

EPA Strategies, Policies, and Tools to Advance Greener Cleanups: Evaluating Progress to Date

Fourth International Symposium on Bioremediation and Sustainable Environmental Technologies

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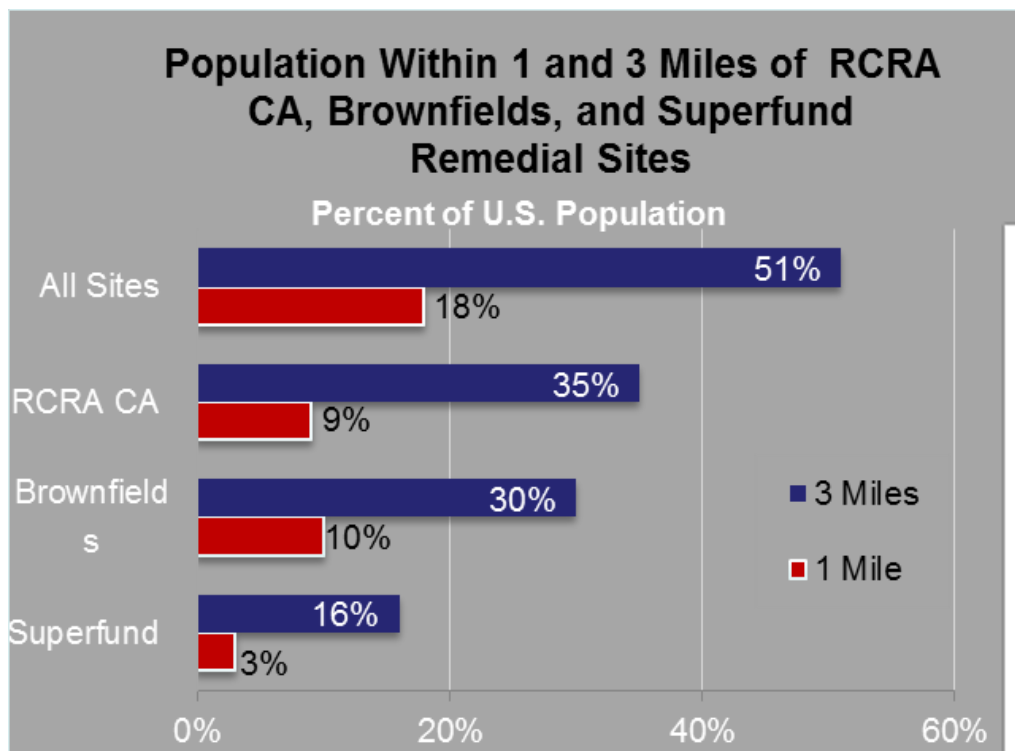
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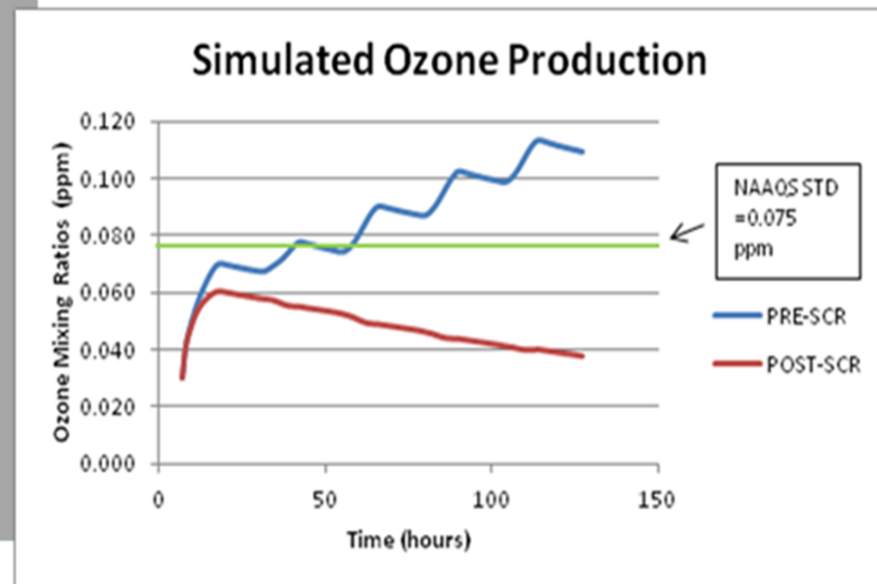




