials and Fuel

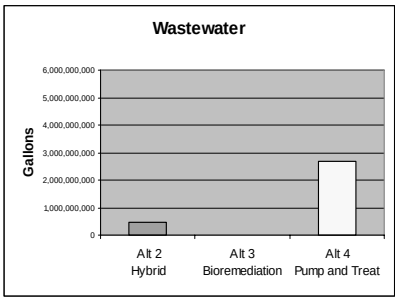




# Results – Wastes Generated

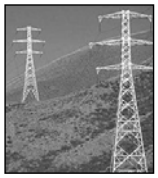


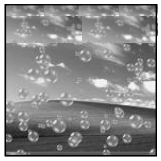
# Levels 1, 2, and 3 Combined

## Adding Level 3 (Off-site Manufacture) to the mix

**water used**

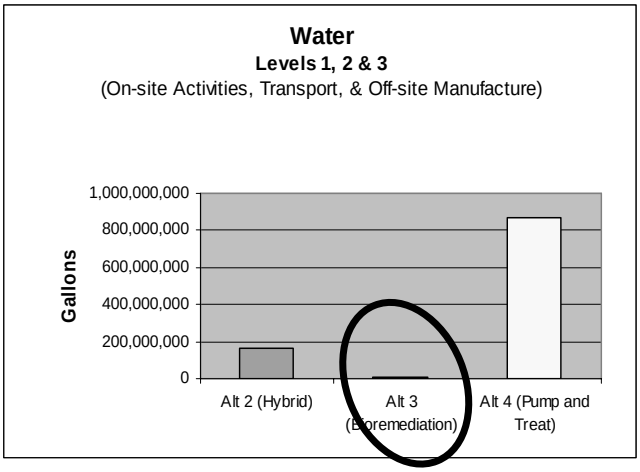


**electricity required**



**carbon dioxide emitted**

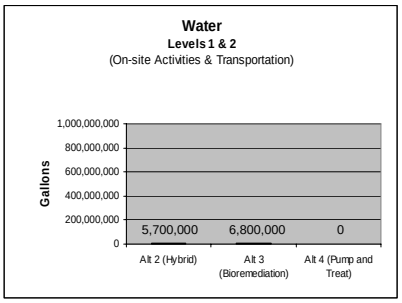
# Results – Water

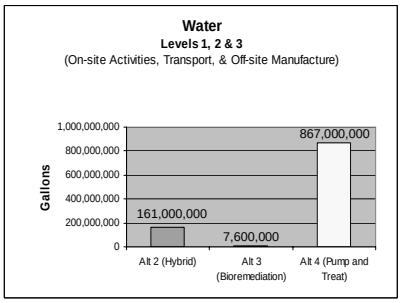



*These values are for the life-time of each alternative remedy.*

# Results – Water

Including Level 3 (manufacturing) in the analysis substantially increases our estimate of the water footprint.




***Not* including off-site manufacturing**

***Including off-site manufacturing***

# Results – Water

## Issues related to water:

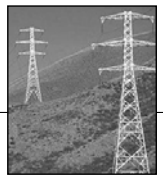
- Water withdrawn *versus* water consumed.

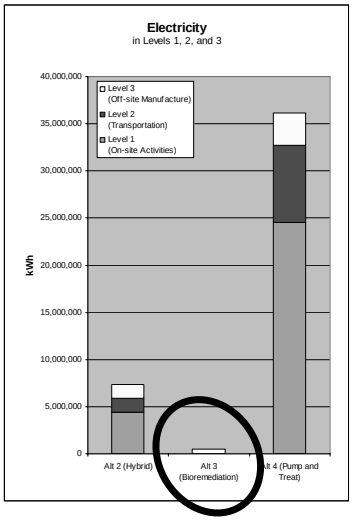
- Water withdrawn in "water scarce" areas *versus* water withdrawn in "water abundant" areas.

- Potable *versus* non-potable water.

