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Tips and Tricks to Reduce the Environmental Footprint of Your Cleanup

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Integrating green remediation and sustainable practices can accelerate site cleanups, reduce costs, lower emissions of greenhouse gases, and contribute to meeting state and local renewable energy standards. Commonly used technologies like pump and treat systems may be effective but are energy intensive and expensive to maintain.

Opportunities exist to implement sustainable systems and practices at any stage of cleanup: be it increasing the efficiency of existing treatment systems or evaluating and constructing new remediation systems and controls. The EPA recommends implementing greener cleanups whenever possible and implementing such strategies into decision documents, and ASTM International has issued standards to guide greener cleanups.

For existing treatment systems, look for ways to optimize and increase efficiency.

There are many opportunities to increase the efficiency of existing treatment systems and decrease the overall footprint of a site remediation. Here are some ways that you may consider bringing green remediation to the operation and

maintenance of your treatment systems:

- Consider conducting periodic energy audits of existing systems for treating contaminated soil, air, and water. These audits can highlight whether energy intensive equipment, like blowers or pumps, are bigger than needed or set at temperatures or operating rates that are higher than needed. They can also lead to removal of redundant steps in a treatment process and cutting out excess process monitoring.

- Use an environmental footprint calculator. The EPA's model gathers data on activities associated with different phases of cleanups.

- Consider tracking a remediation system's energy consumption through, for example, utility-provided meters. Knowing about energy consumption can lead to greater use of energy efficient measures.

- Evaluate whether it's possible to modify treatment systems to operate at heavier loads during non-peak hours to optimize efficiency and lower energy costs.

- Consider conducting routine maintenance, periodic inspections, and timely repairs when needed to maintain system optimization.

- Evaluate whether you can make your day-to-day operations more sustainable. Is it practicable to use cleaner fuels to power any vehicle or heavy equipment in use as part of the remediation? By increasing efficiency of the cleanup, you can also reduce "investigation derived waste," like contaminated personal protection equipment, because fewer days of field work would be needed. It may also make sense to use steam and non-toxic detergent to clean field equipment, such as soil samplers, in place of toxic cleaning fluids, and to recycle materials removed from or generated at the site.

For the construction and operation of new treatment systems, consider integrating renewable energy and green practices into your remedy.

Having green remediation in mind at the outset of a cleanup affords the greatest flexibility and likelihood that sustainable practices can continue to be incorporated throughout the cleanup. Here are some ways to consider folding renewable energy and sustainable practices into your remediation:

- Planning is key. Evaluate whether it makes sense to conduct a renewable energy assessment to gather information about how renewable resources can be used to meet the energy needs of a site cleanup. Doing so can allow you to analyze energy demand, estimated output of potential renewable energy systems, estimated costs of such systems, and a list of tax incentives that may be available to you to lower costs.

- To meet remediation objectives, consider evaluating whether it's possible to use treatment technologies that require less demand for power from the grid or installing renewable energy systems, like solar or wind energy systems, to

power long-term site controls and to replace or offset electricity requirements. For example, project managers have used wind-driven vacuum systems in place of electrically powered air blowers; solar-powered skimmer pumps to recover non-aqueous phase liquid from groundwater; micro-scale solar systems to power stream gauge monitors and weather stations; and phytoremediation, which uses plants to remove, stabilize, or destroy contaminants in soil, groundwater, and sediment. You can also think about purchasing renewable energy from offsite sources where onsite renewable energy production may be infeasible.

- Incorporate green infrastructure to minimize impacts on the land, water, and ecosystem. For example, if a vegetative landfill cover is needed or soil is excavated and revegetated, you can consider using native plants to reduce water consumption needs, as well as minimize erosion and flooding. Pollinator habitats can also be used to reduce the need for mowing and maintenance.

- If groundwater is treated onsite, you can explore ways to reclaim it for beneficial use, such as using it to water the revegetation. Also, it might make sense to reduce lighting and noise disturbances, which may impact flora and fauna, and to use minimally invasive *in situ* technologies to the extent possible to decrease any habitat disturbance.

- Evaluate whether it's possible to decrease your waste generation by recycling or reusing materials where possible. Implementing a remedy may require building demolition or other site preparation. As an alternative to demolition, you may find a deconstruction company in your area that can take apart buildings and divert up to 90 percent of materials from landfills to reuse. You may also save money by selling or receiving a tax deduction from donating the used building materials. Endeavor to use treatment technologies that are designed to keep waste generation down.

The geographic location of your site may also drive the sustainable practices you wish to incorporate. In arid climates, minimizing water consumption might be key. In areas of non-attainment for national air emission standards, lowering your air emissions may be most important. Each site is different, and some or all of the suggestions offered here may or may not be appropriate for your specific cleanup project.

For more on renewable energy, check out these key strategies for building solar and wind energy systems on potentially contaminated lands.