EPA Cleanup Programs Address Contamination at Sites Near 51% of the U.S. Population



Example of a local impact



Source: <https://www3.epa.gov/osweraccomplishments/story.html>
<https://clu-in.org/s.focus/c/pub/i/2545/>



Sustainability Principles in Cleanup Programs Now and in the Future...

Minimize diesel emissions

Promote use of renewable energy

Recycle materials on site

Minimize waste generation

Promote water efficiency

Minimize habitat disturbance

Preserve greenspace
through reuse

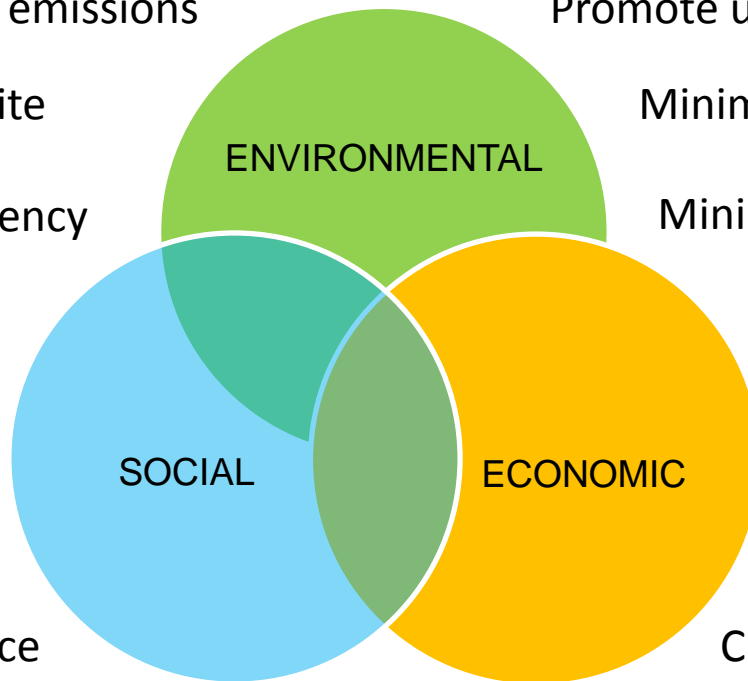
Facilitate land reuse &
redevelopment

Engage communities in
cleanup and reuse decisions

Provide employment
opportunities

Provide technical assistance
to communities

Clean up to reasonably
anticipated land use





Why Greener Cleanups?

Greener cleanups build sustainable practices into our core mission: protect human health and the environment

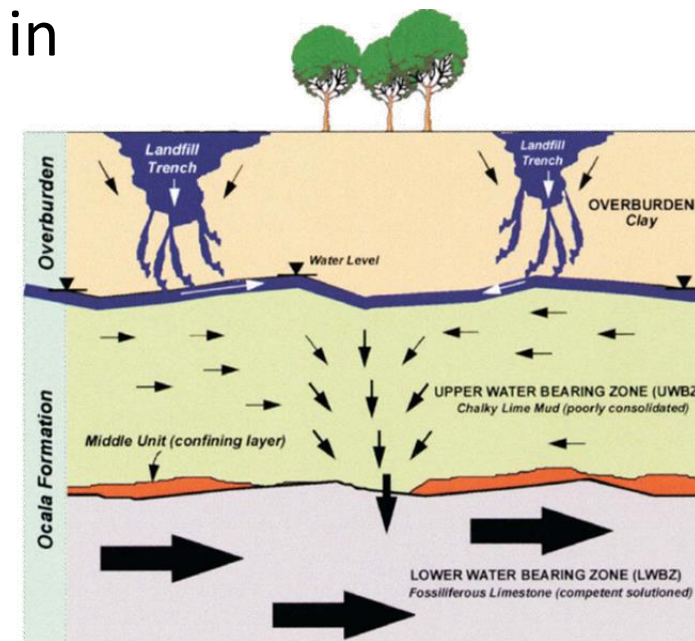




Leveraging Innovation to Achieve Efficient Remedies with a Lower Environmental Footprint

◆ Cost effectiveness and large reductions in environmental footprints come from...