**Maybe, not all water is equal… how should we take this into consideration?**

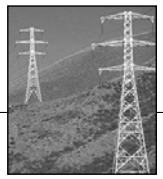
# Results – Electricity

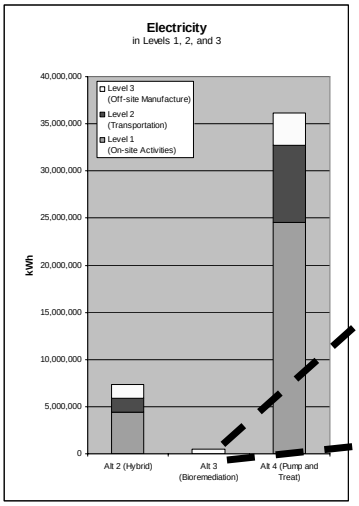


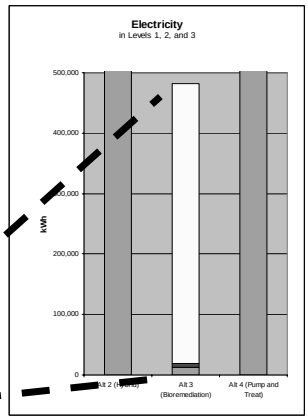



*These values are for the life-time of each alternative remedy.*

# Results – Electricity



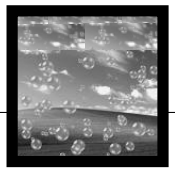


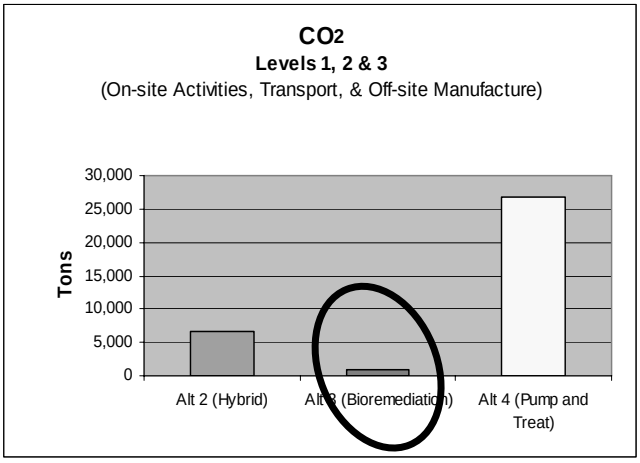




**We are used to taking into account on-site electricity in evaluating environmental footprints.**

**However, electricity required for transport and manufacture are also important.**

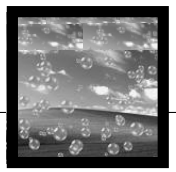
# Results – $CO_2$ Emissions

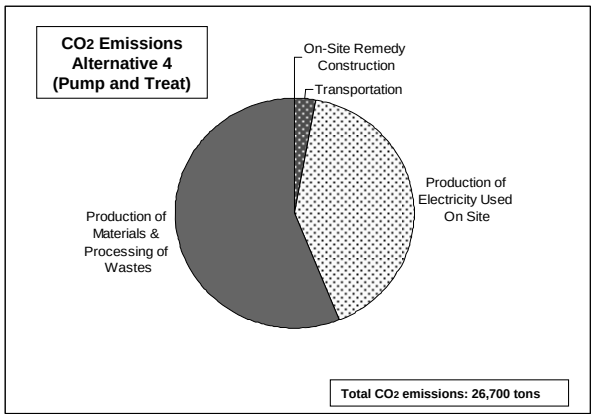





*These values are for the life-time of each alternative remedy.*

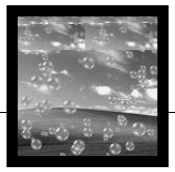
# Results – $CO_2$ Emissions

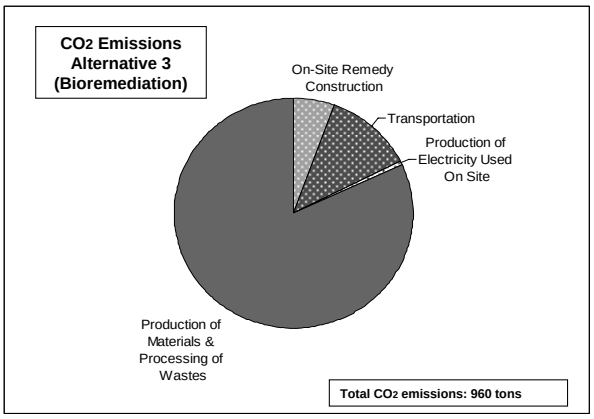





Off-site activities, even those not related to production of electricity used on-site, are a big part of the $CO_2$ footprint.

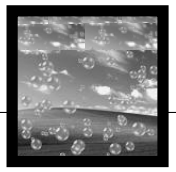
# Results – $CO_2$ Emissions

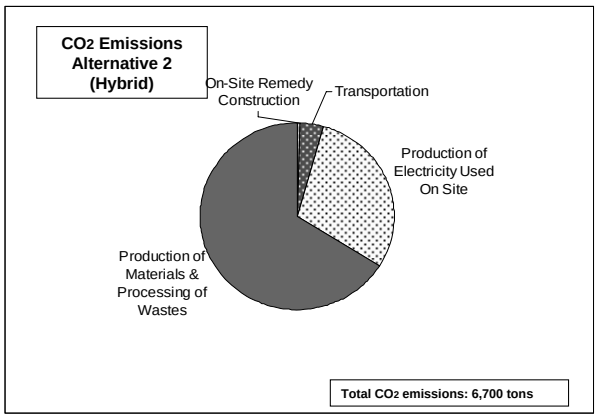





Off-site activities, even those not related to production of electricity used on-site, are a big part of the $CO_2$ footprint.

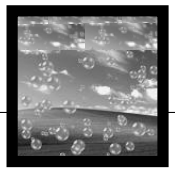
# Results – $CO_2$ Emissions






Off-site activities, even those not related to production of electricity used on-site, are a big part of the $CO_2$ footprint.

# Results – $CO_2$ Emissions



## Issues related to $CO_2$:

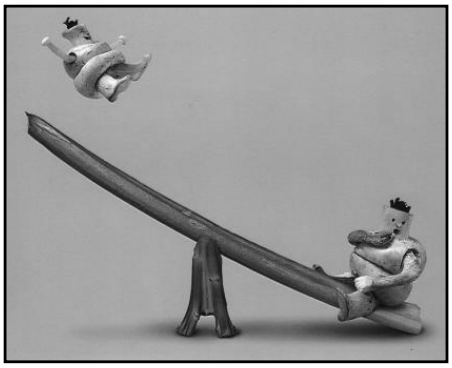
- Finding $CO_2$ emissions factors that include resource extraction as well as manufacturing.

- Taking into account likely lower emissions of $CO_2$ per unit material produced in the future.

- Being careful not to "double count" in reporting electricity requirements and CO2 footprint of the remedy.

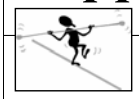
**Identify which materials and activities contribute the greatest to the $CO_2$ footprint and research them thoroughly.**

# Applying results to our clean-up sites



**We need to balance the various aspects of the environmental footprints.**

# Applying results to our clean-up sites



- **Balance local effects with global effects:**
  - water resources
  - greenhouse gas emissions
  - particulate emissions
- **Balance effects of disparate items:**
  - natural resource depletion
  - waste generation
  - environmental contamination
  - years to complete remedy

# Applying results to our clean-up sites

- **Balancing disparate environmental impacts will be specific from site to site.**
- **Metrics for environmental impacts are not the only factor at a clean-up site, but should be seen as one of several balancing factors.**
- **In all cases the remedy must first meet threshold criteria, such as protection of human health and the environment.**

# Life-Cycle Assessment Principles

Improving the Pilot Study --

**We performed complete (but back-of-the-envelope) Level 3 calculations for:**

- Water use
- Electricity use
- $CO_2$ emissions

**We would like to add Level 3 calculations for:**

- Wastes generated
- Fossil fuels consumed
- Air toxics emitted

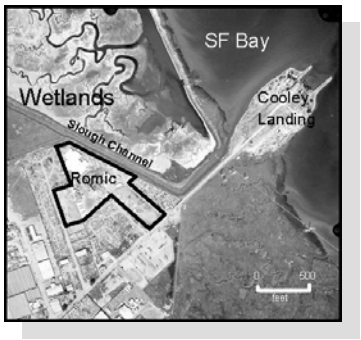
*We are working with EPA life-cycle analysis experts in ORD (Cincinnati) and with OSRTI to improve and add to our Level 3 calculations.*

# Life-Cycle Assessment Principles

Improving the Pilot Study --

**Run calculations for other remedial activities at Romic:**

- soil excavation
- groundwater monitoring
- capping contaminated areas



# Life-Cycle Assessment Principles

**Life-Cycle Assessment principles helped us greatly in developing our conceptual approach**

- **Quantify on- and off-site environmental impacts**
- **Distinguish between local and global impacts**
- **Compare relative impacts of remedial technologies in a more comprehensive way**
- **Focus our efforts in reducing the environmental impacts of a remedy**

# Life-Cycle Assessment Principles

**Develop a methodology based on Life-Cycle Assessment principles for estimating environmental footprints**

- **Conduct Pilot Studies at three additional sites**
- **Streamline the methodology**
  **identify aspects of remedies that make the largest contribution to the overall footprints and focus on those**
- **Establish a library of data inputs**
- **Designed for regulatory staff and site owners in all clean-up programs**

# Key Points

- **Yes, it's feasible to <u>estimate</u> the environmental footprint of a clean-up remedy.**
- **Importance of including off-site manufacturing in estimations of the environmental footprint.**
- **A streamlined methodology would be helpful for conducting this type of analysis at other sites.**

# Promoting Green Remediation

## Reducing the Environmental Footprints of Our Site Clean-ups


# Green Remediation: What's Next

## Delfasco Forge Vapor Intrusion

Greg Fife
OSC, Region 6
fife.greg@epa.gov

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# Delfasco Forge

- Delfasco Forge
- Grand Prairie, TX
- Vapor Intrusion
- RCRA Enforcement

## Delfasco Forge - History

- Delfasco, as in Delaware Forge and Steel Company
- Made practice bombs for DOD
- Outgrew the facility
- Auto repair shop now

