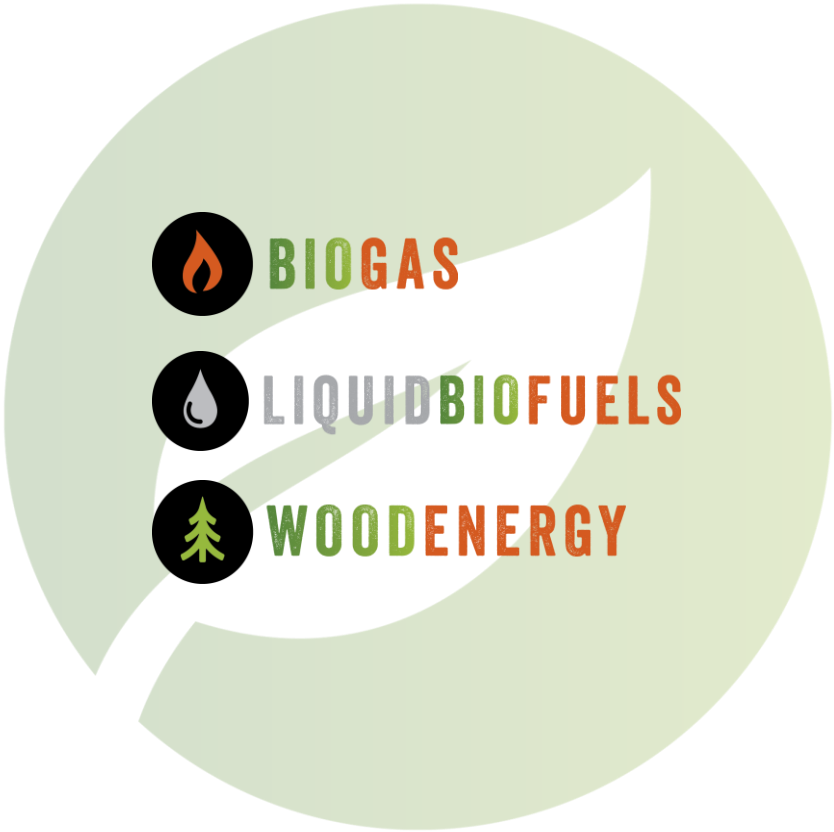
BIOENERGY ASSOCIATION



Roadmap to replace 100% of essential natural gas

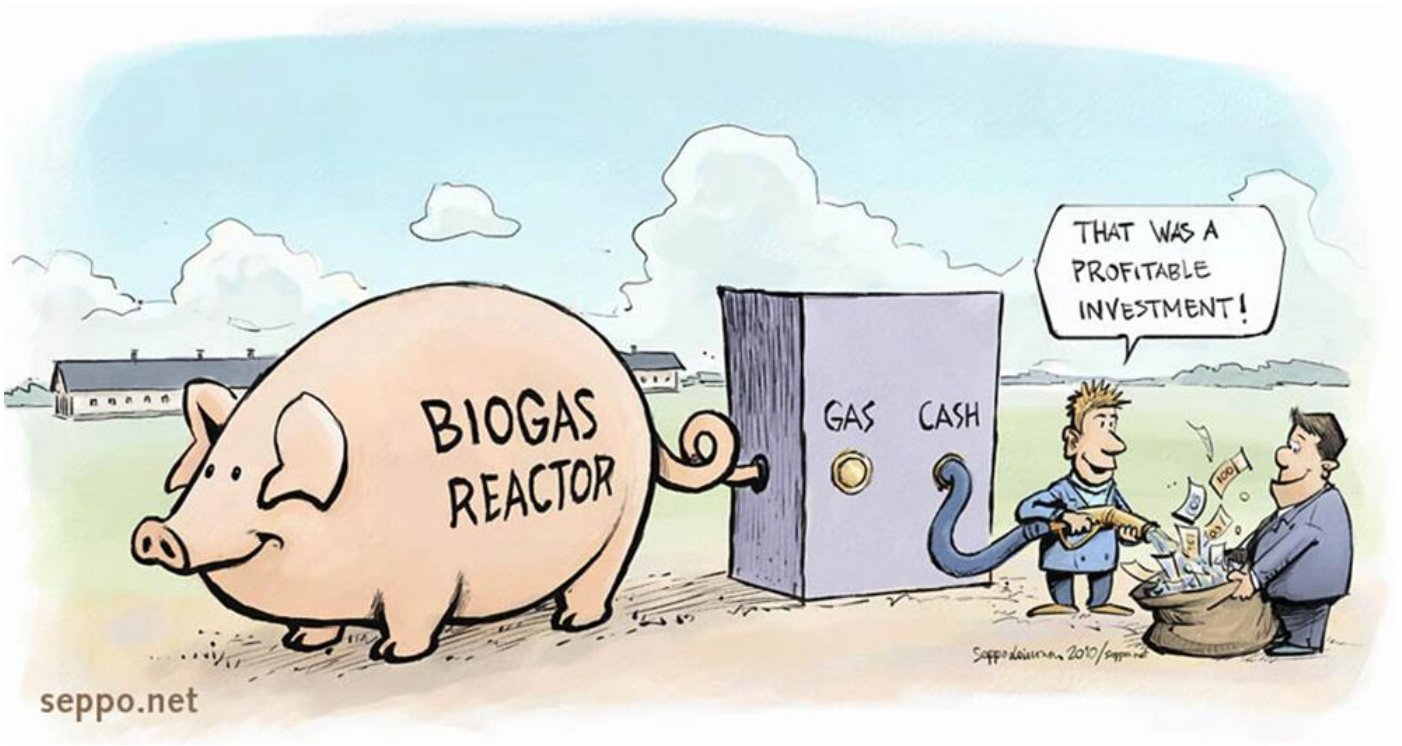
Brian Cox Executive Officer, Bioenergy Association of New Zealand

