

Fuel Cell Technologies Program



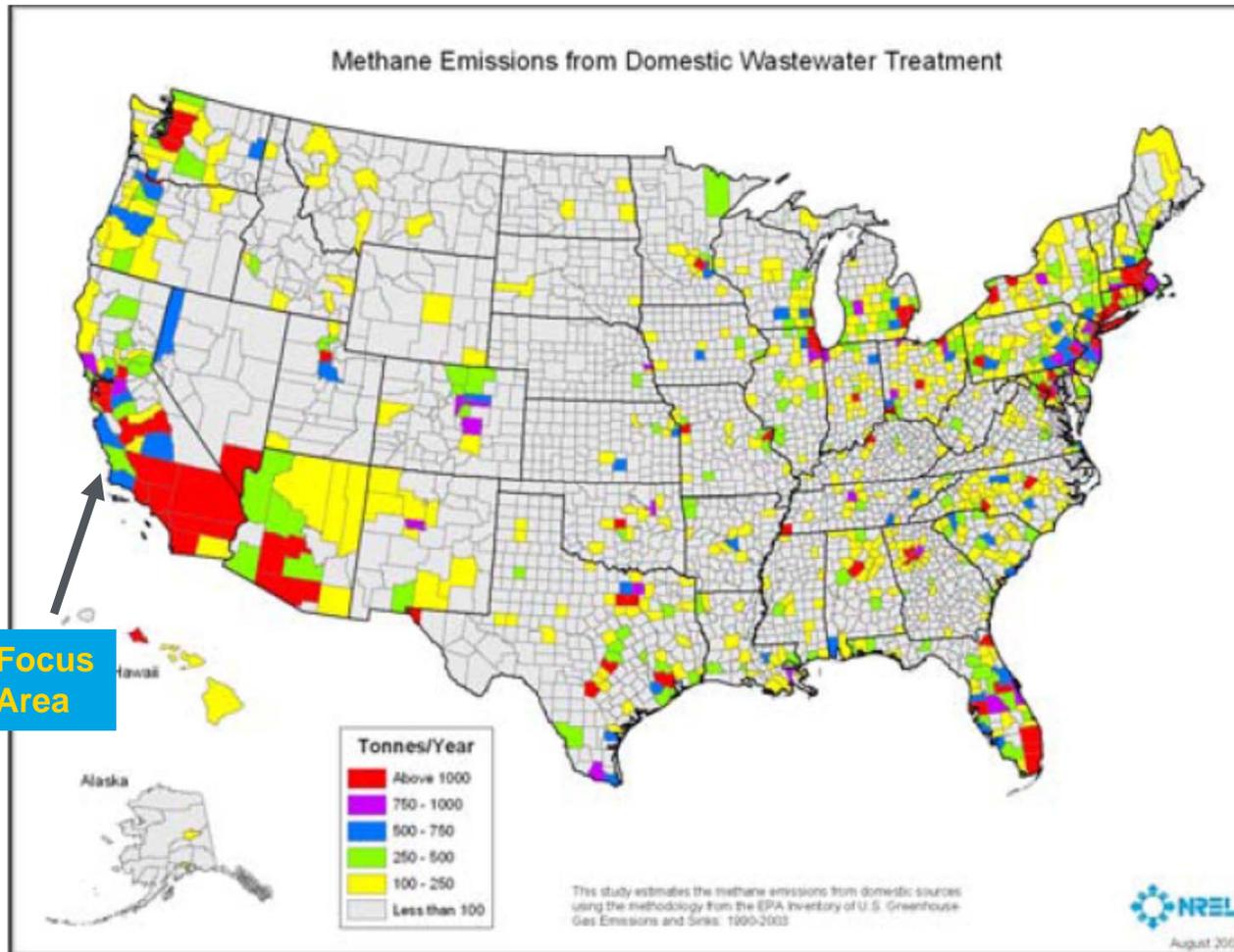
DOD - DOE MOU WTE Using Fuel Cells Briefing

July 13, 2011

Pete Devlin
Market Transformation and Intergovernmental Coordination Manager

Biogas Resource Example: Methane from Waste Water Treatment

Biogas from waste water treatment plants is ideally located near urban centers to supply hydrogen for fuel cell vehicles.