- » An accurate CSM
- » Well-characterized source areas and contaminant plumes
- » Optimal remedial strategy
- » Adaptive management
- » Streamlined performance monitoring & optimization



◆ Further footprint reductions are achieved by applying greener cleanup best management practices (BMPs)

◆ As a result, we sustainably protect human health and the environment and prepare sites for reuse



Overall Evaluation Approach to Evaluating Progress in Greener Cleanups

- ◆ Evaluate change in ***awareness*** of greener cleanups among key audiences
- ◆ Assess changes in ***organizational support*** for greener cleanups for EPA and state audiences and ***available tools***
- ◆ Evaluate extent of ***implementation*** of greener cleanup practices
- ◆ Identify ***opportunities to further advance*** greener cleanup efforts



Awareness



Signs of Progress: Draft Results of National Survey*

Greener Cleanups Regional SurveyFY 2016

2) Are you familiar with the following Greener Cleanups resources? Please check all that apply.

Answer Options	Response Percent	Response Count
Green Remediation page on EPA's Clu-In website	73.4%	290
EPA's Principles for Greener Cleanups	72.7%	287
Your Region's Greener Cleanups Policy	63.5%	251
ASTM Standard Guide for Greener Cleanups	34.4%	136
EPA's Methodology for Environmental Footprint	25.1%	99
EPA's Spreadsheets for Environmental Footprint	19.7%	78
ITRC's Green and Sustainable Remediation: A	24.8%	98
Other Greener Cleanups resources (briefly describe):	8.6%	34
<i>answered question</i>		395
<i>skipped question</i>		104

Greener Cleanups Regional SurveyFY 2016

1) Are you familiar with the term "Greener Cleanups"?

Answer Options	Response Percent	Response Count
Yes	90.7%	420
No	9.3%	43
Comments:		25
<i>answered question</i>		463
<i>skipped question</i>		36

Greener Cleanups Regional SurveyFY 2016

3) Do you generally approach site remediation with Greener Cleanups in mind?

Answer Options	Response Percent	Response Count
Yes, I try to incorporate Greener Cleanups at my sites	70.4%	307
No, I have not yet incorporated Greener Cleanups at	29.6%	129
Please provide additional comments below.		112
<i>answered question</i>		436
<i>skipped question</i>		63

