



# Green Remediation: An EPA Perspective

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**CalEPA Green Remediation Symposium**  
**Sacramento, CA – February 4, 2009**



# Green Remediation – An EPA Perspective

## Outline for Today:

1. Introduction / Definition of Green Remediation
2. EPA Region 9 Green Remediation Activities
3. EPA HQ Green Remediation Activities
4. Case Studies / Tools



# Green Remediation – An EPA Perspective

## Research and Development at EPA



- 1,858 employees
- \$540 million\* budget
- \$65 million\*\* extramural research grant program
- 13 lab or research facilities across the U.S.
- Provide credible, relevant and timely research results and technical support that inform EPA policy decisions

\*FY09 Requested Levels  
\*\* FY07 Requested Levels



## ORD Lab and Office Locations



**ORD Lab Locations:**

<http://www.epa.gov/ord/htm/map.htm>



# Green Remediation – An EPA Perspective



What is GREEN REMEDIATION?

*Green remediation is the practice of considering environmental impacts of remediation activities at every stage of the Remedial process in order to maximize the net environmental benefit of a cleanup. Considerations include selection of a remedy, energy requirements, efficiency of on-site activities, and reduction of impacts on surrounding areas.\**

\*Ref: <http://clu.in.org/download/studentpapers/Green-Remediation-Renewables-A-Dellens.pdf>



# Green Remediation – An EPA Perspective

## • EPA Region 9 History

- Engineering Forum Issue Paper (May 2004)
- Version 1 “Energy Calculator” (2005) (unreleased)



### Welcome

Welcome to the Waste Site Energy CALCULATOR, a web based tool that estimates energy requirements of individual remedial technologies at waste clean up sites.

Horizontal tabs (top right) provide basic information, main tabs (vertical, far left) serve as an access to all calculator functions.

To use the CALCULATOR, complete, in order:

#### Step 1

Provide basic information about the remedial site into “type\_of\_site” (green tab).

#### Step 2

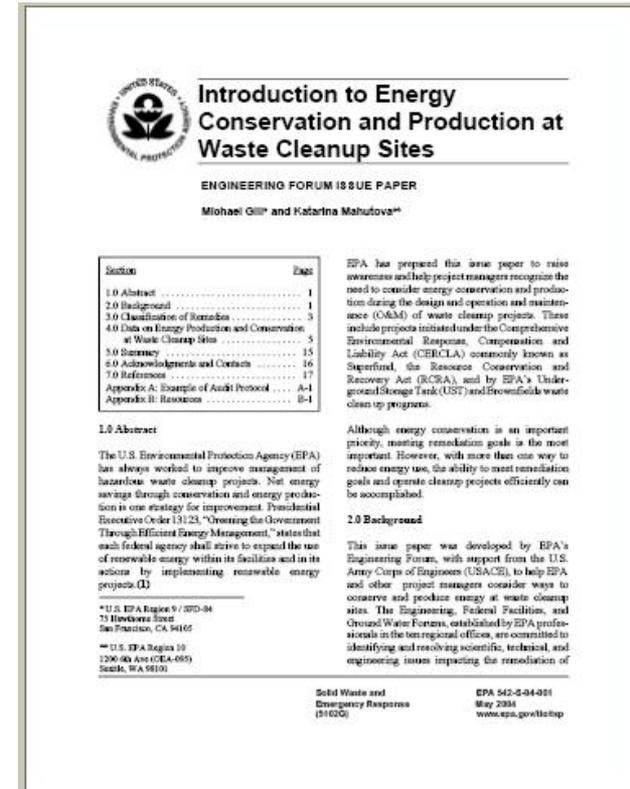
Select remedial “technologies” (red tab). You will be prompted to provide technology - specific parameters.

#### Step 3

Review CALCULATOR “outputs” (orange tab). Energy requirements between technologies and comparisons between alternative technologies are provided.

