

Through its RE-Powering America's Land Initiative, the U.S. Environmental Protection Agency (EPA) encourages renewable energy development on current and formerly contaminated lands, landfills, and mine sites when aligned with the community's vision for the site.

Building on an existing tool, the RE-Powering Initiative expanded screening to more than 80,000 EPA- and state-tracked sites, comprising over 43 million acres. Using screening criteria developed in collaboration with the U.S. Department of Energy's (DOE) National Renewable Energy Laboratory (NREL), each site was screened for the potential to develop solar, wind, biomass and geothermal facilities at various scales.

What is biomass energy?

Biomass energy or "bioenergy" is generated from organic feedstocks. Wood is the largest biomass energy resource; other sources of biomass include food crops, grassy and woody plants, residues from agriculture or forestry, and the organic component of municipal and industrial wastes. These feedstocks can be used as a solid fuel or converted into liquid or gaseous forms, for the production of electric power, heat, chemicals or fuels. Three types of biomass production were evaluated:

- **Biopower facility** – Burns biomass resources to produce heat, which is used to boil water for a conventional steam-turbine generator to produce electricity. Biopower facilities utilize cumulative biomass resources that can include residues from forests, primary and secondary mills, and urban wood waste.
- **Biorefinery facility** – Integrates biomass conversion processes and equipment to produce fuels, power and chemicals from biomass. The technology utilizes cumulative residues from crops or forests, primary and secondary mills, and urban wood waste.



The McNeil Station biopower facility in Burlington, VT



The Front Range Energy ethanol plant in Windsor, CO

How much biomass potential exists on contaminated sites?

Biopower Facility – 10,343 sites

- Cumulative biomass resources \geq 280,000 metric tons per year within 50 miles
- Acreage \geq 50 acres
- Distance to transmission lines \leq 10 miles
- Distance to graded roads \leq 3 miles
- Distance to rail \leq 8 miles

Biorefinery Facility – 10,033 sites

- Cumulative biorefinery resources \geq 700,000 metric tons per year within 50 miles
- Acreage \geq 50 acres
- Distance to graded roads \leq 3 miles
- Distance to rail \leq 8 miles

Landfill Gas Energy Project - 1,839 sites

Includes sites that currently have landfill gas energy projects, construction projects, or that have been defined by EPA's Landfill Methane Outreach Program (LMOP) as a candidate or potential site.

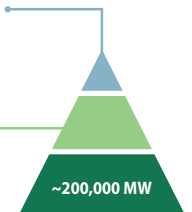
Estimating Total Technical Potential

Biomass technical potential for EPA tracked sites: over 200,000 MW

Market potential – The portion of the economic potential that could be achieved given current costs, policies and technical constraints.

Economic potential – The portion of the technical potential that is economically viable, but requires additional policies to break down market barriers.

Technical potential – Potential that is technically possible, without consideration of cost or practical feasibility.



Potential installed capacity based on percentage of acreage screened and reused for renewable energy development

10% OF ACRES	25% OF ACRES	50% OF ACRES	100% OF ACRES
OVER 20,000 MW	OVER 50,000 MW	OVER 100,000 MW	OVER 200,000 MW

For more information:

On biomass technologies, visit:
www.nrel.gov/gis/biomass.html

On EPA's Landfill Methane Outreach Program (LMOP) and landfill gas energy technologies, visit:
www.epa.gov/lmop/

RE-Powering America's Land:

Siting Renewable Energy on Potentially Contaminated Land, Landfills and Mine Sites

Biomass Technologies

- **Landfill gas energy project** – Uses gas that is created as organic solid waste decomposes in a landfill. This gas consists mostly of methane (the primary component of natural gas) and carbon dioxide. Instead of allowing landfill gas to escape into the air, it is extracted from landfills using a series of wells and a blower/flare (or vacuum) system. The extracted landfill gas is directed to a central point where it can be processed and treated to produce various forms of energy, including electricity, boiler fuel, steam, alternate vehicle fuel, and pipeline quality gas.



Landfill gas energy project in Alberta, Canada

What are some examples of biomass facilities being successfully sited on contaminated land?

RE-Powering America's Land Initiative tracks the installation of renewable energy projects installed on contaminated lands, landfills, and mine sites. One example is the Operating Industries Landfill in Monterey Park, California. This Superfund site was contaminated with vinyl chloride and other organic and inorganic compounds that, if left untreated, could enter the water table and pose a health risk for the surrounding population. A leachate treatment plant was built onsite to treat liquids from this 190-acre landfill and other surrounding landfills. Since much of the landfill's content is municipal solid waste, it was a prime location to capture landfill gas. Six 70 kilowatt microturbines were installed, generating 80% of the annual energy needs of the landfill's leachate treatment plant.

For more information on completed biomass and other renewable energy projects on contaminated lands, landfills, and mine sites, check out the [RE-Powering Project Tracking Matrix](#).

For more information, visit www.epa.gov/renewableenergyland or contact cleanenergy@epa.gov