Bioenergy Association

- Represents all leading NZ & Australian bioenergy and biofuels players
  - Members active throughout SE Asia
- Membership based organisation
  - Promotion of member's products
  - Assist members new projects
- Interest Groups
    - Wood energy,
    - waste-to-energy/biogas,
    - liquid biofuels and biobased co-products.
  - Development of policy, standards, market growth activities
- Advocacy
  - Work closely with Government
  - Other resource associations
  - Focus or improved land use and value from organic waste

BIOENERGY ASSOCIATION

Waste to $$$



BIOENERGY ASSOCIATION

The vision

- Gaseous biofuels are an integral part of New Zealand's resilient and sustainable food and energy production cycle.
- Up to 100% of essential gas supply is from renewable gases by 2050,
- Conversion of organic material to biogas is a fully certifiable pathway for processing of organic residues.
- Zero recyclable organic material to landfill by 2035.
- Drop-in renewable gases extend the life of existing pipeline infrastructure

BIOENERGY ASSOCIATION

The target for gaseous biofuels

- Currently:
  - 150 PJ/yr of natural gas and 10 PJ/yr of LPG used in New Zealand.
  - 4.5PJ/yr of biogas
- Removing:
  - 50PJ of discretionary gas used to produce methanol,
  - 10PJ of gas used for base load electricity generation,
  - 4.5PJ/yr provided by hydrogen,
- Target:
  - biogas/biomethane to continue gas supply to essential applications
  - 60PJ/yr of biogas /biomethane and 10PJ/yr of bio-LPG.

BIOENERGY ASSOCIATION

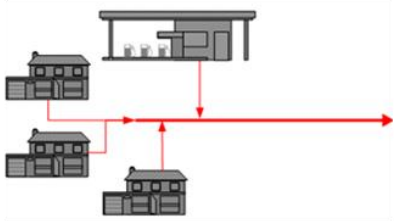
What will be the gaseous biofuels demand in 2050

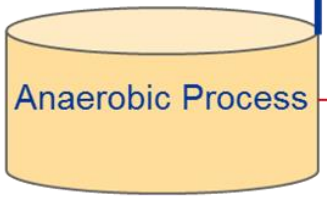
Application areas	Energy from bioenergy or biofuels (PJ pa)	
Essential uses		
Electricity smoothing	3	
Heat users (Circular own use)	5	
Transport	1	
Biomethanol	10	
rLPG	9	
Biomethane to gas network	32	
		60