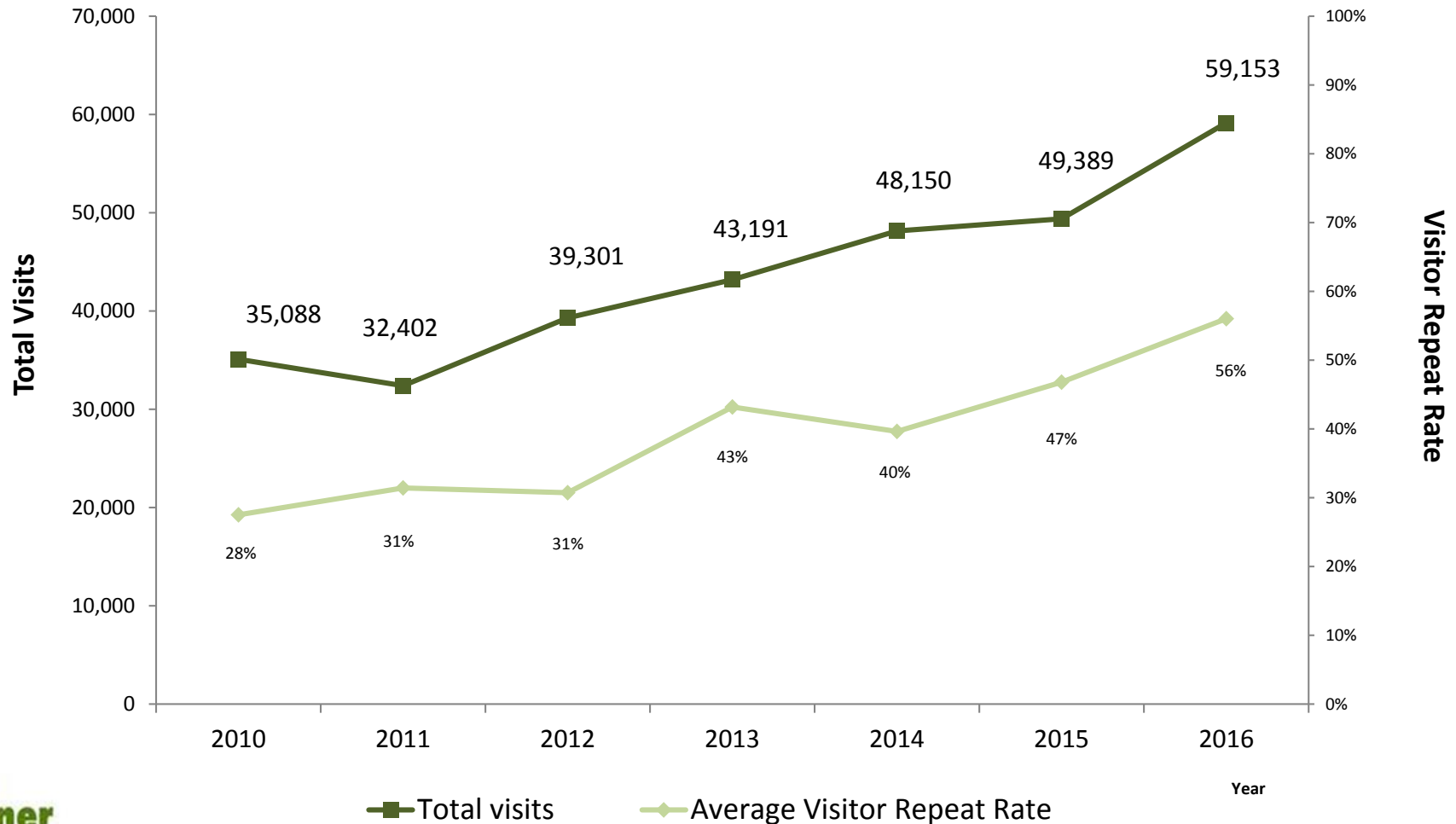
* Internal Agency survey conducted by the SF TSP Engineering Forum Greener Cleanup Subcommittee



Awareness



Visits to EPA's Greener Cleanups Website





Core Audiences Aware & Engaged

- ◆ Webinar participation: 6,624 participants in EPA-hosted webinars
 - » Non-government: 59%
 - » Federal & state agencies: 25%
 - » EPA: 16%
- ◆ Practitioners documenting and sharing lessons learned
 - » 149 papers or posters at Battelle conferences discuss greener cleanups in 2007-2016
 - » Several major conferences held focusing on topic
- ◆ Formation of Sustainable Remediation Forum
- ◆ Access to BMP fact sheets on clu.in.org- +60k downloads





Strong Agency Support for Greener Cleanups

- ◆ EPA Strategic Plan (FY 2014-2018):
 - » EPA's hazardous waste programs also are working to reduce the energy use and environmental footprint during the investigation and remediation of hazardous waste sites
- ◆ Encouraging Greener Cleanup Practices through Use of ASTM International's Standard Guide for Greener Cleanups (December 2013):
 - » I recommend that regions and OSWER programs facilitate and encourage use of ASTM's Standard Guide for Greener Cleanups in your efforts to implement greener cleanup practices.
- ◆ Superfund - Consideration of Greener Cleanup Activities throughout the CERCLA Process (August 2016)





