

Biogas Opportunities

- An Overview of Biogas Potential in New Zealand

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Biogas Opportunities

- Anaerobic Digesters installed to process
 - Dairy shed effluent
 - Wastewater treatment
 - Food waste
 - Meat works effluent
 - Dairy factory effluent
 - Organic fraction municipal solid waste



Drivers for Biogas

- Waste disposal
- RMA compliance
- On-site heat
- Avoid increased gas cost
- Reduced peak electricity demand charges
- Gas security of supply
- Organic fertiliser

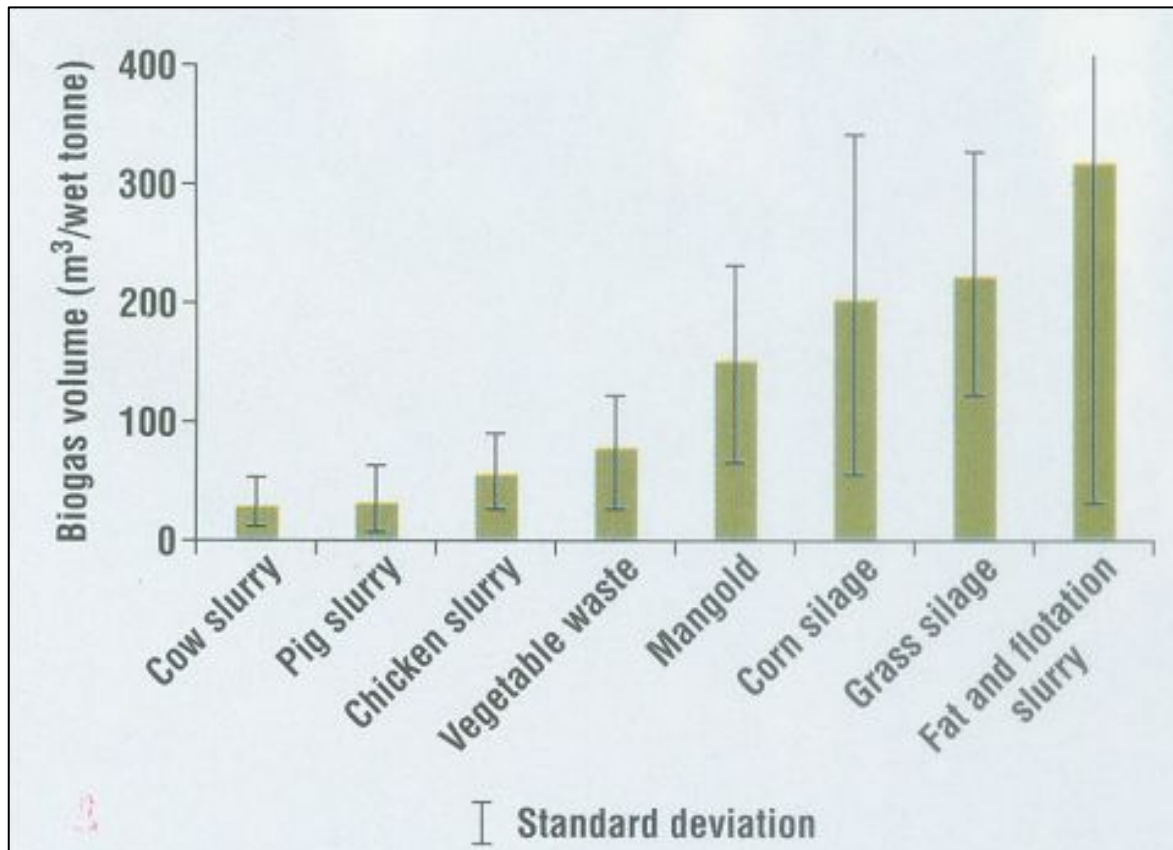
By-Products

- Low calorific value biogas
 - Heat plant
 - Engines
 - Electricity production
- Fertiliser
 - Liquid Fertiliser
 - Humus Material
 - Solid Pellet Fertiliser
 - Nitrogen Extract
- Cleaned wastewater



Biogas Output

- Biogas yield m^3/tonne



Biogas Output

- Examples of feedstock variance

Feedstock	No of Animals to Produce 1 Tonne/Day	Dry Matter Content	Biogas Yield (m ³ /Tonne Feedstock)	Calorific Value (MJ/m ³ Biogas)
Cattle slurry	20 – 40	12%	25	23 – 25
Pig slurry	250 – 300	9%	26	21 – 25
Laying hen litter	8,000 – 9,000	30%	90 – 150	23 – 27
Broiler manure	10,000–15,000	60%	50 – 100	21 – 23
Food processing waste	-	15%	46*	21 – 25

Source: Biogen Website



Opportunities

Industry	# Sites	#Suitable Plants	Likely Drivers	Issues & Constraints
Wastewater / Sewage Treatment	>50	<10	RMA / algal bloom, embedded energy security	Application of human waste to land
Landfill	>30	<10	RMA / Site development, energy supply	Site development and planning
Dairy Farming	>14,000	<1000	RMA / effluent runoff, energy supply	Seasonality, effluent collection, moisture content
Food Processing	>20	<5	Future gas prices, energy supply	Low output per site, feedstock seasonality, transportation cost
Meat Processing	>20	<5	RMA / landfill development / water / emergency stock disposal	Seasonality
Dairy Factory	>10	<5	RMA / effluent runoff, energy supply	
Municipal Solid Waste	>30	<5	RMA / site development, energy supply	Non-homogeneity, feedstock control

Municipal Waste

- Operators experienced in biogas / waste handling
- Large scale operations
- Waste handling – key driver
- Limited opportunity for by-products
 - Human waste
 - Non-homogeneous feedstock



Dairy Farm

- Emerging sector
- Small scale
- RMA waste mitigation – key driver
- Integrated opportunities for byproducts
 - Farm fertiliser
 - Reduce environmental impact
 - Enhance milk quality – reduce somatic #
 - Reduce energy cost – energy intensive



Food Processing

- Recent interest in biogas
- Small to large scale (via clustering)
- Key drivers
 - Future of waste handling
 - Uncertainty of gas price and security of supply
- Potential opportunities for by-products
 - Direct heat for Boilers
 - Potential synergy of fertiliser for growers



Clustering Economies

- Benefits of clustering
 - ▼ Cost through ▲ scale
 - ▲ Feedstock availability
- Potential barriers to clustering
 - Ownership & operation issues
 - Non-homogeneous feedstock
 - Potential ▼ Digester operation efficiency
 - Uncertainty of feedstock compatibility



Issues & Constraints

- Feedstock collection & conditioning
 - Waste or valuable fuel?
 - Fresh & consistent & homogeneous
 - Care & attention to feedstock preparation
- Feedstock availability
 - Seasonal variance
 - Contingency
 - Ensiling
 - Alternative feedstocks



Key Parameters

- Driven by waste removal
- Produces:
 - Clean environment
 - Embedded energy / security
 - Organic fertiliser
- Requires:
 - Feedstock (fuel) management
 - Contingency feedstock