BIOENERGY ASSOCIATION

The life of biogas

CREATE - CAPTURE - PROCESS - PRODUCE





To CHP/boiler

Biogas

Biomethane to pipelines

Direct composting: no gas

Biofertiliser

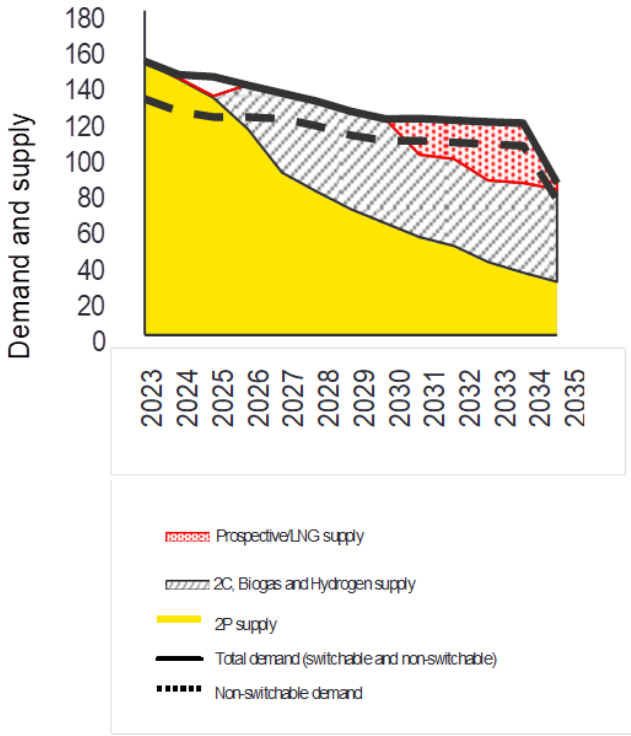
Further treatment: composting/ stabilisation

Beneficial Residuals

BIOENERGY ASSOCIATION

Gas sector wants biomethane

NZ gas sector planning includes significant demand for gaseous biofuels



- Gas is an important part of the energy supply mix
- Lack of interest in new offshore gas exploration
- Risk of stranded assets
- Ideally want a drop-in renewable gas
- Replacement gas for manufacturing

BIOENERGY ASSOCIATION

Business want biogas

- Circular resource use
  - Recycling their own residues
- Reducing operating costs
- Energy security
- Strengthen business resilience.
- Exported food must have sustainable origin and processing

BIOENERGY ASSOCIATION

Biogas in cities: part of the modern energy landscape

- Municipal WWTPs: anaerobic digestion
  - The international (and NZ) standard
  - May be aerobic or anaerobic treatment
  - Efficient technologies for smaller plants developing
- Landfills: purpose designed to capture biogas
  - Mandatory in New Zealand
  - Inefficient technology for converting waste to energy
- Municipal and food processing organic wastes
- End uses of the gas → CHP, boilers etc