Superfund Remedial Acquisition Framework

Greener Cleanups Referenced in Published Superfund Sources Sought/Request for Information*

- ◆ SOW requirements under section 1.4 Green Remediation
 - » "...the contractor shall explore and implement green remediation strategies..."
- ◆ ASTM E2893 referenced in two suites of contracts:
 - » Remediation Environmental Services Contract (RES)
 - » Environmental Services and Operations (ESO)

* Published in FedConnect: The reference number is SOL-R1-14-00003 for ESO; SOL-HQ-14-00022 for DES; and SOL-HQ-14-00023 for RES (posted 9/16/16)





Consideration of Greener Cleanup Activities in the Superfund Cleanup Process (August 2016)

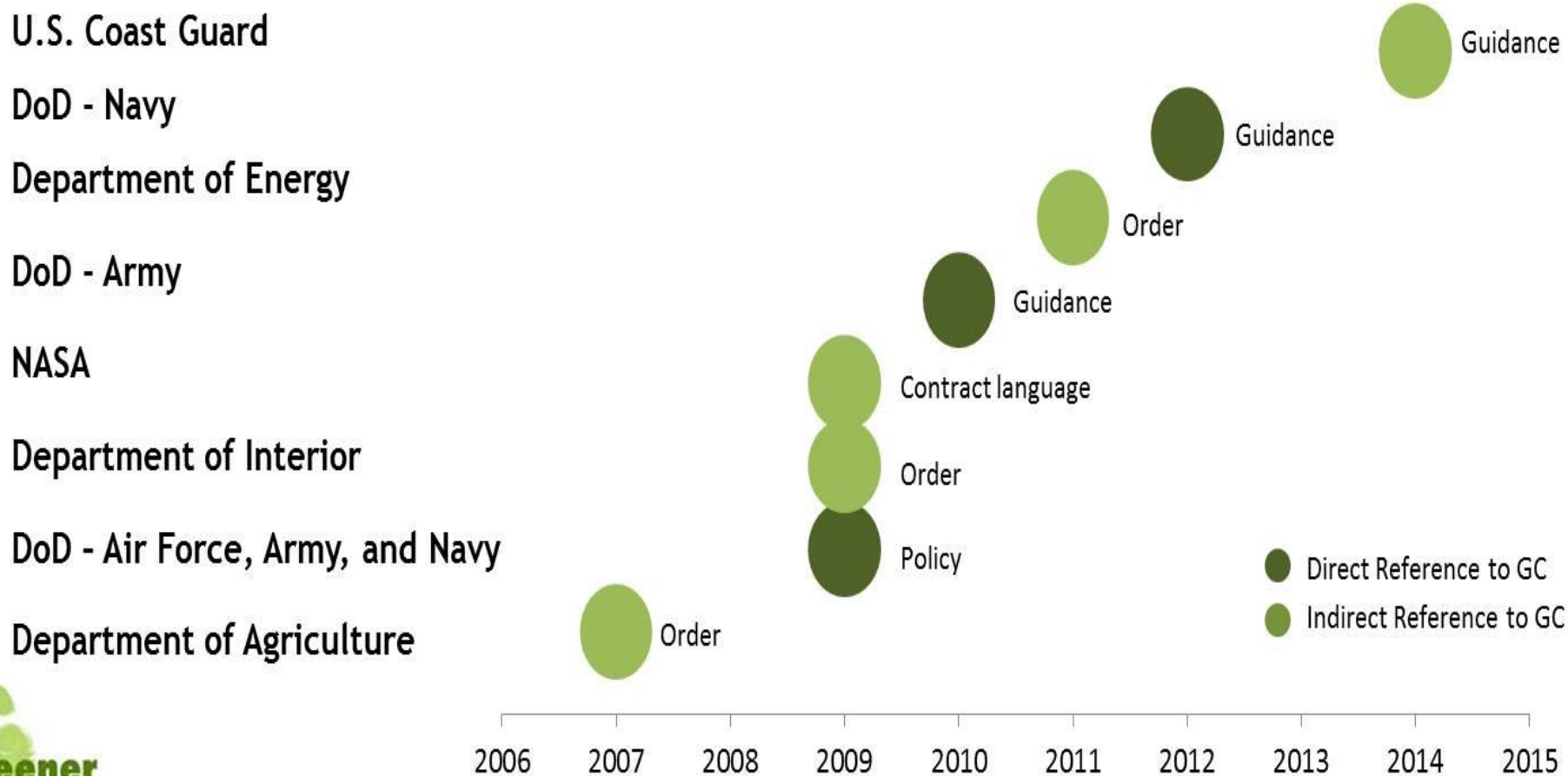
- ◆ Links back to basic CERCLA authorities, but neither modifies nor amends the NCP
- ◆ Includes three main recommendations
 - » Consider greener cleanup measures through the life of a project
 - » Evaluate BMPs or need for environmental footprint
 - » Address Fund-lead and PRP-lead sites
- ◆ Provides key definitions & includes seven references to ASTM Standard Guide E2893



