



## Renewable Energy Potential at Contaminated Lands and Abandoned Mining Sites

**ConSoil 2008**

June 5, 2008

Milan, Italy

## EPA Launched Initiative: Siting Renewable Energy on Contaminated Land and Mining Sites

- Goal: Encourage and facilitate renewable energy development projects on EPA-tracked contaminated lands and mining sites
- EPA is taking a multi-prong approach for this initiative as follows:
  - Developing tools, such as RE and contaminated lands/mining sites mapping, model AOCs and comfort letters for RE development on contaminated lands and mining sites
  - Outreach and education
  - Coordinate with interested parties
  - Identify and work on pilot sites
  - Measure results
- More information will be available on the web this summer



## Why Screen Contaminated Lands for RE Production Potential

- Millions of acres of contaminated lands
- Define total potential
- Tool for interested parties
- Starting point for further site-specific screening



## Clean and Renewable Energy Development on Contaminated Lands Mapping

### Clean and Renewable Energy

#### Sources

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

### Preliminary Screening

#### Criteria

- Availability & quality of solar, wind, biomass
- Acreage
- Distance to electric transmission lines
- Distance to graded roads
- Slope and aspect of property



## What Contaminated Lands?

- RCRA
- Superfund
- Brownfields
- Mining Sites



## Sites Screened - The Numbers

- Screened Sites
  - EPA Brownfields Sites
    - 4,561
  - EPA NPL Sites
    - 1,633
  - RCRA Sties
    - 3,611
  - AML sites
    - 1,000s
- Other Sites (not yet included in mapping)
  - State Brownfields and State Cleanup sites
    - 1,000s



## Why Use Contaminated Lands?

- Productive reuse strategy that provides economic redevelopment value for otherwise unattractive properties
  - ~80% of federally tracked contaminated lands are in non-urban/remote locations
    - Lower traditional economic redevelopment potential
- Streamline approach to large-scale land acquisition
- Institutional controls that may prohibit other types of redevelopment
- Use brownfields not greenfields to produce green energy
  - Including agricultural land



## Why Use Contaminated Lands?

- **GHG reductions**
  - Clean energy production
  - Less energy required to develop land that has existing infrastructure
  - Reduced reliance on “dirtier” peak power supplies
- **Social Benefits**
  - Job creation
- **National energy independence and security**