BIOENERGY ASSOCIATION

Feedstocks

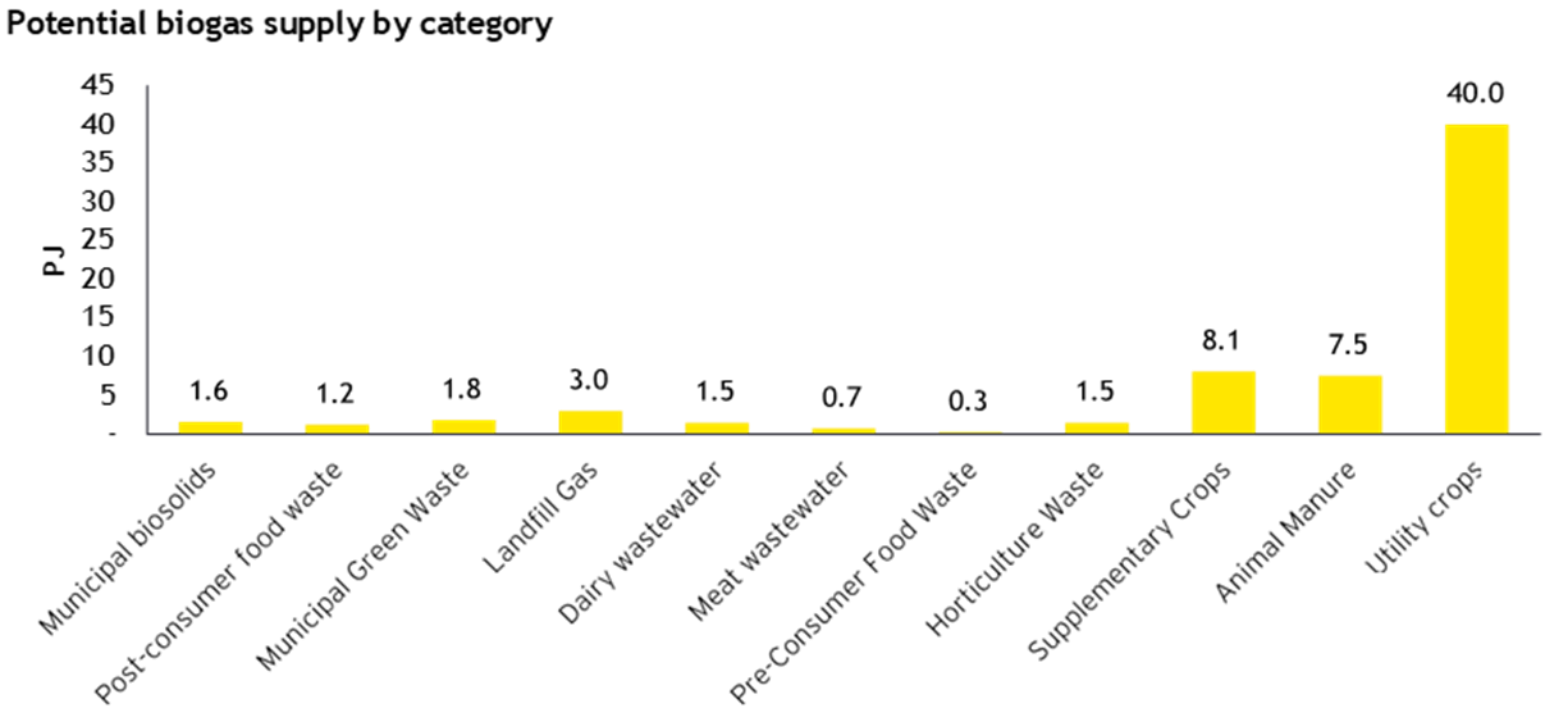
BIOENERGY ASSOCIATION

Sources of organic material

			2050
			Energy PJ/yr
Organic			
	Waste		
		Municipal WWTP	0.6
		Gas capture at landfill	3
		Dairy effluents	6.8
		Post consumer organics	1.5
	Residues		
		Crop residues	1.4
		Pulp and paper effluent	0.6
		Pig and poultry organics	1.7
		Food processing residues	1.8
	Non residual sources		
		Break and supplementary crops	42.6
			60.0

BIOENERGY ASSOCIATION

Priority feedstocks



BIOENERGY ASSOCIATION

Urban biogas resources

- Residential Food Waste
  - AC low carbon plan: 40 % of household waste by weight is food waste
- Industrial/Commercial Waste e.g.
  - Organic wastes from markets
  - Reject product
  - Brewery wastes
  - Rendering plant liquid wastes
  - Cooking oils
- Sewage