Tools & Support



Federal Agencies with Direct or Indirect Greener Cleanup Policy or Guidance





ASTM's Standard Guide for Greener Cleanups

- Supports the tenets of EPA's Principles for Greener Cleanup
- Applicable to individual or multiple phases of a cleanup
- Identifies and employs BMPs
- Offers an option for a quantitative evaluation
- Promotes transparency through a robust reporting structure

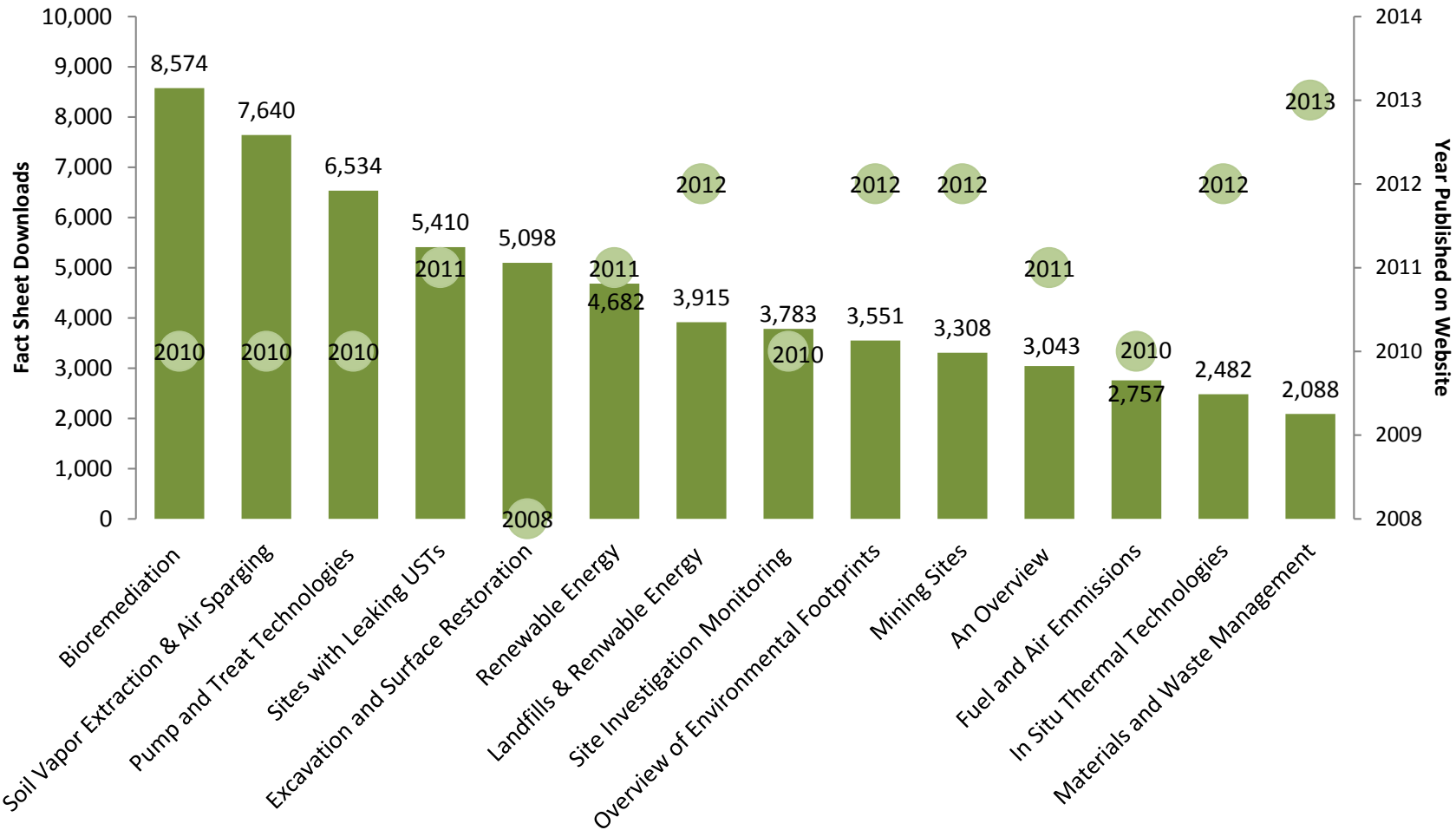
It Works at Any
Site



Implementation



BMP Fact Sheet Downloads (68,000 total)