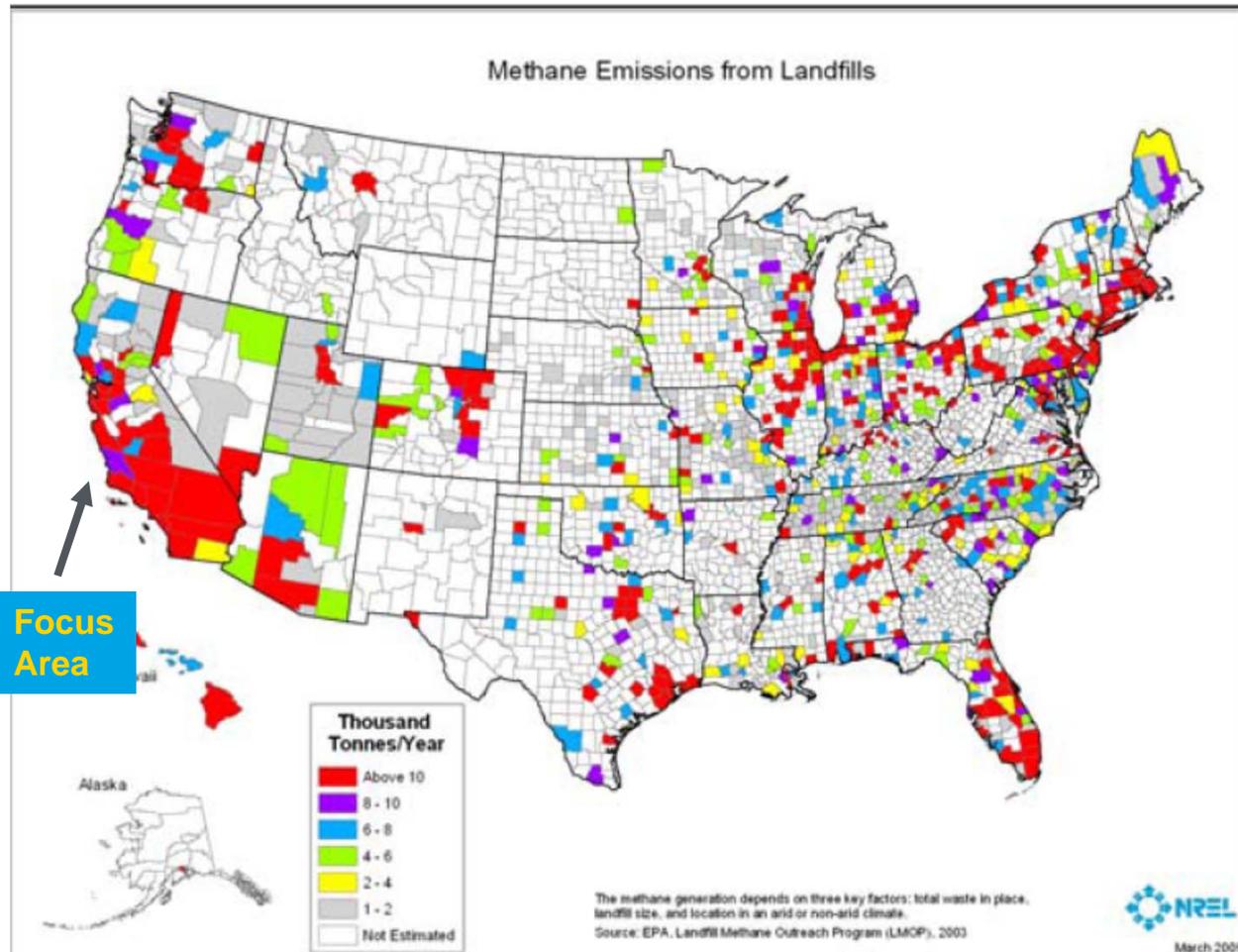


Source: NREL report *A Geographic Perspective on Current Biomass Resource Availability in the United States*, 2005

- 500,000 MT per year of methane available from waste water treatment plants in U.S.
- Majority of resource located near urban centers.
- If ~50% of the bio-methane was available, ~340,000 kg/day of renewable hydrogen could be produced from steam methane reforming
- Renewable hydrogen is enough to fuel ~340,000 fuel cell vehicles per day.