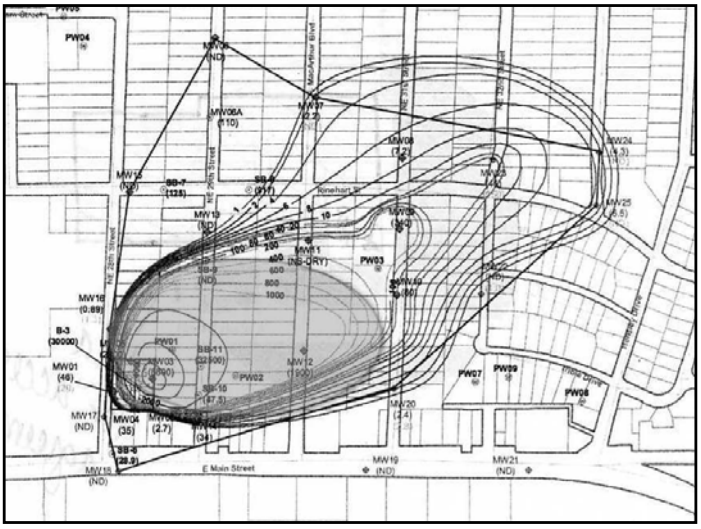
## Delfasco Forge

- Trichloroethylene used in the process
- Spills, releases, and poor housekeeping led to contamination of groundwater
- Residential to the north and east
- Direction of groundwater, Northeast.

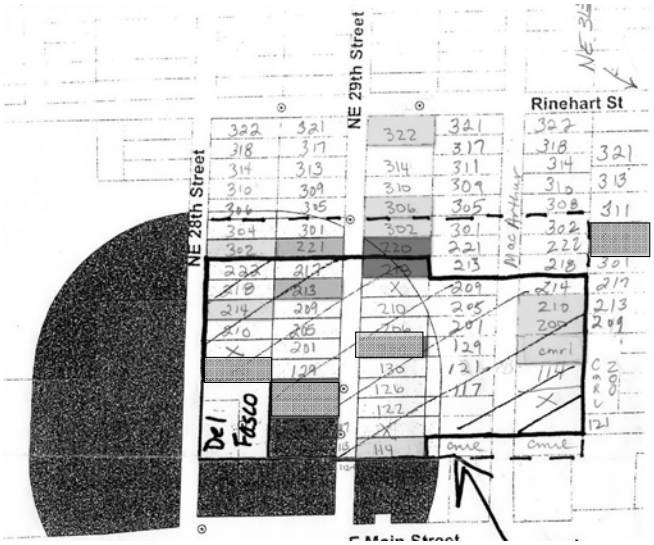
# Delfasco Neighborhood

# Delfasco Neighborhood

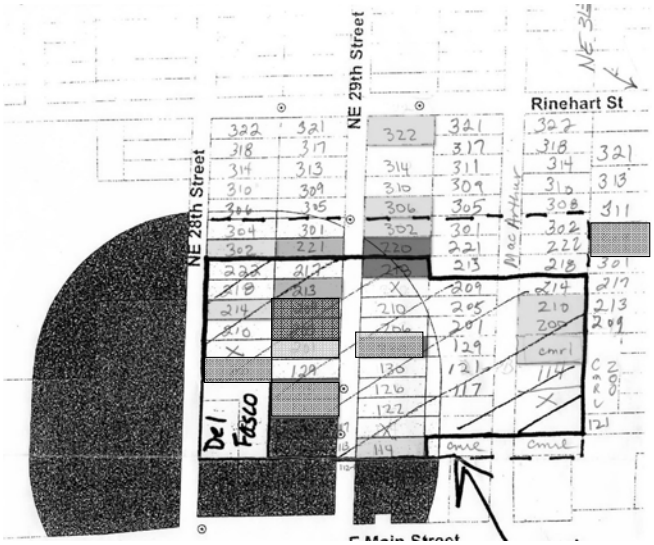
# Delfasco Groundwater Plume



# RCRA Indoor Air Sampling



# RCRA & TX Indoor Air Sampling



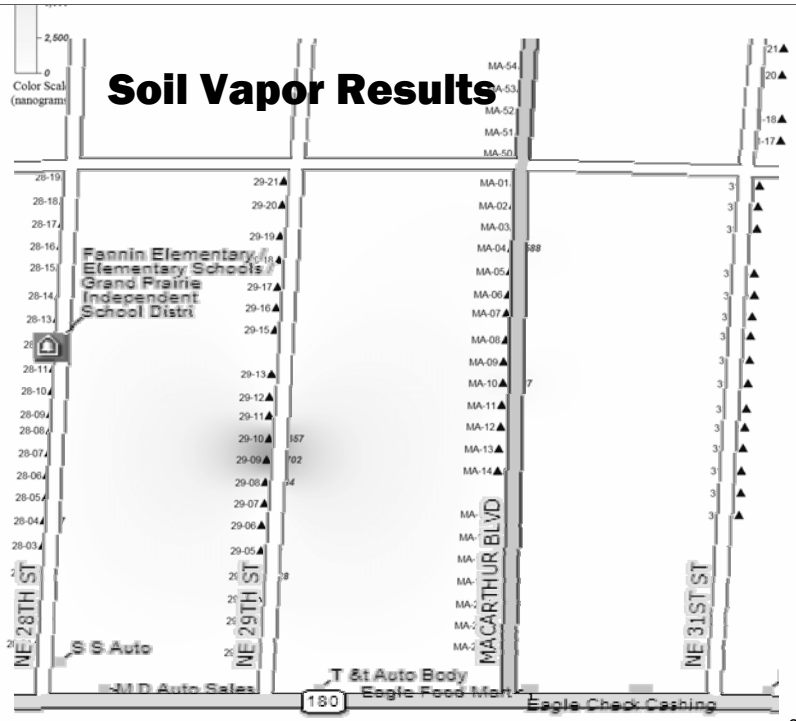
# Passive Soil Gas Sampling

- Semi-quantitative
- In-Ground
- 1-2 weeks
- $18/sample
- Beacon Environmental

# Passive Sampler Deployment

- 100 points + dups, TBs, etc
- 1 day install
- 1 day retrieve
- 8 day turn-around

