



the Energy to Lead

Biogas Cleanup Challenges and R&D Needs for Fuel Cells

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GTI at a Glance...

- > Not-for-profit research, with 65+ year history
- > Facilities
 - 18 acre campus near Chicago
 - 200,000 ft², 28 specialized labs
- > \$60 + million in revenue
- > Staff of 250
- > A growing business
- > Commercial partners take our technologies to market



Offices & Labs



Flex-Fuel Test Facility



Energy & Environmental Technology Center

GTI Recent Biogas Projects

- > Gills Onions—Anaerobic digestion of agricultural waste for on-site fuel cell electricity generation
- > Altamont Landfill—Landfill gas (LFG) cleanup for production of liquefied natural gas (LNG) for vehicle fuel
- > Ft. Lewis—Anaerobic digestion of wastewater for production of hydrogen as a fuel cell vehicle/MHE fuel
- > SCRA—Landfill gas (LFG) cleanup and on-site reformation to generate hydrogen for MHE in S.C.



Key Biogas Cleanup Challenges

- > High level of contaminants & high concentration variability
- > High contaminant removal costs
- > Limited experience with cleanup
- > Real-time monitoring of contaminant levels
- > Time & cost for purity sampling & testing
- > Contaminant disposal–cleanup media generally not recyclable
- > Supply vs demand buffering options

R&D Recommendations

- > Assess and improve biogas contaminant tolerance of fuel cells
- > Generate data on adsorption properties of contaminants on sorbents/catalysts
- > Assess performance of existing cleanup systems
- > Cost reduction of biogas cleanup systems
- > Develop recycling technologies for gas cleanup schemes to reduce O&M costs
- > Improved gas quality monitoring/sensor development