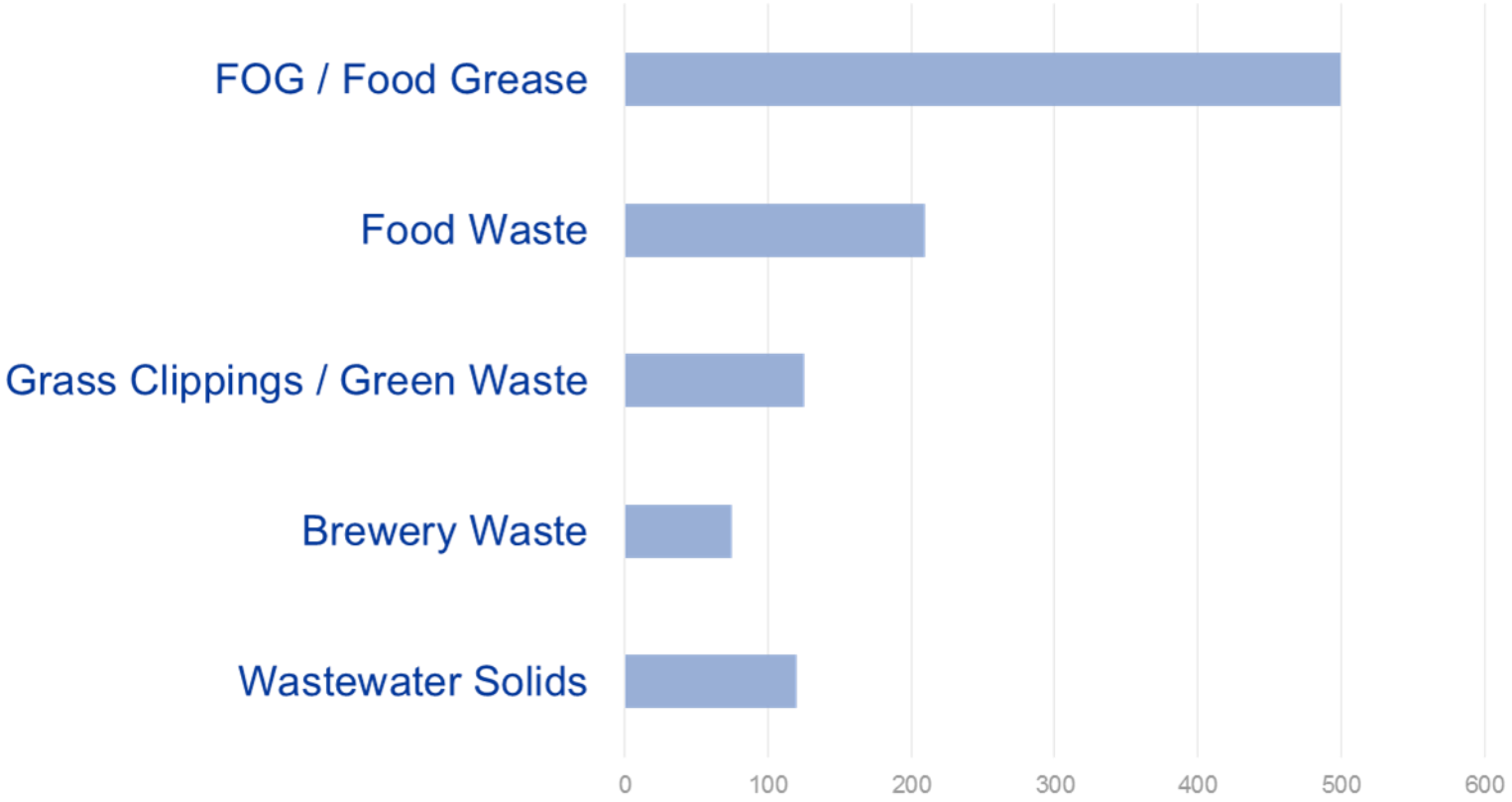
BIOENERGY ASSOCIATION

Food processing wastes

- Anaerobic digestion of organic residues → $$
- Reduces waste disposal costs
- Simple pond covers address odour issues
- Can use modest sized waste water treatment plants
- Technology works everywhere
- Municipal, industrial and agricultural wastewaters can be integrated
- High rate algal ponds for nutrient removal at modest scale can provide additional biogas
- Very often onsite treatment is a win win situation for both industries as well as communities
- Requires continuity of feedstocks