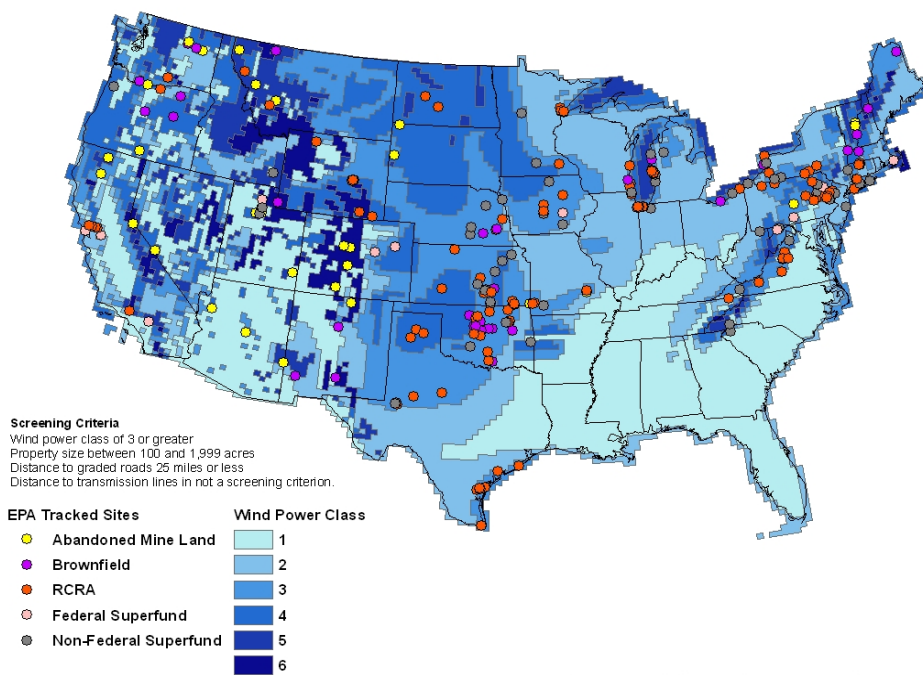


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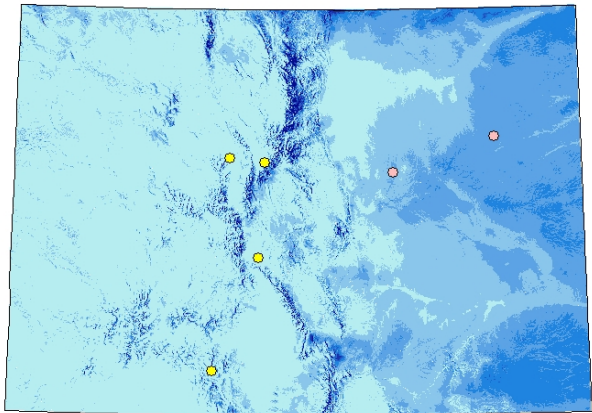


## EPA Tracked Sites with Community Wind Energy Generation Potential



*Developed by SRA International for EPA. Results are based on preliminary site screening. For further information, please see the accompanying data guidelines.*

EPA Tracked Sites in Colorado with  
Community Wind Energy Generation Potential



EPA Tracked Sites

- Abandoned Mine Land
- Federal Superfund

Wind Power Class

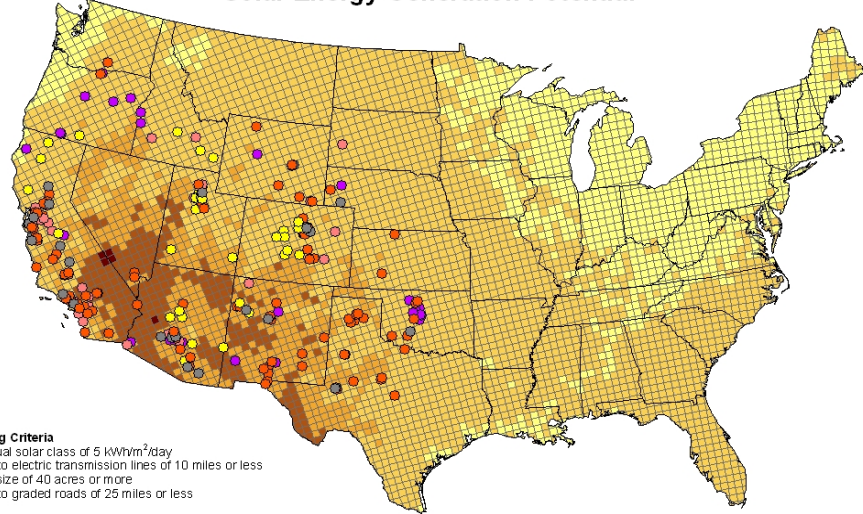
- 1
- 2
- 3
- 4
- 5
- 6
- 7

Screening Criteria

- Wind power class of 3 or greater
- Property size between 100 and 1,999 acres
- Distance to graded roads 25 miles or less
- Distance to transmission lines in not a screening criterion.

Developed by SRA International for EPA. Results are based on preliminary site screening.  
For further information, please see the accompanying data guidelines.

# EPA Tracked Sites with Utility Scale Photovoltaic (PV) Solar Energy Generation Potential



## Screening Criteria

CSP annual solar class of 5 kWh/m<sup>2</sup>/day  
Distance to electric transmission lines of 10 miles or less  
Property size of 40 acres or more  
Distance to graded roads of 25 miles or less