#### Step 4

Review suggestions for “improvements” (violet tab). Improvements are suggestions that may result in better



(<http://www.epa.gov/tio/tsp/download/epa542s04001.pdf>)



# Green Remediation – An EPA Perspective

- **EPA Region 9 History (cont)**
  - R9 Cleanup - Clean Air Initiative (2005)
  - R9 Energy Advisor Hired (2007)
  - Smart Energy Resources Guide (May 2008)



**CLEANUP - CLEAN AIR**  
**DIESEL EMISSIONS & GREENHOUSE GAS REDUCTIONS**



# Green Remediation – An EPA Perspective

## Electricity and Diesel Emissions Inventory\*

- Footprint of half of R9 Superfund Sites
- Total diesel emissions from 1985-2009 are estimated to be 3,140 tons NO<sub>x</sub>, 848 tons CO, and 105 tons PM.
  - ~ 54,000 buses driven across US
- Total CO<sub>2</sub> emissions associated with electricity consumption from 1990-2009 are estimated to be 428,174 tons.
  - ~ 84,000 cars on the road for one year or
  - ~ 50,000 single family homes for one year

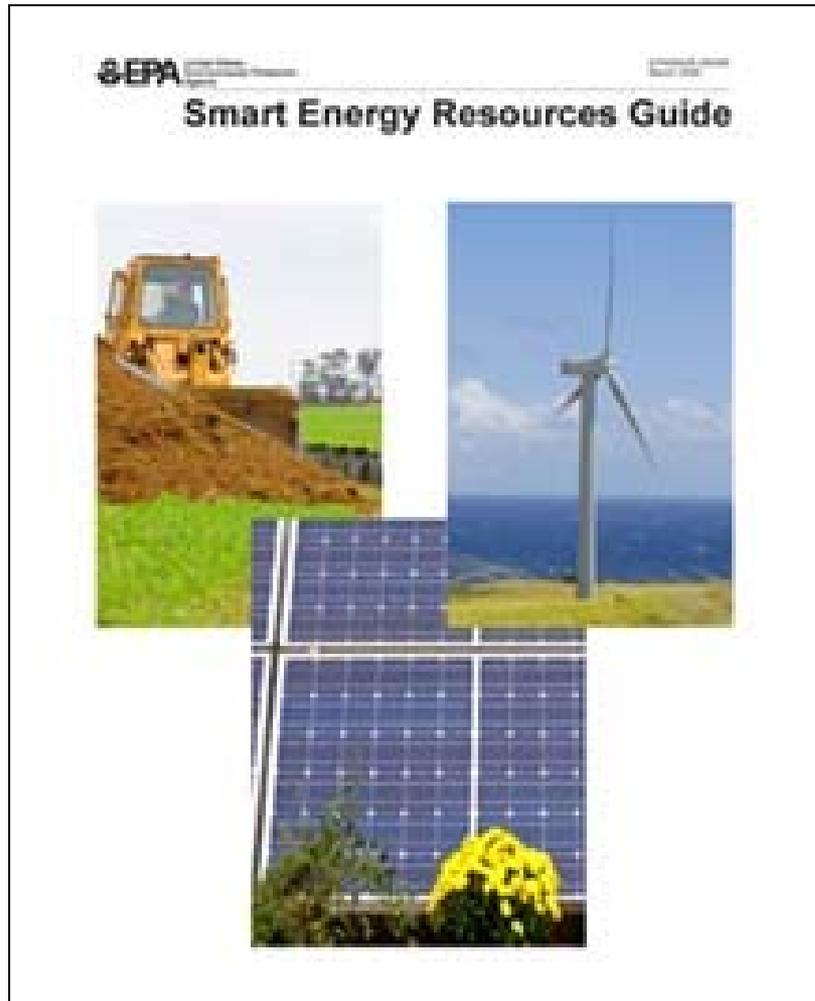


Dozer with diesel particulate filter

(\*Ref: Superfund Electricity and Diesel Emissions Inventory, Ashley DeBoard MacKenzie, EPA Region 9 GRO Fellow, Aug 16, 2007 )



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<http://www.epa.gov/nrmrl/pubs/600r08049/600r08049.htm>



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- **SERG Outline**

- Renewable Technologies (basics, assessments, costs, success stories)

- Solar
- Wind
- Landfill Gas-to-Energy
- Anaerobic Digestion
- Biomass Gasification
- Cleaner Diesel

- Funding Resources and Opportunities



LFG flares at Oll site, CA



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- **SEREG Outline (continued)**
  - Tools – Calculators, References, Programs
  - Appendices
    - More on Technologies
    - Contract Language
    - Federal Regulations
    - Utility Programs



