

# SUSTAINABLE REMEDIATION AND AIR-BASED TECHNOLOGIES



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# What is Sustainable Remediation?

- US EPA defines sustainable remediation as:
  - “The practice of considering all environmental effects of remedy implementation and incorporating options to maximize net environmental benefit of cleanup actions” (US EPA, 2008)



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# Important Aspects of Sustainable Remediation

- Life-cycle analysis of impacts, not just construction
- Consider carbon dioxide and other air emissions due to major activities and materials used at the site
  - Electrical use
  - Vehicle use
  - Material production, transport, or treatment
- Consider impacts to other natural resources, including water, aesthetics, land space
- Reduce the use of or recycle supplies, materials
- Use renewable energy sources, recover energy, optimize operations
- Safety impacts to workers, residents due to remediation



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# Sustainable Remediation Tools

- Software applications for computing carbon emissions, water use, safety risks
  - US Air Force has Sustainable Remediation Tool (SRT), Microsoft Excel-based
  - DuPont
  - Various US consultants
- Very dynamic area



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# Sustainability Options for Air-Based Remediation Technologies

- Optimization of systems to reduce energy use by blowers, compressors, treatment units
  - Proper sizing, use of variable-frequency drive motors
  - Adjust to needed flow, vacuum/pressure
- Proper piping sizing
- Treatment units
  - Thermal oxidizers, high carbon emission, use only for high concentrations
  - Use regenerated carbon adsorption media



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# Sustainability Options for Air-Based Remediation Technologies, Continued

- Recovery of waste heat from units
- On-site renewable power generation (wind, solar)
- Use of passive venting techniques
- Optimize subsurface monitoring program
  - Reduce vehicle fuel consumption
  - Reduce use of other sampling materials, shipment
- Noise abatement, low-maintenance landscaping



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# References for Sustainable Remediation

- Sustainable Remediation Forum (SuRF, USA)
  - <http://www.sustainableremediation.org/>
- Interstate Technology and Regulatory Council
  - Green and Sustainable Remediation Team
  - [http://www.itrcweb.org/teampublic\\_GSR.asp](http://www.itrcweb.org/teampublic_GSR.asp)
- SuRF UK (Great Britain)
  - [http://www.claire.co.uk/index.php?option=com\\_frontpage&Itemid=1](http://www.claire.co.uk/index.php?option=com_frontpage&Itemid=1)
- US EPA, 2008, “Incorporating Sustainable Practices into Site Remediation,” EPA 542-F-08-002
  - <http://www.epa.gov/tio/download/remed/epa-542-f-08-002.pdf>



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