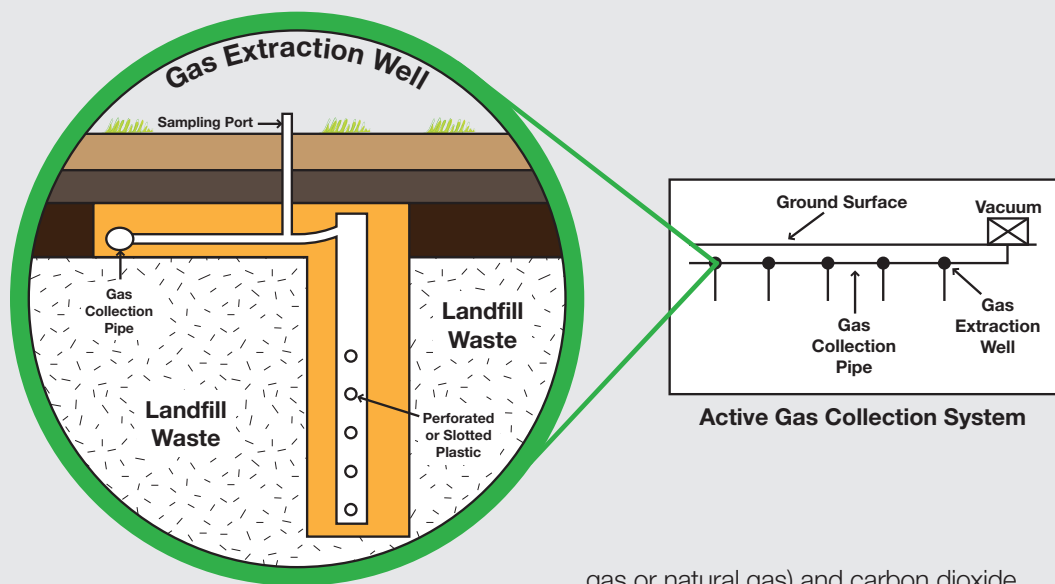


# Every Alternative.

## Biomethane—Low Carbon Renewable Fuel



Biogas can provide a clean, easily controlled source of renewable energy from organic waste materials, replacing fossil fuels with a sustainable carbon neutral fuel option.

### What is Biogas?

Biogas is generated when bacteria degrade biological material in the absence of oxygen, in a process known as anaerobic digestion. Biogas is primarily a mixture of methane (also known as marsh

gas or natural gas) and carbon dioxide (CO<sub>2</sub>), and is a renewable fuel.

Landfill gas is biogas produced by organic waste decomposing under anaerobic conditions in a landfill. The waste is covered and compressed mechanically by the weight of the material that is deposited from above. This material prevents oxygen from accessing the waste and anaerobic microbes thrive. This gas builds up and is slowly released into the atmosphere if the landfill site has not been engineered to capture the gas.

# The Natural Evolution of Power.



## What is Biomethane?

Municipal solid waste landfills account for over one quarter of the total methane emissions in the U.S. Landfill gas is a particularly attractive natural gas supply option because it is a low-cost feedstock source due to the minimal processing required to remove the impurities to produce biomethane.

Biogas is normally rich in methane (about 65%) and impurities of hydrogen sulfide (H<sub>2</sub>S), CO<sub>2</sub> and water. Technology is commercially available to remove H<sub>2</sub>S, CO<sub>2</sub> and water contaminants present in the biogas and landfill gas through processing to produce high-purity natural gas (biomethane) suitable for vehicles.

Therefore, biomethane is simply pipeline quality natural gas that can be used directly or added to existing supplies.

## Biomethane Benefits.

Capturing landfill gas or biogas for processing into biomethane suitable for vehicles has significant benefits.

- Using biomethane as a renewable fuel has significant greenhouse gas (GHG) benefits.
- Unlike naturally occurring methane emissions, biomethane is converted to CO<sub>2</sub> during combustion (a 21 times greenhouse gas savings).
- Biomethane is a renewable resource that can displace fossil fuel by 100%.
- Biomethane does not compete with food production.
- The biomethane that is used as fuel in place of fossil fuels produces less GHG than the fuel it replaced.

Using natural gas and biomethane as a low-carbon fuel addresses not only global warming, but also the problems of high oil prices and foreign oil dependence.

## Fuel Specifications.

Using biomethane as a fuel combined with the Cummins Westport ISL G—the cleanest heavy-duty engine available—provides for low emissions and a sustainable advantage.

Cummins Westport approves the use of up to 100% biomethane that meets Cummins published natural gas fuel specifications in its natural gas engines including the ISL G.

## Customer Success Stories.

Sequedin and Wattrelos in France have 300 buses operating on biomethane. The feedstock biogas comes from organic waste and waste water sludge.

Orange County Transit in California is currently using liquefied natural gas produced from landfill gas as part of their every day operations.

## Explore Every Alternative.

As emission rules and engine technology change, it is possible to gain economic benefit by operating an alternative fuel fleet. Explore Every Alternative for your refuse or vocational fleet. Natural gas powered trucks can be part of the solution to improve urban air quality. And, new economics can help your bottom line. Contact your Cummins Westport representative or visit our website at: [www.cumminswestport.com](http://www.cumminswestport.com).



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Printed in Canada. Rev. 2009-04  
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