Exploring the Next Generation of Low-Carbon Technologies for Deployment on Contaminated Lands

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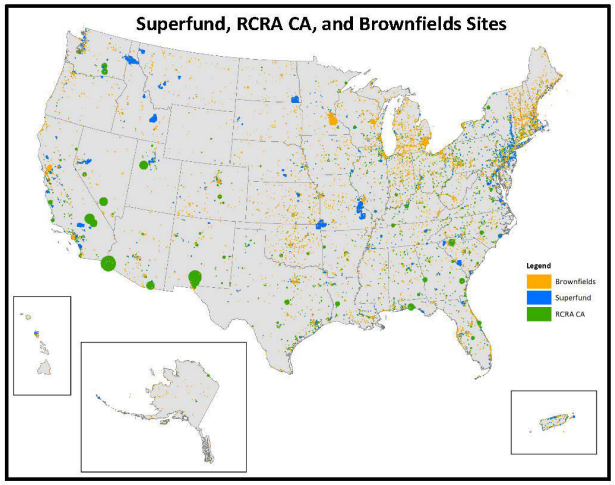


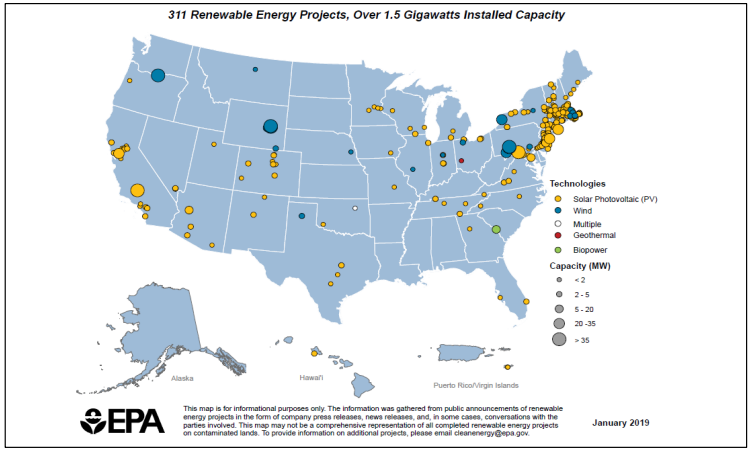
What NREL-Supported Tools Facilitate This Collaboration with EPA?

Re-Powering Mapper, Energy Zones Mapping Tool, Jobs and Economic Development Impact (JEDI) Model, countless site-specific feasibility studies, decision trees and other resource.

What Next Generation Technologies Could be Explored?

Hydrogen Production, Battery Storage, Renewable Natural Gas Production, Microgrid Enablers (controllers, forecasting, load management), Clean Energy Manufacturing, Combined Heat and Power, and more…

Location of Superfund, RCRA Corrective Action, and Brownfield Sites Limited to Those Directly Receiving U.S. EPA Funding. (U.S. EPA, 2017)



Location and type of Renewable Energy Projects on Contaminated Lands (U.S. EPA, 2019)

Overview

- Low-carbon energy technologies and industries can reduce or avoid pollution, create economic development benefits (e.g. job creation), enhance local tax revenues, and support supply chain businesses.
- Many communities have vacant or underutilized and contaminated land that presents an opportunity cost for the economy and a blight on neighborhoods.
- This paper identifies a **research agenda and funding proposal** to support the next generation of low carbon technologies to deploy on contaminated lands.

Why Contaminated Lands?

- Approximately **188 million people live within 3 miles** of a Superfund, RCRA CA, or Brownfields site, including **60% of all children under age 5** (U.S. EPA, 2017).
- *Currie et al* compared changes in birth outcomes from mothers living within 2,000 meters and between 2,000 and 5,000 meters from of a Superfund site to determine if differences in health outcomes exist before and after Superfund site cleanup activities took place. The study estimated Superfund **cleanup activities reduced the incidence of congenital anomalies by approximately 20-25%** (Currie, Greenstone, & Moretti, 2011).
- **Local property values increased 5%-11.5%** after nearby Brownfield cleanup (Haninger, Ma, & Timmins, 2014).
- Land cleanup standards are based on intended reuse and human exposure pathways. Some forms of energy deployment will have limited exposure pathways**, improving the economics of land cleanup for the energy project developer.**

History of Collaboration

- The U.S. EPA's **RE-Powering America's Land Initiative** (RE-Powering), established in collaboration with NREL in 2008, encourages renewable energy development on current and formerly contaminated land, landfills, and mine sites.
- **EPA and NREL provide and maintain a host resources** to support this program
- **EPA's program is currently limited** to wind, solar, geothermal, and biomass facilities.

Future Opportunities

- Cost decreases and commercialization of new technologies warrant **investigation of potential program expansion.**
- Community support, buy-in from local politicians, and **number of jobs created** are influential factors in successful brownfield redevelopment (Lange & McNeil, 2004).
- **No systematic accounting of the social benefits** of EPA's remediation and reuse programs (e.g. RCRA, Superfund) despite several proposals to do so.

Planning for the Future

- **Conduct an Expert Workshop** – Host an expert workshop to identify five additional technologies or industries to focus on for contaminated land deployment.
- **Complete Techno-Economic Analysis and Screening Criteria** for five new technologies.
- **Publish a Feasibility Study** for a hydrogen production facility co-located at a RCRA corrective action site.
- **Publish a Report Detailing JEDI Model Expansion and Enhancement Scoping** – identify data gaps for new technologies and expansion of income distribution information.

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