

# Recovery and Utilization of Biomethane Landfill Gas for Transportation Fuel

## PROJECT PARTNERS

- > Waste Management
- > Linde-BOC
- > Gas Technology Institute



## PUBLIC BENEFITS

- > California's recoverable biomethane resources are estimated at 125 billion cubic feet (bcf) a year – a quantity that could grow over time with expanded use of digesters. **The current supply could displace over 900 million gallons of diesel fuel annually if fully utilized as a vehicle fuel.** This technology can assist with making that opportunity a reality.
- > Recognizing there are currently value-added uses of biomethane, even 10% of the available biomethane could offset California's need for imported diesel fuel by over 85 million gallons per year. This 12.5 bcf could also avoid fossil fuel CO<sub>2</sub> emissions of 1.0 million tons annually.
- > WMI alone controls 8 bcf of bio-methane in California capable of displacing 57 million gallons of diesel annually and potentially resulting in the elimination of 630,000 tons of CO<sub>2</sub> emissions.

**Not only will the project reduce the state's reliance on imported oil products, reduce greenhouse gases, lower NO<sub>x</sub> and reduce particulate emissions, it will also serve as a model for other facilities in California to utilize indigenous biogas resources and displace fossil fuels.**

## PROJECT'S TECHNICAL GOALS

It is important for the Altamont project to prove the technical and commercial feasibility of the clean-up and purification systems necessary to yield transportation quality fuel from varying landfill gas constituents. Understanding the best solutions to these issues ensure operational and economical viability of this project and others to follow. Specific R&D issues that require evaluation include:

- > Type of adsorbent removal system for non-methane organic compounds (NMOC),
- > Approach to bulk separation of CO<sub>2</sub>, nitrogen, and oxygen,
- > Degree of refrigeration used in clean-up,



- > Impacts of full scale continuous operation (minimum one year testing for feedstock variations and climate conditions is needed), and
- > Methods to determine gas recycle system process and material selection for future sites.

## PROJECT DESCRIPTION

- > This project will develop and introduce economically viable and environmentally friendly on-site landfill gas (LFG) recovery, purification, and liquefaction of biomethane to liquefied natural gas (LNG) for use as a transportation fuel.
- > This project will construct and operate an LNG production facility that will consume approximately 2,500 standard cubic feet per minute of collected landfill gas from the Altamont Landfill in Livermore, California.
- > This project will produce 13,000 gallons per day and over 4 million gallons annually of LNG as a bio-fuels product in California.
- > The project will make use of a novel GTI-patented multi-refrigerant liquefaction technology exclusively license to Linde for commercialization.
- > This project represents the largest effort to introduce onsite liquefaction for landfill gas recovery in North America and will yield significant impact in validating the technical and economic viability of this renewable resource as a transportation fuel.



## BIOFUEL PRODUCTION AND GREENHOUSE GAS EMISSION REDUCTION TARGETS

This project specifically addresses two important directives from Governor Schwarzenegger. Demonstrating the utilization of landfill gas as a viable source for medium- and heavy-duty vehicles directly supports:

- > **The Bioenergy Action Plan**, which seeks to advance the use and market development of biomass as a transportation fuel, among other uses; and
- > **Executive Order S-3-05** – enforced through AB 32, landmark legislation which requires the development of regulations and market mechanisms to ultimately reduce California's greenhouse gas emissions by 25% by 2020.

## FOR MORE INFORMATION

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