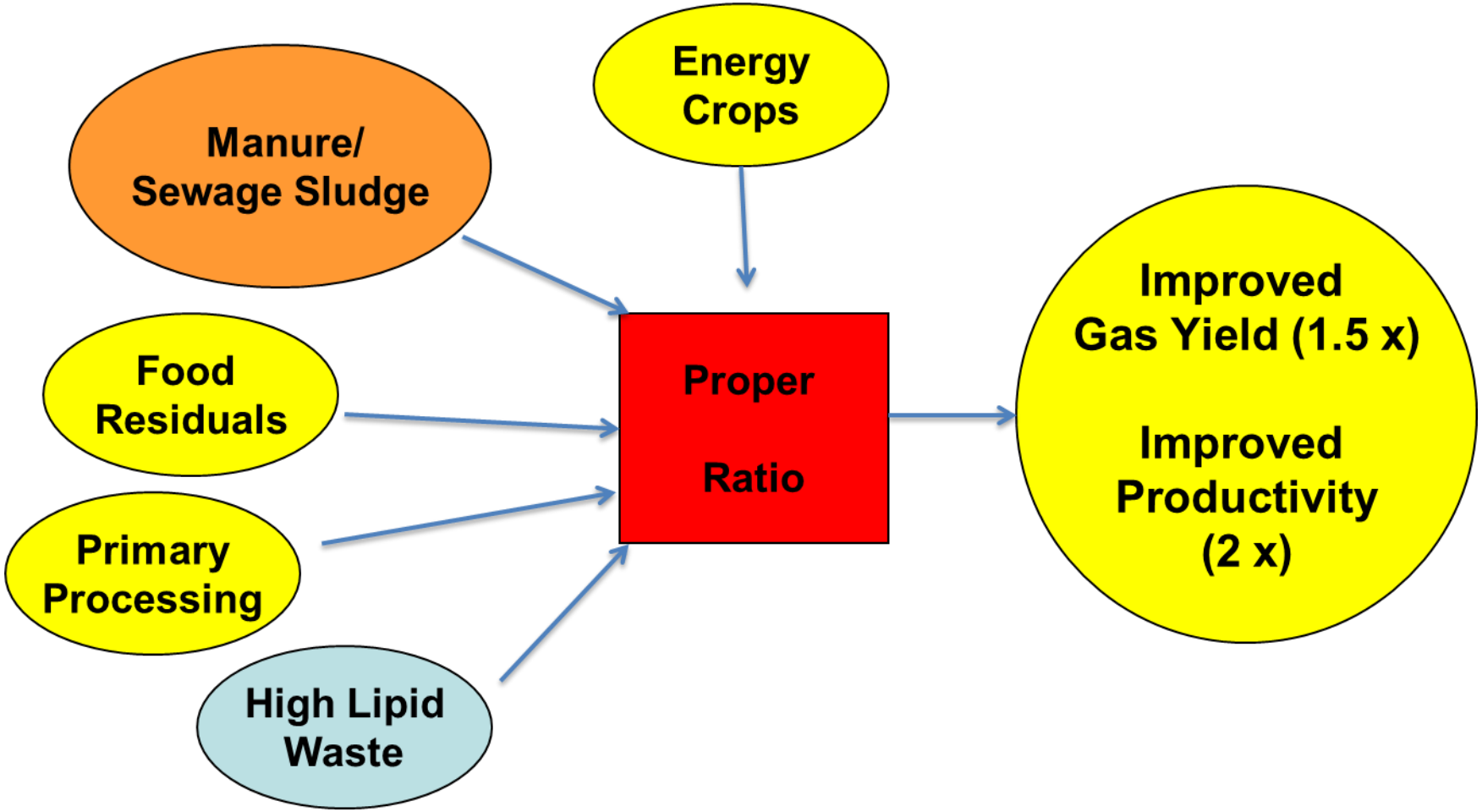
BIOENERGY ASSOCIATION

Preferred waste selection



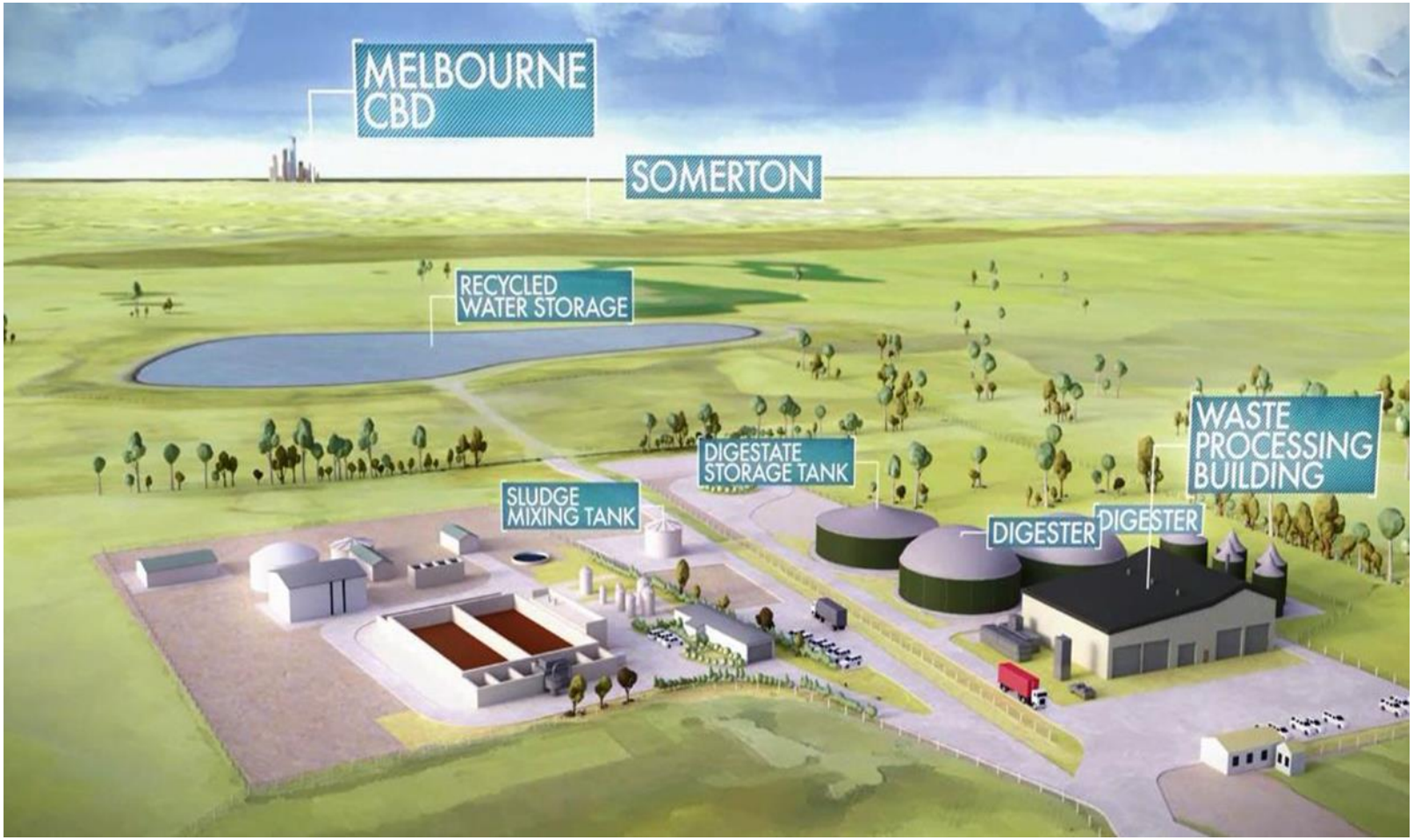
BIOENERGY ASSOCIATION

Co-digestion of waste + industrial feedstocks improves yield