# Soil Vapor Results

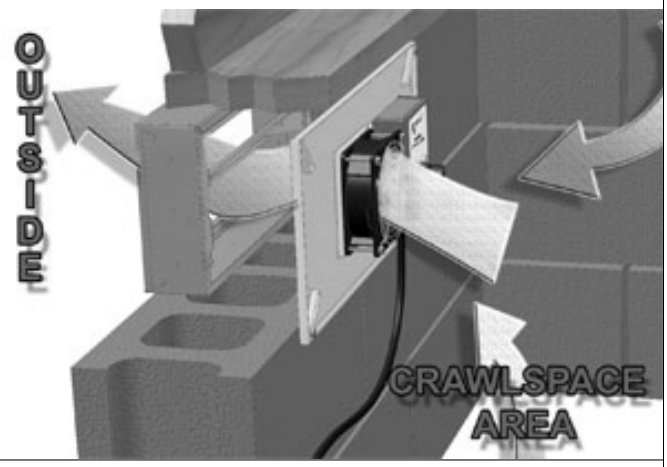


# Passive Sampling on the Site

- Insert bullets

# Crawl Space Fan

- Pier and beam construction
- Commercially available exhaust fans



## Fan Comparison

- Radon fan - - 60-90 CFM
- $1,500 per unit

- Crawlspace fan - - 200 CFM
- $200 per unit

## Electrical Costs

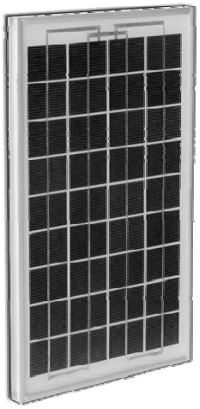
- Each fan type, running 24/7/365
- $3 to $8 per month

## Impact of Electrical Cost on Budget

- $8 per month, $96 per year
- Compare to increase price of gasoline
- Federal Standard is 15,000 miles per year
- Avg miles per gallon is 21
- That is 714 gallons per year.
- The $96 in additional electricity cost is equivalent to **$0.134 per gallon**

# Solar Power Exhaust Fan

- Solar powered
- Panel: 10”x16”x0.7”
  10 Watt
  Fan: 6” dia.
  2500 RPM
  200 CFM
  55 DB

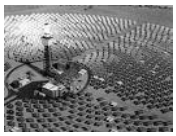


## Crawl Space Fan Effectiveness

- Reduced one home an order of magnitude to right at action level
- Reduced second home two orders of magnitude
- Battery to be installed for longer operation

# Solar Fan Installed

# Evaluating Potential for Renewable Energy on Contaminated Lands and Mining Sites



Shahid Mahmud
Office of Site Remediation and Technology Innovation

December 15, 2009

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# Background

- EPA launched the Siting Renewable Energy on Contaminated Lands and Mining Sites at the 2008 Brownfields Conference.
- EPA has taken a multi-prong approach under this initiative to include:
  - Renewable Energy Mapping on Contaminated Lands & Mine Sites
  - Conducting Outreach Activities
  - Pilot Sites/Project Engagement
  - Tools/Guidance Development

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## Why Develop Renewable Energy Facilities on EPA Tracked Sites?

- Many EPA tracked lands offer thousands of acres of land
- Situated in areas less likely to be met with aesthetic (NIMBY) opposition
- Have existing electric transmission lines, capacity, roads, and are adequately zoned for such development
- Avoided new infrastructure capital and zoning costs can be significant

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## Why Develop Renewable Energy Facilities on EPA Tracked Sites?

- May have lower overall transaction costs compared to greenfields
- Reduce the stress on greenfields land for construction of new energy facilities
- Provide clean, emission-free energy for use on-site, locally, and utility grid

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## 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

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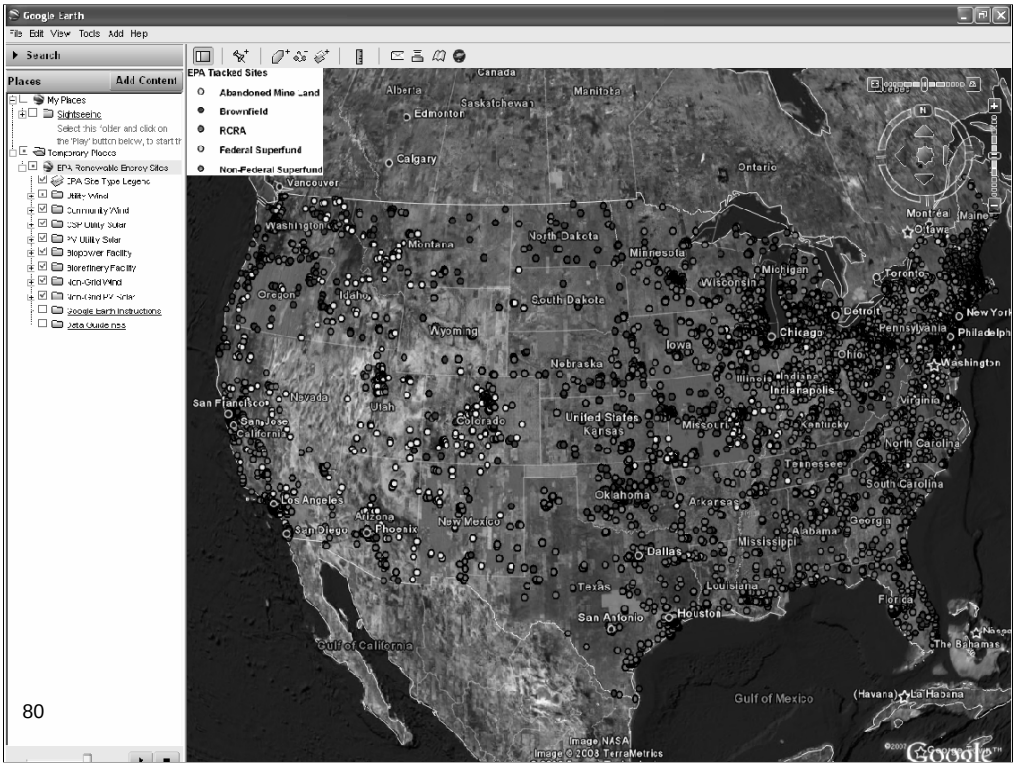
# Google Earth Mapping Tool

- 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
- Produced incentive sheets describing renewable energy development and contaminated lands redevelopment incentives in each state


Google Earth
File Edit View Tools Add Help
Search
Places
Add Content
My Places
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 Questions
EPA Tracked Sites
Abandoned Mine Land
Brownfield
RCRA
Federal Superfund
Non-Federal Superfund
Canada
Alberta
Saskatchewan
Manitoba
Edmonton
Calgary
Ontario
Vancouver
Washington
Montana
North Dakota
Minnesota
Michigan
Wisconsin
Toronto
Oregon
Idaho
South Dakota
Wyoming
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Chicago
Pennsylvania
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San Francisco
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Kansas
Missouri
Kentucky
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North Carolina
Tennessee
South Carolina
Oklahoma
Arkansas
Georgia
Los Angeles
Arizona
New Mexico
San Diego
Phoenix
Alabama
Mississippi
Dallas
Texas
Louisiana
Florida
San Antonio
Houston
Gulf of California
The Bahamas
Gulf of Mexico
(Havana) La Habana
Image NASA
Image © 2008 TerraMetrics
Google