## EPA Tracked Sites

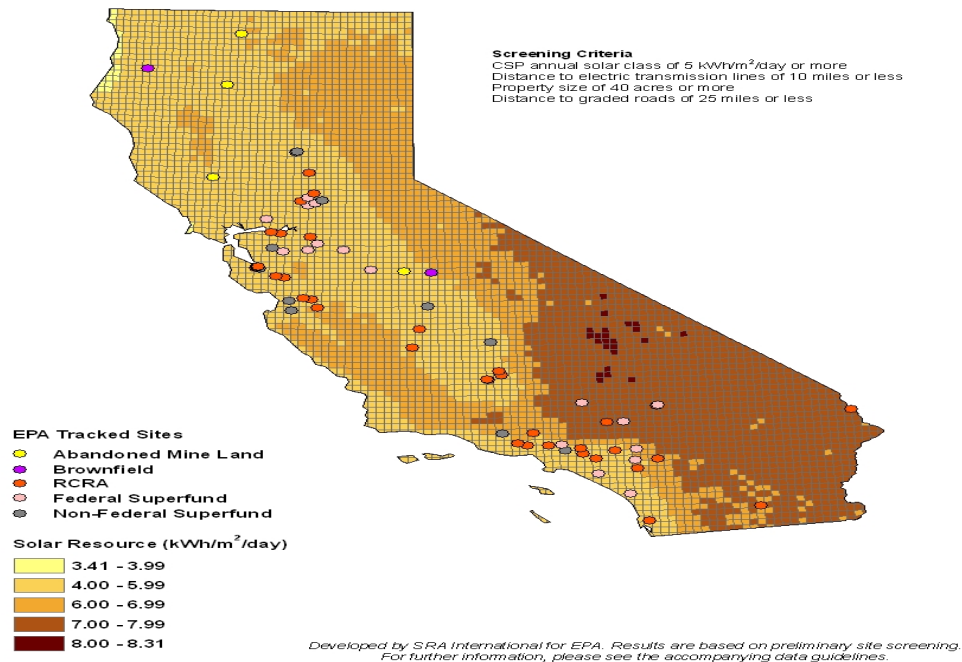
- Abandoned Mine Land
- Brownfield
- RCRA
- Federal Superfund
- Non-Federal Superfund

## Solar Resource (kWh/m<sup>2</sup>/day)

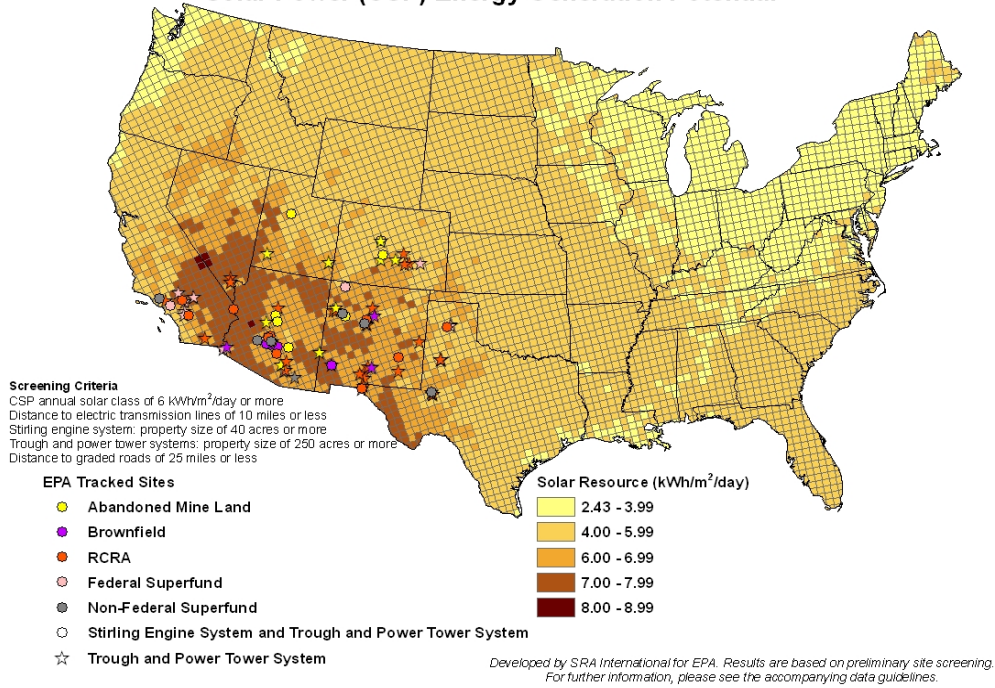
- 2.43 - 3.99
- 4.00 - 5.99
- 6.00 - 6.99
- 7.00 - 7.99
- 8.00 - 8.99

*Developed by SRA International for EPA. Results are based on preliminary site screening. For further information, please see the accompanying data guidelines.*