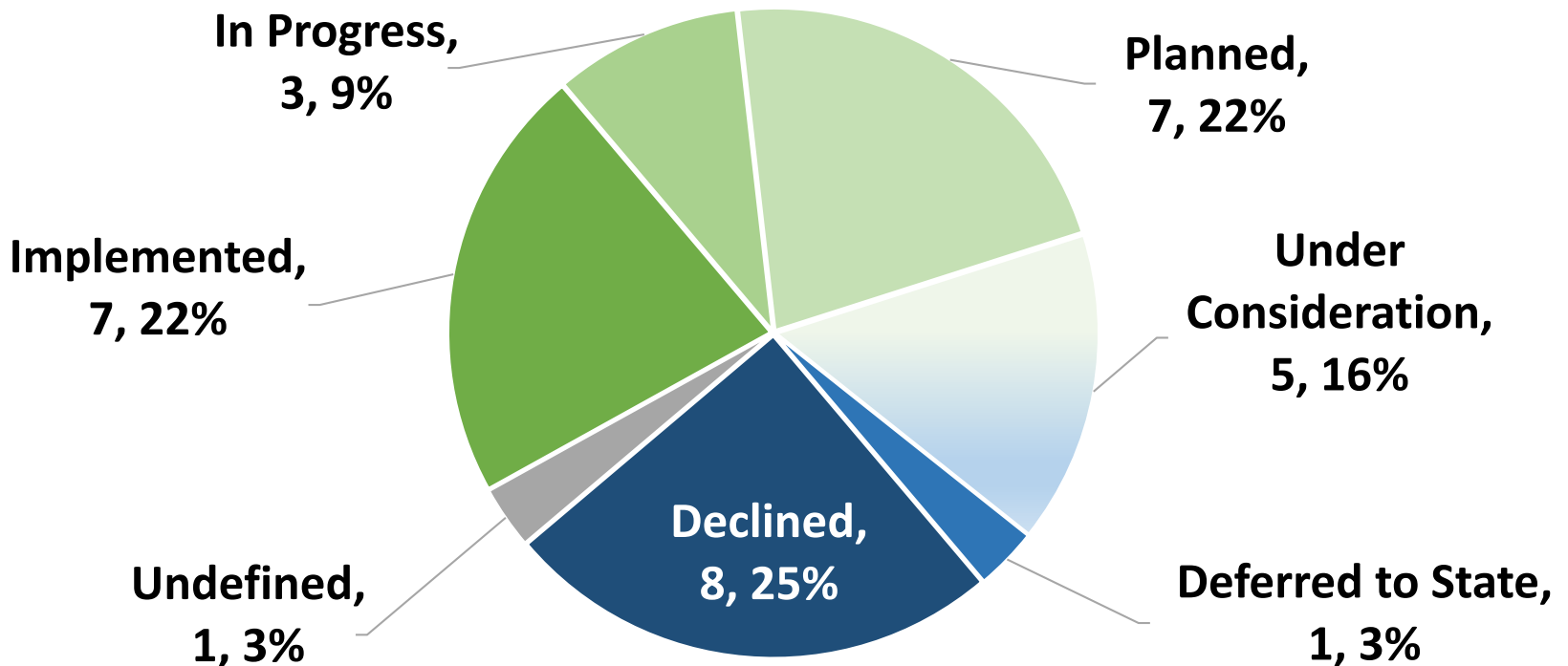


Implementation



Green Remediation Recommendations in Optimizations

Total Number of Recommendations = 32



Implementation



Cleaner Air

A new generation of clean diesel technology for off-road engines and equipment (Tier 4) is making its way onto remediation job sites across the country, such as the [Elizabeth Mine NPL site in Vermont](#) (Region 1).

Water Resource Protection

More permanent solutions are used to manage stormwater at urban sites. A subsurface geotextile-lined stormwater basin was installed during remedy construction at the [Whitney Young Branch Library brownfield site](#) in Chicago (Region 5) to complement future site reuse and the city's developing green infrastructure. *Winner of 2015 IL Governor's Sustainability Award*



Renewable Energy

Off-grid renewable energy systems are increasingly used at remote sites. A mobile 25-kW SolaRover Mojave 3 hybrid system supported Superfund [removal action](#) at the [Pennsylvania Mine](#) near Keystone, CO (Region 8); the system's generator recharged portable tools and sampling devices and powered communication equipment and EPA's mobile lab.



Implementation



Ecosystem Considerations

Increased attention is given to accelerating restoration of damaged ecosystems and increasing ecosystem services. At the [Pharmacia-Upjohn site](#) in North Haven Connecticut (Region 1), [RCRA corrective action](#) included restoring ecosystems along portions of the Quinnipiac River and creating a new upland meadow providing habitat for pollinators, songbirds, reptiles and other wildlife.

Sustainable Materials

Greater efforts are made to choose greener products. Removal and remedial actions at the [Lawrence Aviation Industries NPL site](#) in Port Jefferson Station, NY, (Region 2) involved building groundwater treatment facilities made of certified green lumber, low-toxicity siding and insulation, and products containing recycled or rapidly-renewable materials.