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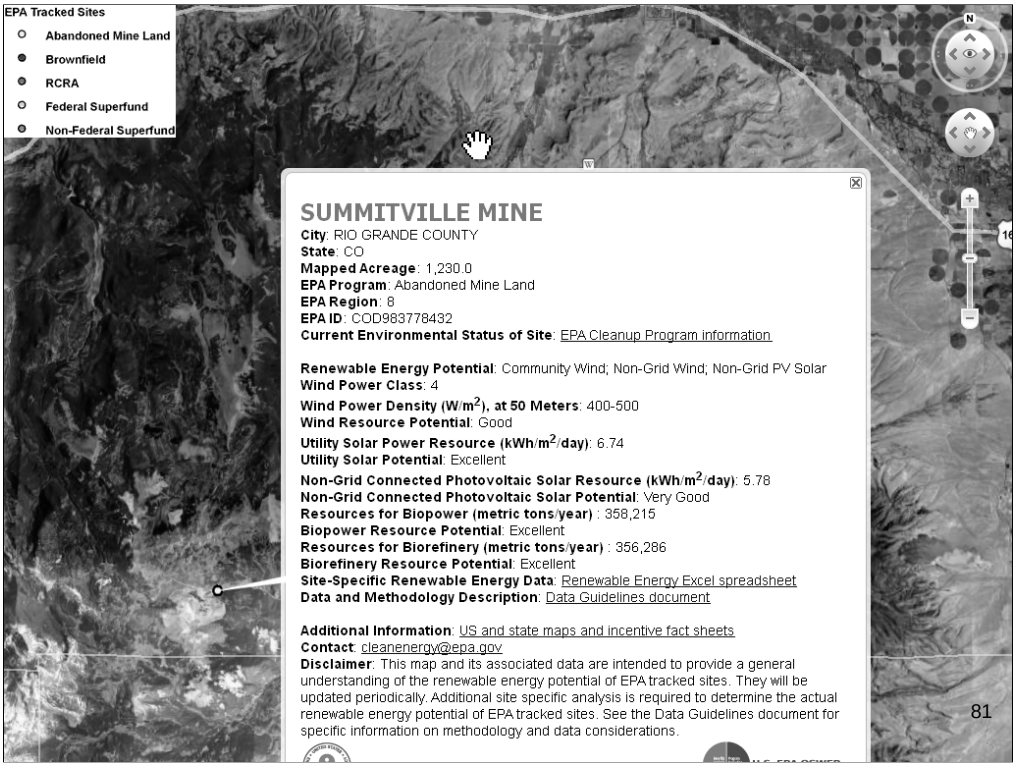
EPA Tracked Sites
Abandoned Mine Land
Brownfield
RCRA
Federal Superfund
Non-Federal Superfund
SUMMITVILLE MINE
City: RIO GRANDE COUNTY
State: CO
Mapped Acreage: 1,230.0
EPA Program: Abandoned Mine Land
EPA Region: 8
EPA ID: COD983778432
Current Environmental Status of Site: EPA Cleanup Program information
Renewable Energy Potential: Community Wind; Non-Grid Wind; Non-Grid PV Solar
Wind Power Class: 4
Wind Power Density (W/m2), at 50 Meters: 400-500
Wind Resource Potential: Good
Utility Solar Power Resource (kWh/m2/day): 6.74
Utility Solar Potential: Excellent
Non-Grid Connected Photovoltaic Solar Resource (kWh/m2/day): 5.78
Non-Grid Connected Photovoltaic Solar Potential: Very Good
Resources for Biopower (metric tons/year) : 358,215
Biopower Resource Potential: Excellent
Resources for Biorefinery (metric tons/year) : 356,286
Biorefinery Resource Potential: Excellent
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.

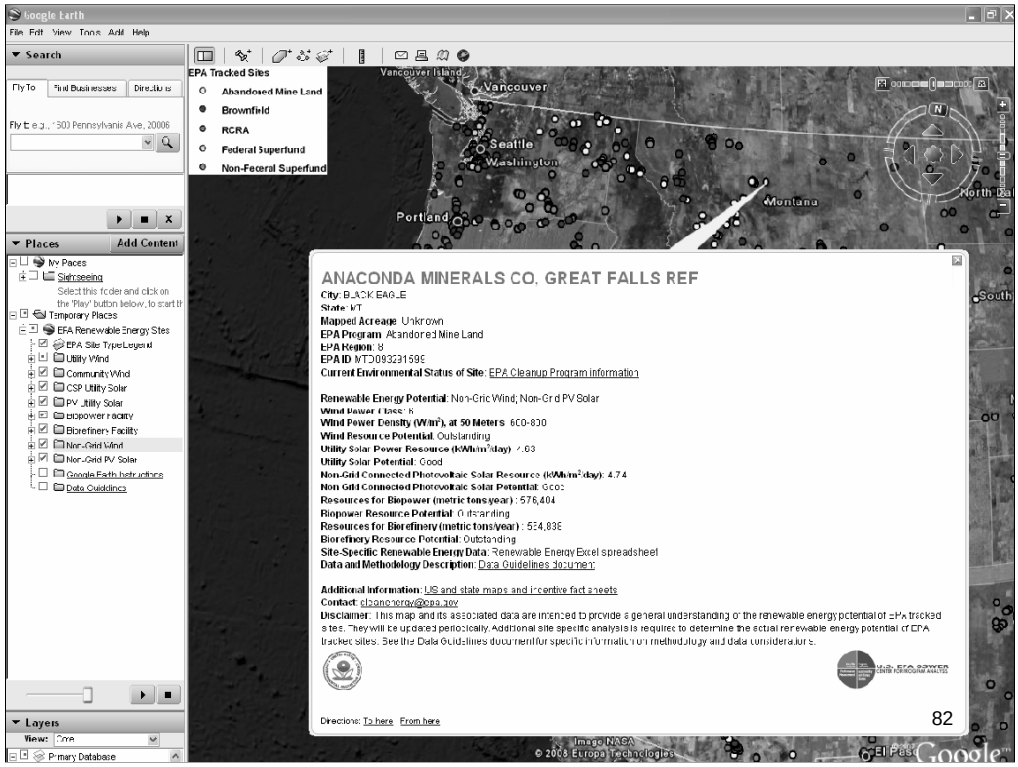
Google Earth
File Edit View Tools Add Help
Search
Fly To
Find Businesses
Directions
Places
Add Content
My Places
Sightseeing
Temporary Places
EPA Renewable Energy Sites
EPA Site Type Legend
Utility Wind
Community Wind
CSP Utility Solar
PV Utility Solar
Biopower Facility
Biorefinery Facility
Non-Grid Wind
Non-Grid PV Solar
Google Earth Instructions
Data Guidelines
Layers
View: One
Primary Database
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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Image NASA
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El Paso
Google

# Incentives

- State Incentives
  - Grants and Loans
  - Tax abatements, deductions, credits
  - Net metering
  - Other incentives: equipment loan programs for wind production
- Federal incentives
  - Production tax credit for renewable energy: $0.95/kWh to $1.95/kWh for sales of electricity for the first 10 years of operation
  - Federal grants and loans
- Database of State Incentives for REs and EE
  - www.dsireusa.org