BIOENERGY ASSOCIATION

Aurora Waste to Energy Facility



BIOENERGY ASSOCIATION

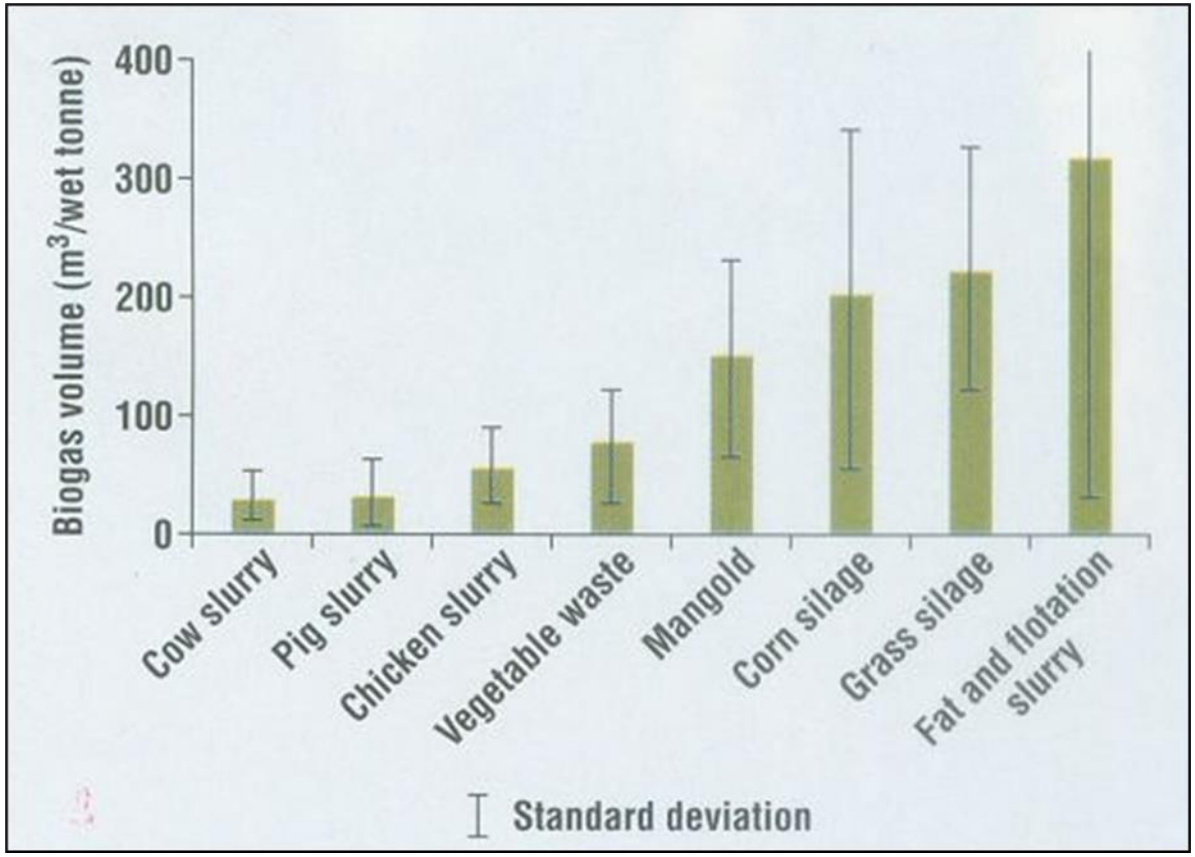
NEW ZEALAND
FOREIGN AFFAIRS & TRADE
Aid Programme