Biogas Resource Example: Methane from Landfills

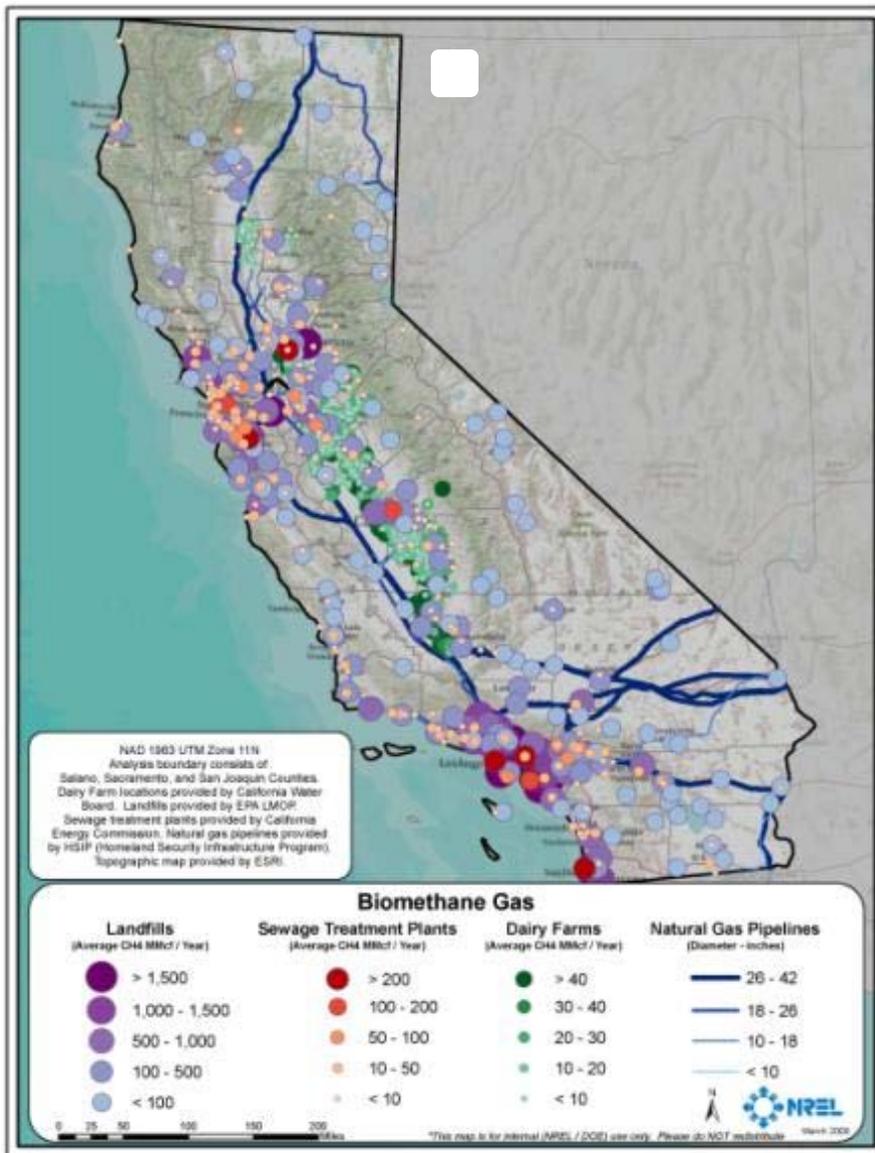
Biogas from landfills is located near large urban centers and could provide enough renewable resource to fuel ~8 million fuel cell vehicles per day.