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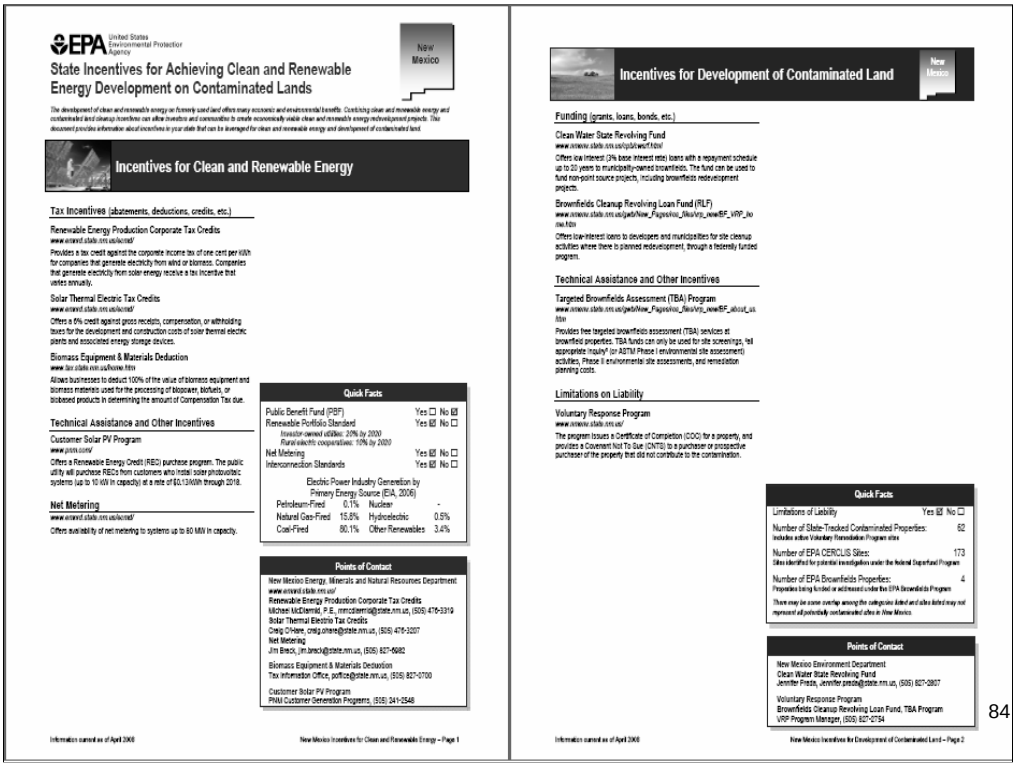

EPA United States Environmental Protection Agency

# 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

Information current as of April 2008

New Mexico Incentives for Clean and Renewable Energy – Page 1

## Incentives for Development of Contaminated Land

New Mexico

### Funding (grants, loans, bonds, etc.)

**Clean Water State Revolving Fund**
www.nmenv.state.nm.us/cpb/cwsrf.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/voc_files/vrp_newBF_VRP_loan.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/voc_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, Tell 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

Information current as of April 2008

New Mexico Incentives for Development of Contaminated Land – Page 2

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# Outreach Efforts

- OSWER engaged in outreach to stakeholders at a variety of venues with Renewable Energy booth and presentations, and stimulated significant interest. Some of these include:
  - Wind and Solar Conferences
  - Summit of Mining Communities
  - Brownfields Conference
  - Mine Expo 08
- OSWER started discussions with ASTSWMO subcommittee on this initiative
- OSWER and Region 9 have discussed this effort with BLM HQ and Arizona
- OSWER conducting series of stakeholder dialogues (Detroit, New Orleans, Los Angeles, Atlanta).

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# Pilot Sites/Projects

| Site Name and Location | Renewable Energy Aspects | Status | Issues/Opportunities |
|---|---|---|---|
| Abandoned/Superfund Sites<br>Summitville, CO | Hydroelectric to power water treatment plant | Phase I construction underway | Project potentially transferable to other sites |
| Holmes Road Landfill, TX | Solar Power | Contractor Support in-place for Feasibility Study | RFP for Developers |
| Anaconda, MT | Wind Power with possibility for geothermal | Phase I completed | Developer propose<br>50 MW Wind Project |
| Active Site:<br>Chino Mine, NM | Concentrated Solar Power | Met with New Mexico and Freeport-McMoran<br>Freeport to submit proposal | Multiple Agencies<br>Technical Study<br>Need Proposal from Freeport |
| MolyCorp Mine, NM | Solar Power | Chevron interest in solar project | Chevron conducted Phase I screening |

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# Tools to Encourage Reuse of Impaired Land

- Comfort/Status letters provide information about the site and can clarify liability issues for prospective purchasers and site owners.
- An Ready for Reuse Determination is an environmental status report written in clear language that is designed to provide important information about a site so it can be used without compromising protection for people and the environment. http://www.epa.gov/superfund/programs/recycle/pdf/rfrguidance.pdf
- A site reuse profile, which is used in some regions, highlights a site's background, environmental history, and reuse status.
- At NPL sites, EPA may carve out portions of sites – Partial Deletions to allow certain land uses.
- EPA's *Revitalization Handbook*: http://www.epa.gov/compliance/resources/publications/cleanup/brownfields/handbook/bfhbkcmp-08.pdf
- EPA *Fact Sheet on CERCLA, Brownfields, and Lender Liability:* http://www.epa.gov/swerosps/bf/aai/lenders_factsheet.pdf
- EPA's *Small Business Liability Relief and Brownfields Revitalization Act*: http://www.epa.gov/swerosps/bf/sblrbra.htm