THE UNIVERSITY OF AUCKLAND
Te Whare Wānanga o Tāmaki Makaurau
NEW ZEALAND

Biogas from landfill

BIOENERGY ASSOCIATION

Agricultural wastes



The drivers

BIOENERGY ASSOCIATION

Provide biomethane as a biofuel for gas turbine generators (Green Peakers) to smooth electricity supply fluctuations.

- Gas turbine are fast response suitable for electricity smoothing
- Increases the amount of wind and solar that can be built and operated
- Gas turbines are already built and operating
- No capital expenditure to provide smoothing
- Underground gas storage already available – Ahuroa
- Trading of biomethane will require certificates

BIOENERGY ASSOCIATION

Linear to circular food production

- Business and communities are moving from linear to circular approach to use of resources
- Recycling of residues into new products
- Recycling organics to produce energy
  - Reduce need to purchase energy
  - Can have control over energy security
- Improves demonstration ofsustainability

BIOENERGY ASSOCIATION

Provides security of energy supply

- Biofuels can assist electricity to be used in the right application
- Improve energy security by having a diversity of energy forms
- Increased regional supply from bioenergy as a distributed energy source
- Reducing an over dependence on the need to build additional electricity power stations and distribution infrastructure

BIOENERGY ASSOCIATION

Meeting international food buyer's requirements

- Farmers and horticulturists want to improve New Zealand's credentials as a sustainable food supplier to the world.
- There are many technologies or practices which already exist but until now have not had strong drivers for adoption.
- Utilisation of biogas sources helps ensure NZ food producers and suppliers can promise international food buyers a lower carbon footprint throughout their supply chain.
- Two primary drivers are
  - reducing production and processing costs and
  - demonstrating sustainability, including offsetting of animal greenhouse gas emissions.

BIOENERGY ASSOCIATION

Biofuel production provides another income stream for landowners.

- Farms are expanding diversity by producing new products
- Forest or cropping residues provide another income stream for landowners.
- Underpin sustainable food production and processing .
- Bioenergy from residues allows food processors to hedge future energy costs by directly managing their own energy supply for heat.

BIOENERGY ASSOCIATION

Increase food production.

- Farm crop residues can be recycled to produce biogas, food grade carbon dioxide, and biofertilizer.
- Use of crop residues turns waste into $$
- Dairy effluent AD processing produces clean water, biogas for heating and cooling, and biofertilizer.
- Arable break crops are important for
  - maintaining soil health
  - Diversification of crops and thus markets
  - a source of feedstock for the production of energy
  - providing an additional revenue stream for farmers.

BIOENERGY ASSOCIATION

So why aren't we doing it already

- It is a complex market
  - Many players
  - Requires collaboration and partnerships
  - feedstock owners need to work with AD operators and end users
- Requires vision and champions
- Requires action from those who do not want to end up with stranded assets

We need to be bold

BIOENERGY ASSOCIATION