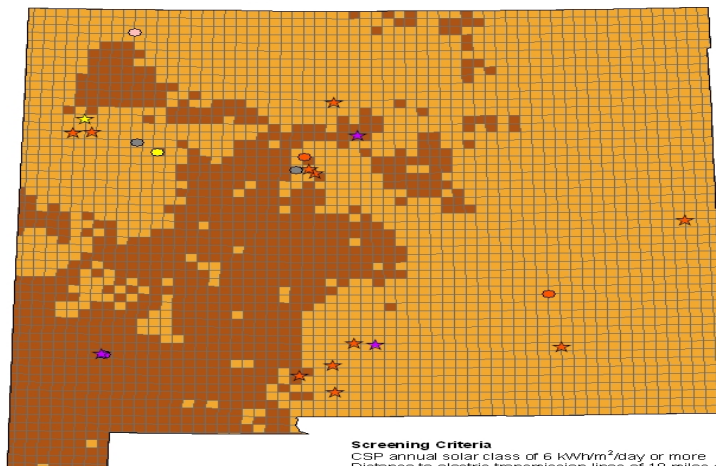
## EPA Tracked Sites in California with Utility Scale Photovoltaic (PV) Solar Energy Generation Potential



## EPA Tracked Sites with Utility Scale Concentrated Solar Power (CSP) Energy Generation Potential



# **EPA Tracked Sites in New Mexico with Utility Scale Concentrated Solar Power (CSP) Energy Generation Potential**



## **EPA Tracked Sites**

- Abandoned Mine Land
- Brownfield
- RCRA
- Federal Superfund
- Non-Federal Superfund
- Stirling Engine System and Trough and Power Tower System
- ☆ Trough and Power Tower System

## **Screening Criteria**

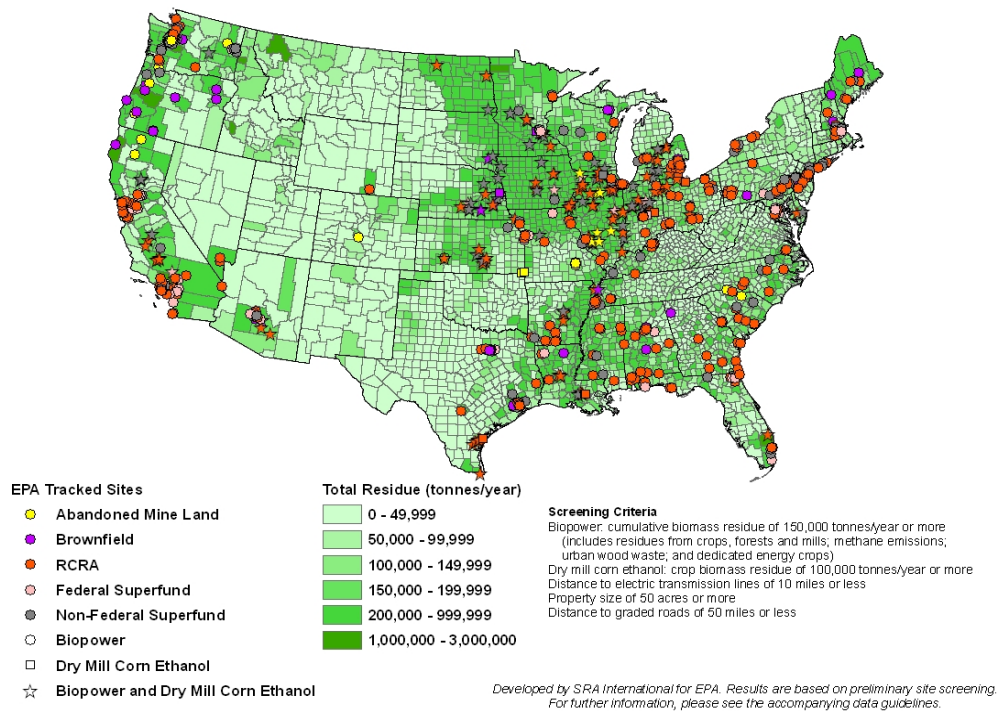
CSP annual solar class of 6 kWh/m<sup>2</sup>/day or more  
 Distance to electric transmission lines of 10 miles or less  
 Stirling engine system: property size of 40 acres or more  
 Trough and power tower systems: property size of 250 acres or more  
 Distance to graded roads of 25 miles or less