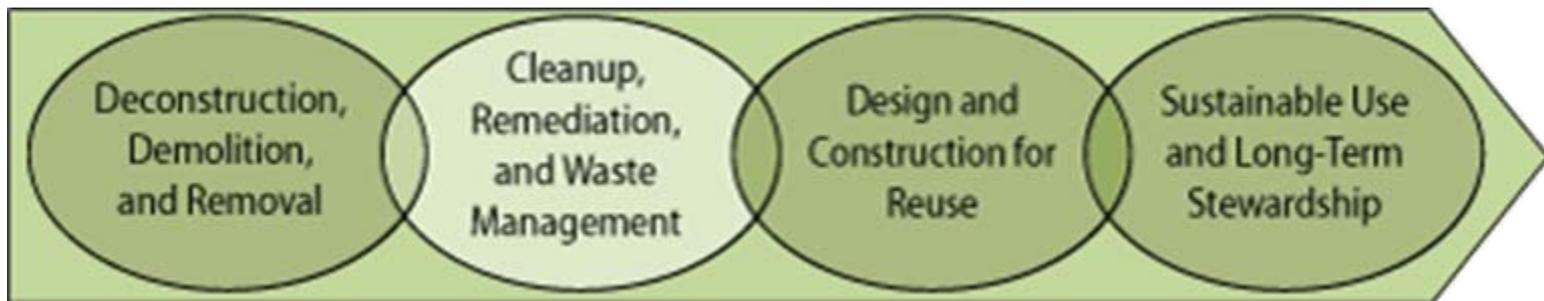
Gasifier fueled with poultry waste, WV



# Green Remediation – An EPA Perspective

## EPA HQ Efforts in Green Remediation

- GR covers many items, not just energy savings...it's all about BMPs.
- Guidance (Fact Sheet, Primer, etc.)
- Training (e.g. NARPM)
- Funding for projects (e.g., energy calculator upgrade)
- Many specialized workgroups (technical, policy, etc.)





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## Green Remediation Primer

In general, the GR Primer covers the following sustainability topics:

- Saving energy (renewables use, optimization of systems)
- Saving water resources
- Water quality protection
- Ecological and soil preservation

GR Primer: <http://clu.in.org/download/remed/Green-Remediation-Primer.pdf>



# Green Remediation – An EPA Perspective

## Training

### EPA “NARPM” Conference (July ’08)

- Full day session on Green Remediation
- Message that GR does NOT mean PRPs should not clean up (ROD goals are still applicable)
- Definitions, case studies
- Metrics, Life Cycle Analysis
- Contracts tools are out there (language), but no regulations

### Follow-up 3 Part Seminar Series (Nov-Dec 08, Jan 09)

- archived on <http://www.cluin.org>

### NARPM GR Part 2 (June ’09)



# Green Remediation – An EPA Perspective

## Green Remediation Activities

### EPA HQ:

Technology Innovation Program Green Remediation (GR) Effort  
Superfund Green Remediation Workgroup  
Technical Support Project (TSP) Green Remediation Subcommittee  
Green Remediation, Revitalization, and Reuse (GRRR) Team  
Climate Change and Contaminated Lands (CCCL) Workgroup  
Climate Change Coordinating Committee (C4)

### EPA Regional Initiatives:

Region 3 Pilot Project on Green Cleanup Standards  
Region 9 Cleanup-Clean Air Initiative

### EPA Partnerships with other Federal Agencies:

Dept of Defense  
Dept of Energy



# Green Remediation – An EPA Perspective

## Green Remediation Activities (cont)

### State Initiatives:

Cal/EPA GR Team

Illinois Greener Cleanups

Wisconsin Initiative on Sustainable Cleanups (WISC)

### Other Partnerships:

Federal Remediation Technologies Roundtable (FRTR) GR Focus

Brownfields Sustainability Plots: Green Redevelopment

Tribal Initiatives

Sustainable Remediation Forum (SuRF)

Association of State and Territorial Solid Waste Management Officials (ASTSWMO)

Greener Cleanups Task Force

Interstate Technology and Regulatory Council (ITRC) Green and Sustainable Remediation (GSR) Project



