



**US Army Corps of Engineers**



## **Incorporation of Sustainability into Environmental Remediation – Army Efforts**

Carol Lee Dona, Ph.D., P.E.  
US Army Corps of Engineers  
Environmental and Munitions Center of Expertise  
Omaha, NE  
December 11, 2008



## Army Sustainability Efforts

- Significant Army sustainability efforts (examples: environmental management systems, green building construction, demolition waste diversion)
- More limited (but growing) activity in environmental remediation



## Examples: Incorporation of Sustainability into Army Environmental Remediation

- Direct involvement – environmental remediation
  - Army guidance
  - Wind power
  - Conservation
  - Dry dredge
  - Phosphate amendments to soil
- Broader activities that could be used to incorporate sustainability into environmental remediation
  - Value engineering (design optimization) and remediation system evaluations (operations optimization)
  - Geothermal energy with microgrid electrical stations
  - Demolition waste diversion



## Wind Power

- Nebraska Ordnance Plant (Mead, NE), information supplied by Region 7 EPA RPM, Dave Drake
- One-year (2006-7) pilot study evaluating cost savings of alternative wind power.
- Multiple organizations participating: EPA; Army Corps of Engineers, University of Missouri-Rolla, Bergy Wind Systems, Inc.



## System Description

- Groundwater recirculation well, treatment of VOCs.
- 50 gallons per minute pump rate, 26 million gallons annually.
- 10 kilowatt wind turbine with grid-inter-tie system.



## Study Results

- 26 % of GCW power demands met by alternative energy.
- Estimated annual savings of \$547 and 8,422 kWh generated.
- Total capital costs of \$38,000 recovered in 69 years of operation.
- 169 tons of greenhouse gasses eliminated (30 yrs).





## More Information

- [http://www.clu-in.org/greenremediation/subtab\\_d6.cfm#site3](http://www.clu-in.org/greenremediation/subtab_d6.cfm#site3)
- *Dave Drake, U.S. EPA Region 7*  
([drake.dave@epa.gov](mailto:drake.dave@epa.gov) or 913-551-7626)





## Wind Power, Conservation

- Massachusetts Military Reservation
- 94 sites, 23 plumes, Air Force and Army activities
- AFCEE and AEC overseeing cleanups
- Remedies: source removal, pump & treat (20 million gallons per day)



## Conservation

- High efficiency pumps >\$100,000 savings/yr
- Remedial process optimizations >\$100,000 savings/yr
- Energy audit (motion sensors, programmable thermostats, efficient lighting) >\$50,000/yr



## Wind Power

- Based on the regional power mix, annual MMR groundwater treatment plant power consumption (AFCEE and AEC) results in at least:
  - 13,000 tons of CO<sub>2</sub> (greenhouse gas),
  - 43,000 pounds of SO<sub>2</sub> (acid rain),
  - 42,000 pounds of NO<sub>x</sub> (acid rain and greenhouse gas),
  - Also particulate matter (smog), mercury (bio accumulation), and lead (health effects)
  - VOCs (almost twice as much as is being removed from the groundwater)
- Air Force (AFCEE) 1.5 MW turbine
  - ~30% of electricity needed to cleanup Air Force plumes
  - Cost - \$4.6 million
  - Annual savings - \$640,000
  - Payback time period – 7 yrs
  - Projected startup – September 2009
- Army (AEC) two 600 KW turbines
  - ~100% of electricity needed to cleanup two Army plumes
  - Cost – \$1.8 million per turbine
  - Annual savings - \$450,000 (total)
  - Payback time period – 8 yrs
  - Project startup – Dec 2009
  - Will tie into public and installation grids (one each)
- Because of the excellent wind resource, the State is exploring leasing land on MMR to private investors for up to 30 more wind turbines to power the base and possibly generate revenue





## Points of Contact

- Paul Nixon (USACE)  
508-968-5620  
[paul.nixon@us.army.mil](mailto:paul.nixon@us.army.mil)
- Hap Gonser (USACE)  
508-968-5107  
[kent.gonser1@us.army.mil](mailto:kent.gonser1@us.army.mil)
- Rose Forbes (AFCEE)  
508 968-4670 x5613  
[Rose.Forbes@brooks.af.mil](mailto:Rose.Forbes@brooks.af.mil)



## Dry Dredge

- Uses a sealed clamshell mounted on a rigid, extensible boom.
- Collects sediment at in-situ water concentrations (~75% solids) compared to conventional clamshell dredging (~15% solids). Sustainable because of decreased need for contaminated water treatment
- Jointly developed and tested by DRE and the U.S Army Corps of Engineers, Waterways Experiment Station (WES), Vicksburg, MS
- Not widely used, technology described in Parchure, T.M., and Sturdivant, C.N., (1997). "Development of a Portable Innovative Contaminated Sediment Dredge," U. S. Army Corps of Engineers, Waterways Experiment Station, Final Report CPAR-CHL-97-2 (now ERDC-EL-MS)





## Army Activities – Potential Extension to Environmental Remediation

- Ground source heat pump system using geothermal energy to replace boilers and coolers at Londonderry Armed Forces Reserve Center. Microgrids to give secure power system.

[http://www.imcom.army.mil/site/pw/digest/PWD\\_NovDec08.pdf](http://www.imcom.army.mil/site/pw/digest/PWD_NovDec08.pdf)

- Army/DOD guidance for 50% or greater demolition diversion

<https://frptoolbox.erdc.usace.army.mil/frptoolbox/library/docs/78.pdf>



## Questions

- Contact Carol Lee Dona at (402) 697-2582, [carol.l.dona@usace.army.mil](mailto:carol.l.dona@usace.army.mil)