## **Solar Resource (kWh/m<sup>2</sup>/day)**

- 6.01 - 6.99
- 7.00 - 7.48

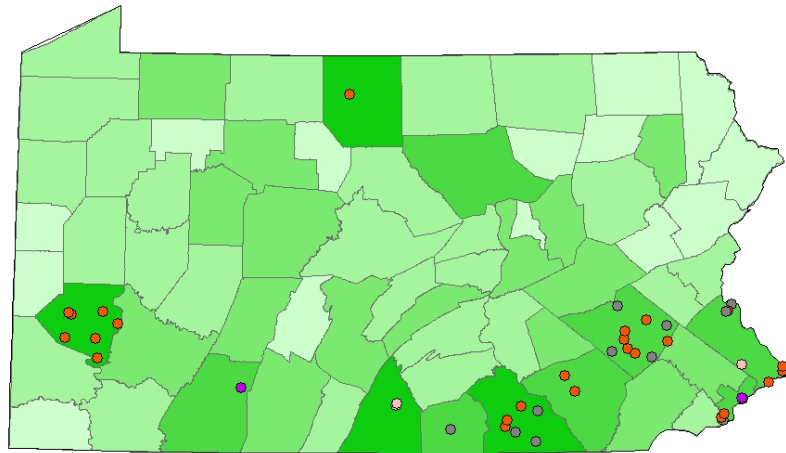
*Developed by SRA International for EPA. Results are based on preliminary site screening.  
 For further information, please see the accompanying data guidelines.*

## EPA Tracked Sites with Biomass Energy Generation Potential





## EPA Tracked Sites in Pennsylvania with Biomass Energy Generation Potential



### EPA Tracked Sites

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

### Total Residue (tonnes/year)

- 9,500 - 49,999
- 50,000 - 99,999
- 100,000 - 149,999
- 150,000 - 199,999
- 200,000 - 299,999

### Screening Criteria

- Biopower: cumulative biomass residue of 150,000 tonnes/year or more (includes residues from crops, forests and mills, methane emissions, urban wood waste, and dedicated energy crops)
- Dry mill corn ethanol: crop biomass residue of 100,000 tonnes/year or more
- Distance to electric transmission lines of 10 miles or less
- Property size of 50 acres or more
- Distance to graded roads of 50 miles or less

*Developed by SRA International for EPA. Results are based on preliminary site screening. For further information, please see the accompanying data guidelines.*



## 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](http://www.dsireusa.org)





United States  
Environmental Protection  
Agency

## State Incentives for Achieving Clean Energy Development on Contaminated Lands

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



### Incentives for Clean Energy

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

##### Connecticut Clean Energy Fund (CCEF)

[www.ctinnovations.com/funding/ccef/about.php](http://www.ctinnovations.com/funding/ccef/about.php)

Promotes, develops, and invests in clean energy resources for sustainable energy for the benefit of Connecticut ratepayers. Provides incentive programs to businesses and developers.

##### Onsite Renewable Distributed Generation

[www.ctinnovations.com/funding/ccef/renewable\\_dg.php](http://www.ctinnovations.com/funding/ccef/renewable_dg.php)

Provides grants of up to \$4 million to install systems that generate energy from renewable sources including wind, solar, fuel cells, biomass, landfill gas, and certain types of hydropower. The total available funding for this program is \$32.75 million. Applicants must be commercial, industrial, or institutional facilities.

##### Operational Demonstration Program

[www.ctinnovations.com/funding/ccef/odp/odp\\_project.php](http://www.ctinnovations.com/funding/ccef/odp/odp_project.php)

Provides up to \$750,000 for demonstration projects that have a high likelihood of developing into a commercial product within a reasonable period of time. Projects must have a capacity of at least one kilowatt (or the functional equivalent for hydrogen generation). Fund requires a front loaded 25% cash cost share for any funding provided, in-kind contributions are accepted under certain conditions.

##### 100 Project Initiatives

[www.ctinnovations.com/funding/ccef/project\\_100.php](http://www.ctinnovations.com/funding/ccef/project_100.php)

Allows for state electric companies to enter into 10-year contracts for not less than 100 MW of Clean Renewable capacity at a price of up to 5.5¢ per kilowatt-hour (kWh). Designed to encourage financing of renewable energy projects, stimulate the development of new projects, and increase the available supply of renewable energy.

##### DPUC - Low Interest Loans for Customer-Side Distributed Resources

[www.dpuc.state.ct.us/Electric%20and%20Gas%20View%20and%20Share%2014/Courtesy%20and%20Share%2014](http://www.dpuc.state.ct.us/Electric%20and%20Gas%20View%20and%20Share%2014/Courtesy%20and%20Share%2014)

Offers grants to eligible baseload distributed generation (DG) projects of \$400 per kilowatt, up to a maximum of \$500K, to retail and end-use customers of electric distribution companies for the installation of customer-side distributed resources.