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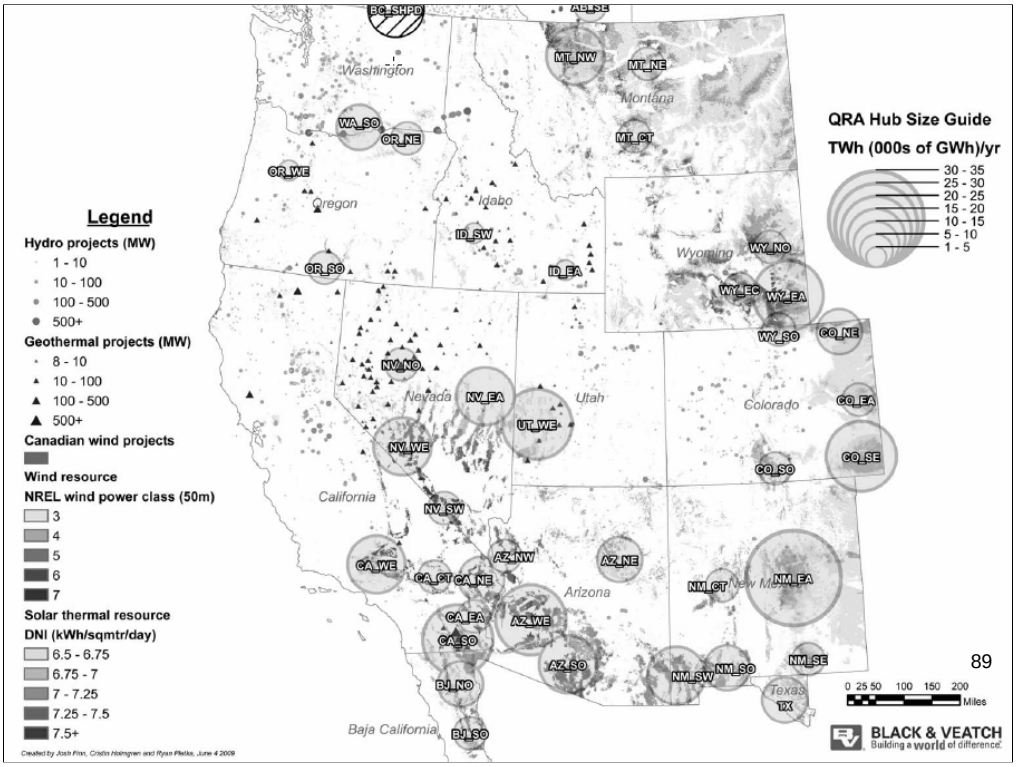
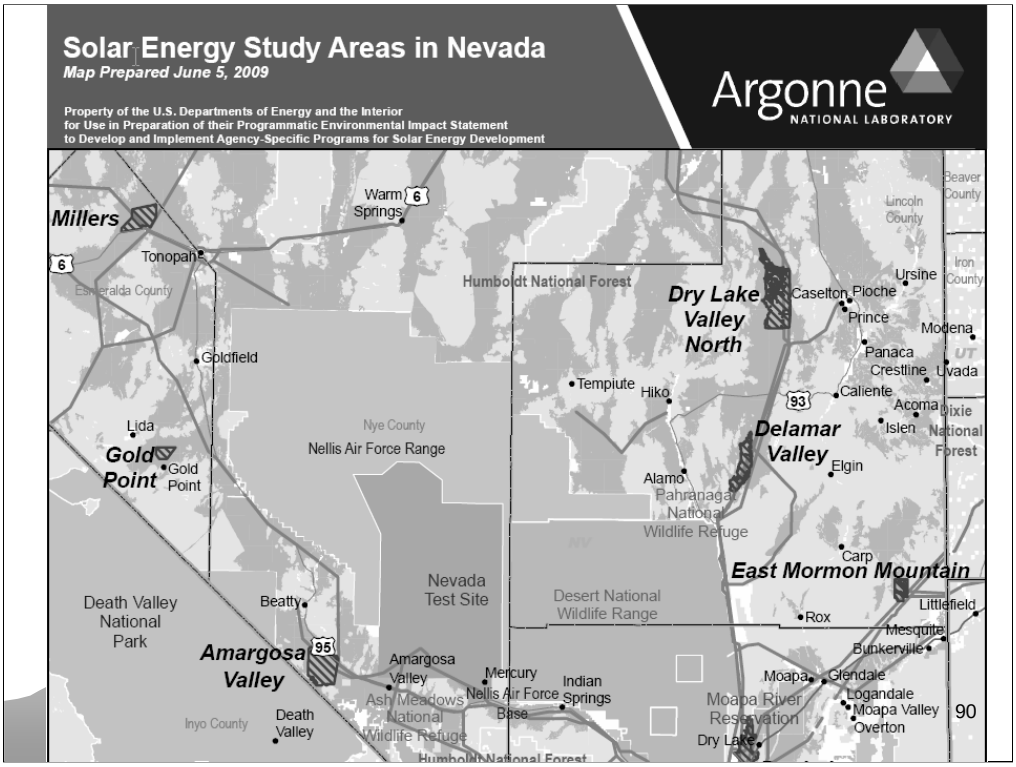
## Potential Collaboration/Next Steps

- Multiple efforts ongoing at Federal and State levels to encourage RE Projects
- Some of these efforts include:
  - WGA and DOE – Western Renewable Energy Zones (WREZ)
  - BLM Solar Zones
  - Colorado Resource Generation Development Areas (GDA)
  - California Competitive Renewable Energy Zones (CA CREZ)
- EPA overlay Repower maps on the 4 efforts listed above.
- EPA has shared site information with BLM HQs and BLM Arizona


Legend
Hydro projects (MW)
1 - 10
10 - 100
100 - 500
500+
Geothermal projects (MW)
8 - 10
10 - 100
100 - 500
500+
Canadian wind projects
Wind resource
NREL wind power class (50m)
3
4
5
6
7
Solar thermal resource
DNI (kWh/sqmtr/day)
6.5 - 6.75
6.75 - 7
7 - 7.25
7.25 - 7.5
7.5+
QRA Hub Size Guide
TWh (000s of GWh)/yr
30 - 35
25 - 30
20 - 25
15 - 20
10 - 15
5 - 10
1 - 5
BC_SHPD
MT_NW
MT_NE
Washington
Montana
WA_SO
OR_NE
MT_CT
OR_WE
Oregon
Idaho
ID_SW
ID_EA
Wyoming
WY_NO
OR_SO
WY_EC
WY_EA
WY_SO
CO_NE
NV_NO
Nevada
NV_EA
Utah
Colorado
CO_EA
UT_WE
NV_WE
CO_SE
CO_SO
California
NV_SW
AZ_NW
AZ_NE
CA_WE
CA_CT
CA_NE
NM_CT
New Mexico
NM_EA
Arizona
CA_EA
AZ_WE
CA_SO
AZ_SO
NM_SW
NM_SO
NM_SE
BJ_NO
Texas
TX
Baja California
BJ_SO
0 25 50 100 150 200
Miles
BLACK & VEATCH
Building a world of difference.
89


Solar Energy Study Areas in Nevada
Map Prepared June 5, 2009
Property of the U.S. Departments of Energy and the Interior
for Use in Preparation of their Programmatic Environmental Impact Statement
to Develop and Implement Agency-Specific Programs for Solar Energy Development
Argonne
NATIONAL LABORATORY
Millers
Warm Springs
6
Tonopah
Esmeralda County
Humboldt National Forest
Dry Lake Valley North
Caselton
Pioche
Ursine
Lincoln County
Beaver County
Iron County
Prince
Modena
Panaca
Crestline
Uvada
UT
Goldfield
Tempiute
Hiko
Caliente
93
Acoma
Islen
Dixie National Forest
Lida
Nye County
Nellis Air Force Range
Delamar Valley
Elgin
Gold Point
Gold Point
Alamo
Pahranagat National Wildlife Refuge
NV
Carp
East Mormon Mountain
Nevada Test Site
Desert National Wildlife Range
Death Valley National Park
Beatty
Rox
Littlefield
Mesquite
Bunkerville
Amargosa Valley
95
Amargosa Valley
Mercury
Nellis Air Force Base
Indian Springs
Moapa
Glendale
Logandale
Moapa Valley
Overton
Moapa River Reservation
Ash Meadows National Wildlife Refuge
Inyo County
Death Valley
Dry Lake
Humboldt National Forest
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# Summary of EPA-tracked Sites Located in REZs

