

# **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

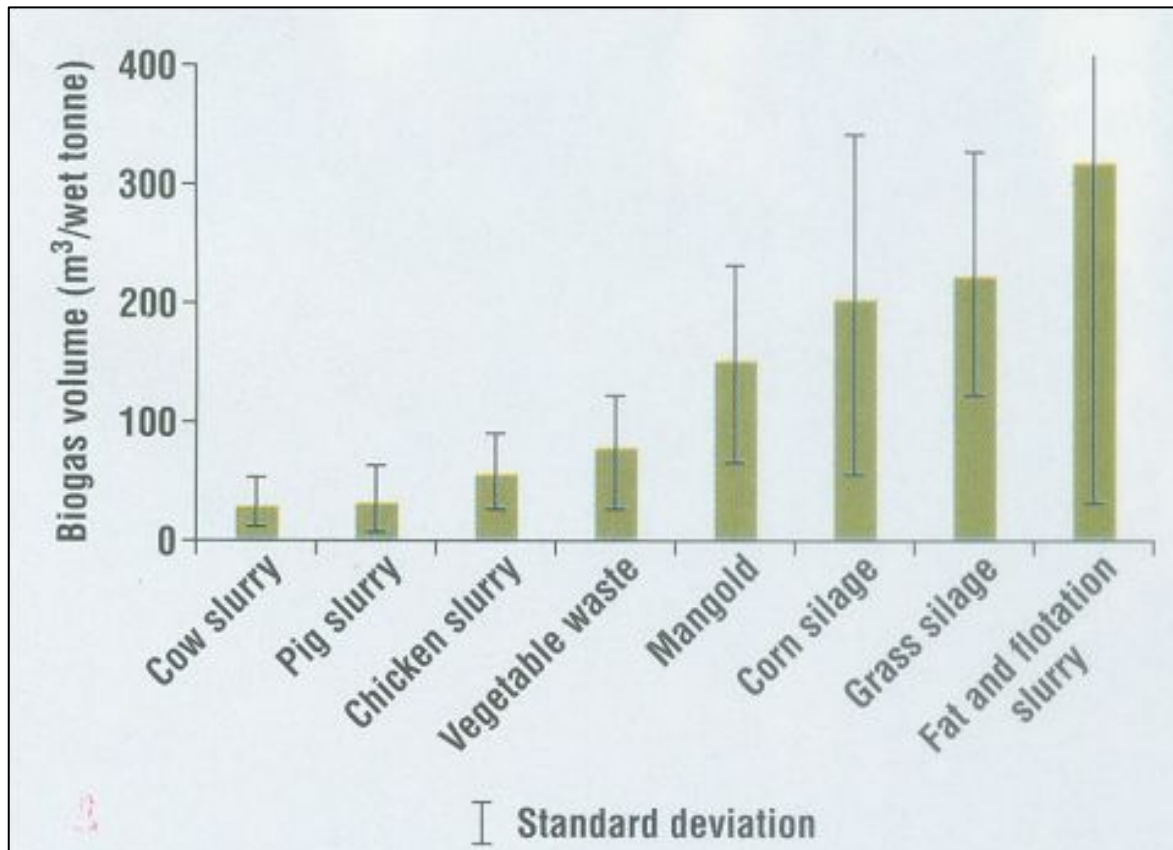
# By-Products

- 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  $\text{m}^3/\text{tonne}$



# Biogas Output

- Examples of feedstock variance

Feedstock	No of Animals to Produce 1 Tonne/Day	Dry Matter Content	Biogas Yield (m <sup>3</sup> /Tonne Feedstock)	Calorific Value (MJ/m <sup>3</sup> 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