#### Technical Assistance and Other Incentives

##### Mass Energy - Renewable Energy Certificate Incentive

[www.massenergy.com/Solar-REC-Sale.html](http://www.massenergy.com/Solar-REC-Sale.html)

Offers to purchase renewable energy certificates at a rate of \$30 per MWh-hour (or \$13 per kWh) for a period of three years from PV systems.

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

##### Sales Tax Exemption for Solar and Geothermal Systems

[www.ct.gov/DPS](http://www.ct.gov/DPS)

100% sales tax exemption for solar and geothermal heat pumps. Eligible solar equipment includes solar electricity generating systems and passive or active solar water or space heating systems, including equipment related to such systems, and sales of services relating to their installation.

##### Net Metering

[www.state.ct.us/dep/07](http://www.state.ct.us/dep/07)

Connecticut requires net metering to no limit for generation using Clean Renewable energy sources (e.g., solar, wind, biomass, wave or tidal power). Contact the Connecticut PUC regarding potential opportunities.

Quick Facts	
Public Benefit Fund (PBF)	Yes <input type="checkbox"/> No <input type="checkbox"/>
Renewable Portfolio Standard	Yes <input type="checkbox"/> No <input type="checkbox"/>
27% by 2020	
Net Metering	Yes <input type="checkbox"/> No <input type="checkbox"/>
Interconnection Standards	Yes <input type="checkbox"/> No <input type="checkbox"/>
Electric Power Industry Generation by Primary Energy Source (2006)	
Petroleum-Fired	3.7% Nuclear 47.8%
Natural Gas-Fired	30.2% Hydroelectric 1.8%
Coal-Fired	12.3% Other Renewables 2.2%

#### Points of Contact

Connecticut Clean Energy Fund  
[www.ctinnovations.com](http://www.ctinnovations.com)  
Lori Doherty, [lori.doherty@ctinnovations.com](mailto:lori.doherty@ctinnovations.com), (860) 257-2236  
Dale Hedman, [dale.hedman@ctinnovations.com](mailto:dale.hedman@ctinnovations.com), (860) 563-5851 Ext.131

##### Connecticut Department of Public Utility Control

[www.state.ct.us/DPUC](http://www.state.ct.us/DPUC)  
Paul Carver, [paul.carver@puc.state.ct.us](mailto:paul.carver@puc.state.ct.us), (860) 827-2773

##### Mass Energy

Kelly Muehlen, [kelly@massenergy.com](mailto:kelly@massenergy.com), (617) 524-3950

##### Sales and Use Tax Exemption

[www.ct.gov/DPS](http://www.ct.gov/DPS)  
Connecticut Department of Revenue Services, Public Information Officer  
(860) 297-5862



## Incentives for Development of Contaminated Land

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

##### Special Contaminated Property Remediation and Insurance Fund (SCRIF)

[www.ct.gov/dep/view.asp?i=1101&p=248624](http://www.ct.gov/dep/view.asp?i=1101&p=248624)

Provides low-interest, five-year loans to municipalities and private entities for Phase I and II investigations and demolition costs. Applicants must have completed a Phase I Assessment. Interest (2% APR) is paid during the term of the loan and the principal is repaid at the end of the term of the loan or when the site is later sold or leased or when the environmental remediation is complete. There is no loan limit or standard loan amount for SCRIF.

##### Connecticut Brownfields Redevelopment Authority (CBRA)

[www.ctbrownfields.com/about.asp](http://www.ctbrownfields.com/about.asp)

Provides grants up to \$10,000,000 to investors, developers, and business owners who undertake redevelopment projects on brownfields sites. The cash grant funding is available through tax increment financing (TIF) and the value of the grant is based on the future incremental municipal property taxes to be generated by the project; it cannot be combined with municipal real estate tax abatements.

##### Urban Sites Remedial Action Fund (USRAF)

[www.ct.gov/dep/view.asp?i=1101&p=248644](http://www.ct.gov/dep/view.asp?i=1101&p=248644)

Provides funds primarily for site investigation, studies, and design; operations and maintenance; removal and remedial actions on commercial or industrial sites. The state can commit unlimited public funds to prepare the planning and implementation of the site remediation. Several project types and criteria are eligible for assistance; however, the site must be in a distressed community or targeted investment community.