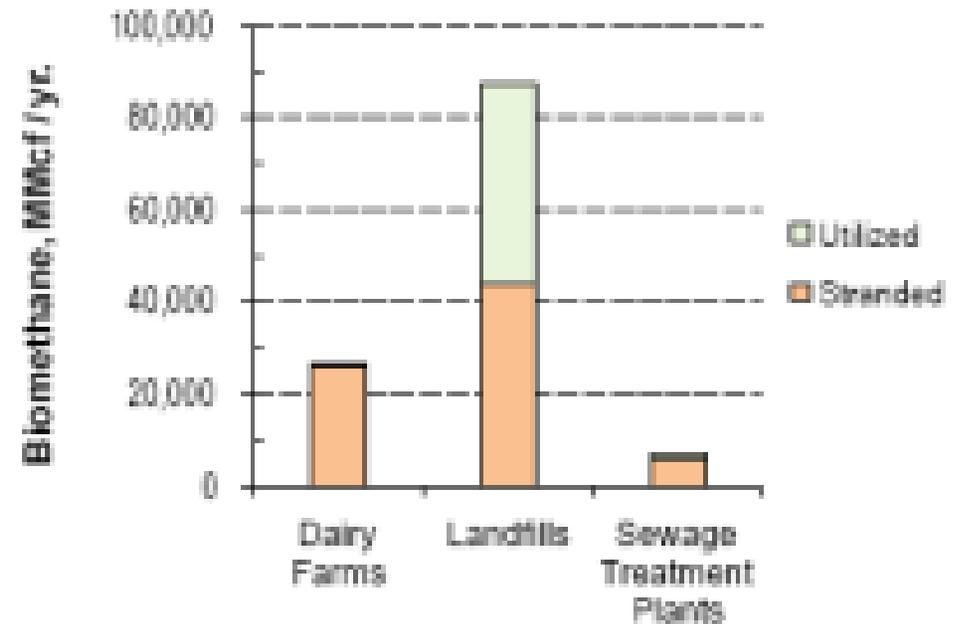
Source: NREL report *A Geographic Perspective on Current Biomass Resource Availability in the United States*, 2005

- 12.4 million MT per year of methane available from landfills in U.S.
- Majority of resource located near urban centers.
- If 50% of the bio-methane was available, ~8 million kg/day of renewable hydrogen could be produced from steam methane reforming.
- Renewable hydrogen is enough to fuel ~8 million fuel cell vehicles per day.

California Example: Potential Sources of Biogas



Stranded vs. Utilized Biomethane



Source: NREL

Example:

Landfills offer ~1.6 M tons/yr of bio-methane.

- Only ~50% of the landfill biomethane is used



***On October 5, 2009
President Obama signed
Executive Order 13514 –
Federal Leadership in
Environmental, Energy, and
Economic Performance***

- Requires Agencies to:
 - Set GHG reduction Targets
 - Develop Strategic Sustainability Plans and provide in concert with budget submissions
 - Conduct bottom up Scope 1, 2 and 3 baselines
 - Track performance

Examples:

- Achieve 30% reduction in vehicle fleet petroleum use by 2020
- Requires 15% of buildings meet the *Guiding Principles for High Performance and Sustainable Buildings* by 2015
- Design all new Federal buildings which begin the planning process by 2020 to achieve zero-net energy by 2030

[Potential opportunities for fuel cells and other clean energy technologies....](#)

<http://www1.eere.energy.gov/femp/regulations/eo13514.html>

- Work Shop Objectives
 - To identify:
 - DOD-DOE WTE using Fuel Cells Opportunities
 - Challenges and needed actions
 - Specific ways to address EO 13514
 - Needed next steps
- Key Summary Opportunities Identified
 - Include WTE Fuel Cell projects in to “Net Zero” Military Base Solutions initiative
 - Use Federal owned WWTP on military bases
 - Target on-base and community high value organic wastes e.g. food, wood, agriculture, and water sewage

- Key Summary Challenges Identified
 - No “burdened cost” estimates of waste, difficult to monetize value
 - Waste streams are often too small to justify a WTE fuel cell project
 - Waste quantities vary over time in volume and composition
 - Best waste stream locations often don’t align with highest power needs
- Actions Summary
 - Develop DOD-wide waste characterization data to incentivize industry to develop more focused products
 - Start an on-going DOD-DOE Working Group
 - Develop criteria for selecting and developing best projects
 - Develop new case studies to inform bases of potential value

- EERE Fuel Cells Technologies and Army CERL co-lead WTE Working Group
 - Develop specific goals, project plans, and status tracking methods
 - Define industry and government roles
 - Develop permitting, install, and financial models tools and templates
 - Provide project guidance and assist in securing technical and financial support.
- Roles and Responsibilities of other EERE Programs?