Waste Reuse

Industrial by-products frequently substitute for virgin resources or processed materials. Through a [state-voluntary](#) partnership, coal ash from a local power plant and spent mushroom compost from a nearby agricultural producer are used to treat acid mine drainage in the [De Sale Restoration Area](#) of western Pennsylvania (Region 3).

Implementation



ASTM Standard Applied Across the Country: Sample BMPs



Land & Ecosystems:
Choose native vegetation needing little/no irrigation or other maintenance
(OR **Superfund** site)

Water / Land & Ecosystems:
Install earthen berms to prevent run-off/run-on in excavation areas
(WA **TSCA** site)



Water / Land & Ecosystems:
Construct wetlands for stormwater management and habitat creation
(CT **RCRA-CA** site)

Materials & Waste: Mix reactive agents in situ to minimize material handling and transfer
(IL **Brownfield**)



Implementation



Green Remediation: A Growing Practice

Examples of companies with green remediation on corporate websites*



* Based on query conducted April 2017. Not exhaustive, inclusion does not imply endorsement.



Forward Momentum: Policy, Tools & Practice

- ◆ Greener cleanups are consistent with Agency policy and authorities
- ◆ The ASTM Standard Guide for Greener Cleanups is an effective tool for all parties at the project level
- ◆ Site cleanup consulting and engineering companies are increasingly incorporating greener cleanup practices into their standard operations





In Closing

Within EPA cleanup programs we see greener cleanups as a means to build sustainable practices into our core mission: to protect human health and the environment

Thank You!!

www.epa.gov/greenercleanups