##### Connecticut Development Authority Direct, Guaranteed, or Participating Loans

[www.ctda.com/CDAS/indirect.asp?CMSURL=/Pages/66444/indirect.aspx](http://www.ctda.com/CDAS/indirect.asp?CMSURL=/Pages/66444/indirect.aspx)

Loans available from \$250,000 to \$5 million to assist with brownfields remediation and redevelopment. Terms are tailored to each transaction up to 20 years.

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

##### Industrial Site Investment Tax Credit Program

[www.ct.gov/dep/view.asp?i=1101&p=248622](http://www.ct.gov/dep/view.asp?i=1101&p=248622)

Offers an eligible investor a dollar-for-dollar corporate tax credit of up to 100% of their investment up to a maximum of \$100,000,000, for investments made in real property or improvements to real property located within Connecticut that has been subject to environmental contamination.

##### Urban Site Investment Tax Credit Program

[www.ct.gov/dep/view.asp?i=1101&p=248642](http://www.ct.gov/dep/view.asp?i=1101&p=248642)

Offers an eligible investor a dollar-for-dollar corporate tax credit of up to 100% of their investment up to a maximum of \$100,000,000. An eligible Urban Site Investment Project is defined as an investment that will add significant new economic activity, increase employment in a new facility, and generate significant additional tax revenue to the municipality and the state.

#### Enterprise Zone Program

[www.ct.gov/dep/view.asp?i=1109&p=248706](http://www.ct.gov/dep/view.asp?i=1109&p=248706)

Provides tax abatement for five years and 80% of local property taxes on real estate improvements located within Enterprise Zones, or 10 years/50% tax credit, seven-year minimum deferral of estimated taxes resulting from property value rise after remediation has been completed.

#### Limitations on Liability

##### Voluntary Remediation Programs - Covenant Not to Sue

[www.ct.gov/dep/view.asp?i=1101&p=32000&id=454](http://www.ct.gov/dep/view.asp?i=1101&p=32000&id=454), CSD-1026

Provides a covenant not to sue—an assurance that the state will not require further cleanup in the future for historical contamination—upon completion of all requirements of the state's Voluntary Remediation Program. This tool reduces the risk of liability to the property owner.

#### Quick Facts

Limitations on Liability	Yes <input type="checkbox"/> No <input type="checkbox"/>
Number of State-Tracked Contaminated Properties:	154
Includes Urban Sites Remedial Action Program, Voluntary Remediation Program, and Property Transfer Program sites	
Number of EPA CERCLUS Sites:	402
Sites identified for potential investigation under the federal Superfund Program	
Number of EPA Brownfields Properties:	313
Properties being funded or addressed under the EPA Brownfields Program	
† There may be some overlap among the categories listed and sites listed may not represent all potentially contaminated sites in Connecticut.	

#### Points of Contact

Connecticut Department of Environmental Protection (DEP)

[www.dep.state.ct.us/air/remediation/index.htm](http://www.dep.state.ct.us/air/remediation/index.htm)

Graham Stevens, [graham.stevens@dep.state.ct.us](mailto:graham.stevens@dep.state.ct.us), (860) 424-4196

##### Department of Economic and Community Development

SCRIF

Ned Moore, [ned.moore@dep.state.ct.us](mailto:ned.moore@dep.state.ct.us), (860) 270-6148

Urban and Industrial Site Investment Tax Credit Programs

Robert Rippey, [robert.rippy@dep.state.ct.us](mailto:robert.rippy@dep.state.ct.us), (860) 270-6110

Enterprise Zone Program

Anne Karam, [anne.karam@dep.state.ct.us](mailto:anne.karam@dep.state.ct.us), (860) 270-6143

CBRA/CDA

Cynthia Polizziello, (860) 258-7833

Wind Energy  
Bethlehem Steel Superfund 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



## Potential Projects

- **Summitville Mine Site and Peru Creek/Pennsylvania Mine Site**
  - Possible installation of microhydro generators to produce 100% of electricity needed to power water treatment system
- **Dover Landfill, New Hampshire**
  - Evaluating development of a solar production facility on 50-acre landfill
- **Hassayampa Landfill, Buckeye, AZ**
  - Collaborating with external public and private partners to explore a possible biowaste to energy production facility on a portion of the Hassayampa Landfill Superfund site
  - Potential for multi-megawatt power production



## Questions?

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[cleanenergy@epa.gov](mailto:cleanenergy@epa.gov)