**Table 1: Summary of EPA-tracked Sites Located in REZs**

| Site Type | Number of Sites | Percentage of Total |
|---|---|---|
| RCRA | 34 | 35% |
| Landfills | 29 | 30% |
| AML | 17 | 18% |
| Brownfields | 13 | 13% |
| Non-Federal Superfund | 4 | 4% |
| **TOTAL** | **97** | **100%** |

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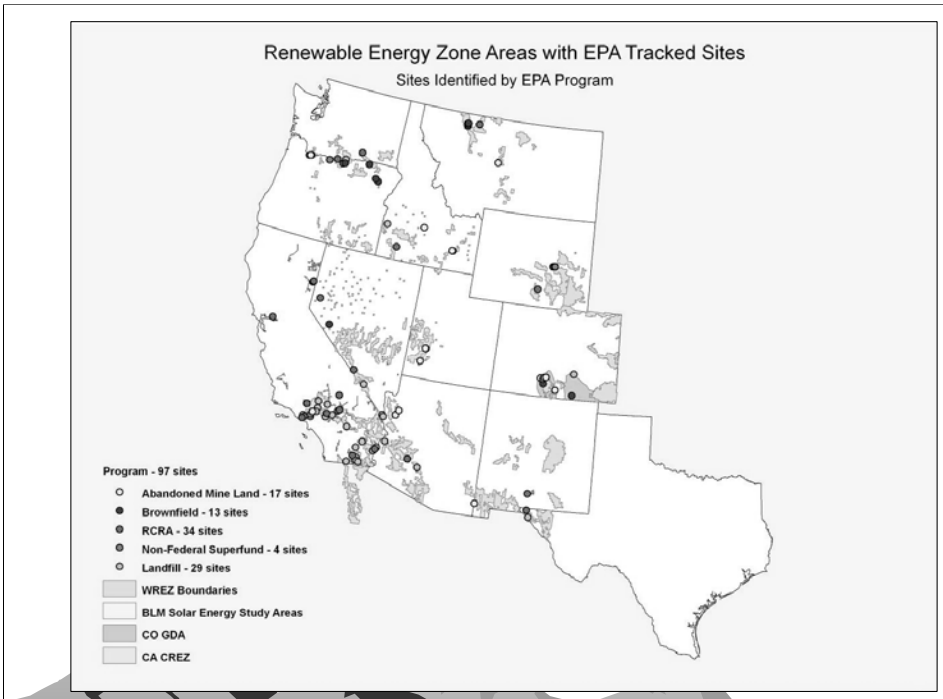
Renewable Energy Zone Areas with EPA Tracked Sites
Sites Identified by EPA Program
Program - 97 sites
Abandoned Mine Land - 17 sites
Brownfield - 13 sites
RCRA - 34 sites
Non-Federal Superfund - 4 sites
Landfill - 29 sites
WREZ Boundaries
BLM Solar Energy Study Areas
CO GDA
CA CREZ

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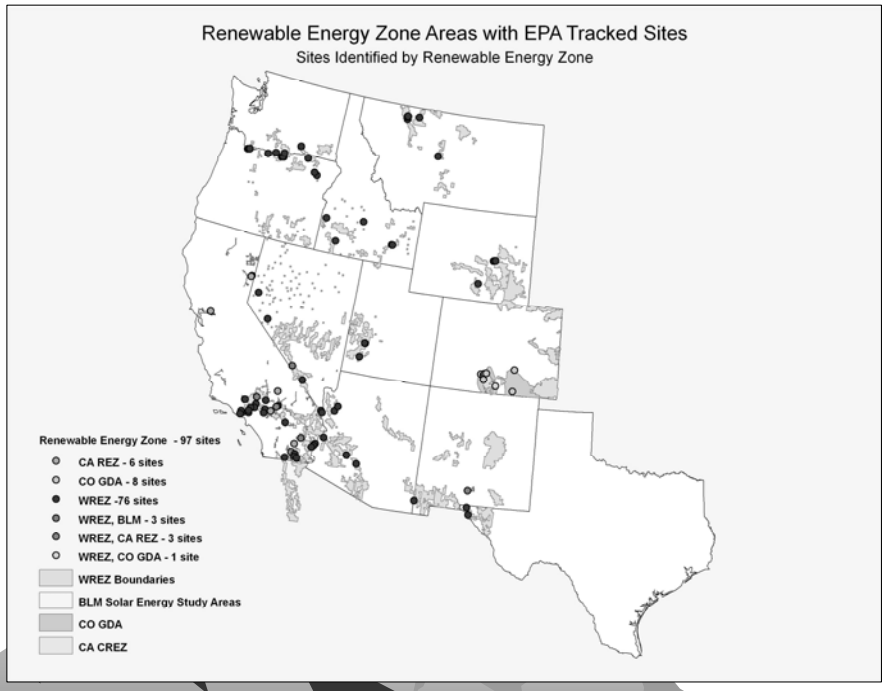
Renewable Energy Zone Areas with EPA Tracked Sites
Sites Identified by Renewable Energy Zone
Renewable Energy Zone - 97 sites
CA REZ - 6 sites
CO GDA - 8 sites
WREZ -76 sites
WREZ, BLM - 3 sites
WREZ, CA REZ - 3 sites
WREZ, CO GDA - 1 site
WREZ Boundaries
BLM Solar Energy Study Areas
CO GDA
CA CREZ

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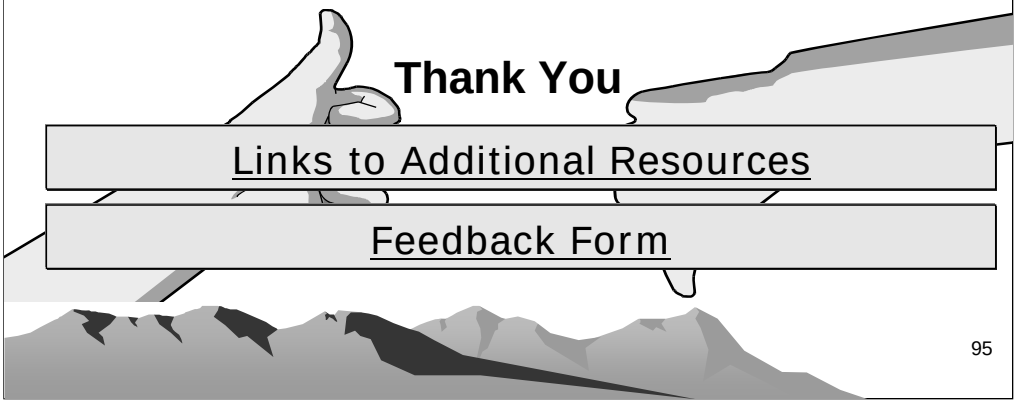
# Next Steps!

- Encourage additional collaboration on siting RE projects with Federal Land Management Agencies at mixed ownership sites.
- Collaboration with other key Federal Agencies (DoE, DoD, Department of Commerce, IRS)
- Collaboration with State Organizations (e.g., ASTSWMO)

# Thank You

After viewing the links to additional resources, please complete our online feedback form.




Links to Additional Resources

Feedback Form

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