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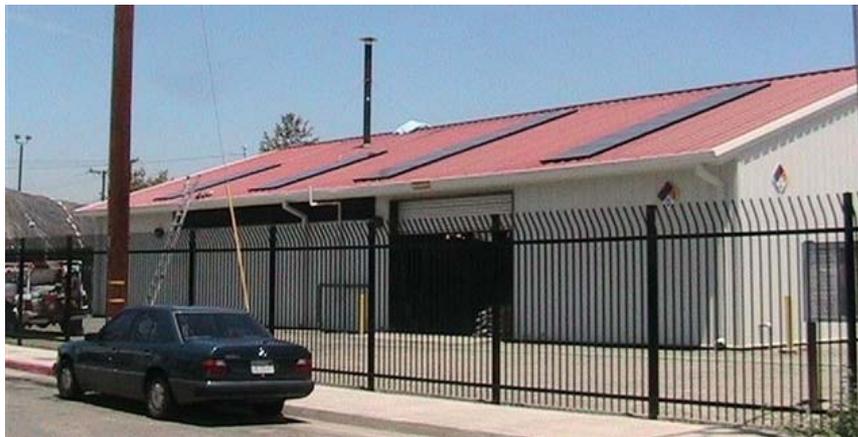
## Case studies:

### Pemaco site (Maywood, CA)

- renewables application for energy needs (~5900 kWh/yr)
- solar panels used for implementation of Electrical Resistive Heating remedy

### OII Landfill (Monterey Park, CA)

- example of using waste products to create energy
- methane gas piped to nearby microturbines and used to create electricity (estimated savings of \$400K / year in energy costs)





# Green Remediation – An EPA Perspective

## More Case Studies:

Camp Pendleton – Diesel emission reduction activities (Reg 9 / Navy collaboration)

Portland Harbor (OR) Clean Diesel Evaluation

- reduced diesel PM by using emission control technologies and cleaner fuels

Nebraska Wind Power Pilot Study

- 100 kW wind turbine
- power for groundwater circulation well system
- 50 gpm system on site

LLNL Site 300, CA

- solar powered water treatment units

24 Case Studies online:

[http://clu.in.org/greenremediation/tab\\_d.cfm](http://clu.in.org/greenremediation/tab_d.cfm)





# Green Remediation – An EPA Perspective

## Tools

- Main EPA Green Remediation Webpage

<http://clu.in.org/greenremediation>

- Best Management Practices Toolkit (guidance documents, etc.)

[http://clu.in.org/greenremediation/subtab\\_b1.cfm](http://clu.in.org/greenremediation/subtab_b1.cfm)

- Contracting and Administrative Toolkit

[http://clu.in.org/greenremediation/subtab\\_b2.cfm](http://clu.in.org/greenremediation/subtab_b2.cfm)

- Decision Support Tools (34 calculators and models)

[http://clu.in.org/greenremediation/subtab\\_b3.cfm](http://clu.in.org/greenremediation/subtab_b3.cfm)

- Partnering Tools

[http://clu.in.org/greenremediation/subtab\\_b4.cfm](http://clu.in.org/greenremediation/subtab_b4.cfm)



# Green Remediation – An EPA Perspective

## Mechanisms which guide EPA efforts

- Environmental Regulations
  - NCP / 9 Criteria
  - Applicable or Relevant and Appropriate Requirements (ARARs)
- Contracts Regulations
- EPA or DOD Guidance documents (SERG, GR Primer, etc.)
- Green Remediation Certification Program

What does it cost now and what will it cost later?

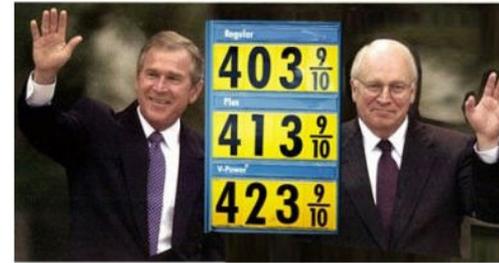
EPA should lead the way in reducing greenhouse gas emissions!



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(<http://bitsandpieces.us>)



(MSNBC)

## Reasons for Green Remediation?

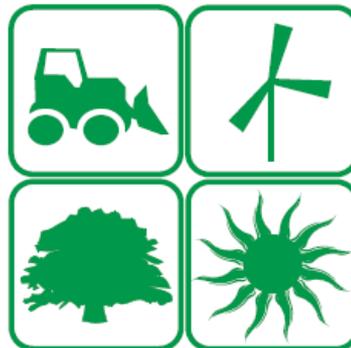
- To mitigate greenhouse gases
- To avoid high energy prices



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## • Acknowledgements

- Mike Montgomery (EPA Region 9)
- Jennifer Wang (now with Energy Solutions, Inc., Oakland, CA)
- Penny McDaniel (EPA Region 9)
- Steve Rock (EPA ORD, Cincinnati)
- Carlos Pachon (EPA HQ)
- EPA's Superfund Engineering Forum



Cleanup - Clean Air



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## Questions??



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