



Biogas and Biomethane in New Zealand

UNLOCKING NEW ZEALAND'S RENEWABLE NATURAL GAS POTENTIAL

Presenters



Jack Timings

Process Engineer at Beca

Jack Timings is a process engineer at Beca, working in their Industrial Sustainability team to help clients reduce their energy consumption & carbon emissions, and achieve their sustainability objectives.

Jack was one of the lead authors for the study along with experts from Beca's Industrial, Water and Sustainability teams, pipeline experts from Firstgas Group, and a range of technical leaders from across industry including members of BANZ!



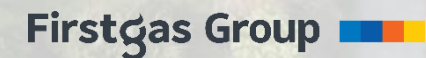
Tony Vranjes

Strategy Advisor at Firstgas Group, Director at Eqblm Consulting

Tony Vranjes is a strategy advisor at Firstgas Group and Director of Equilibrium Innovation & Consulting.

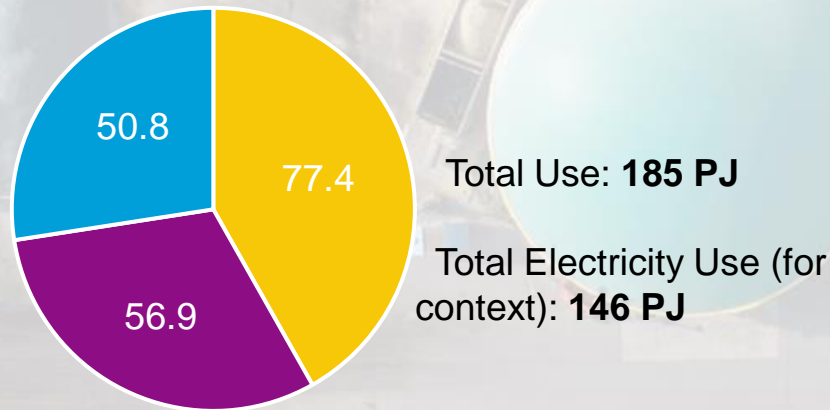
In his role at Firstgas Tony is involved in assessing and developing low-carbon gas options as Firstgas transitions to a net-zero carbon future.

Eqblm consulting offers professional management consulting services for the process industry to clients based in APAC and North America.



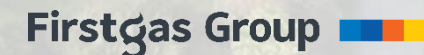
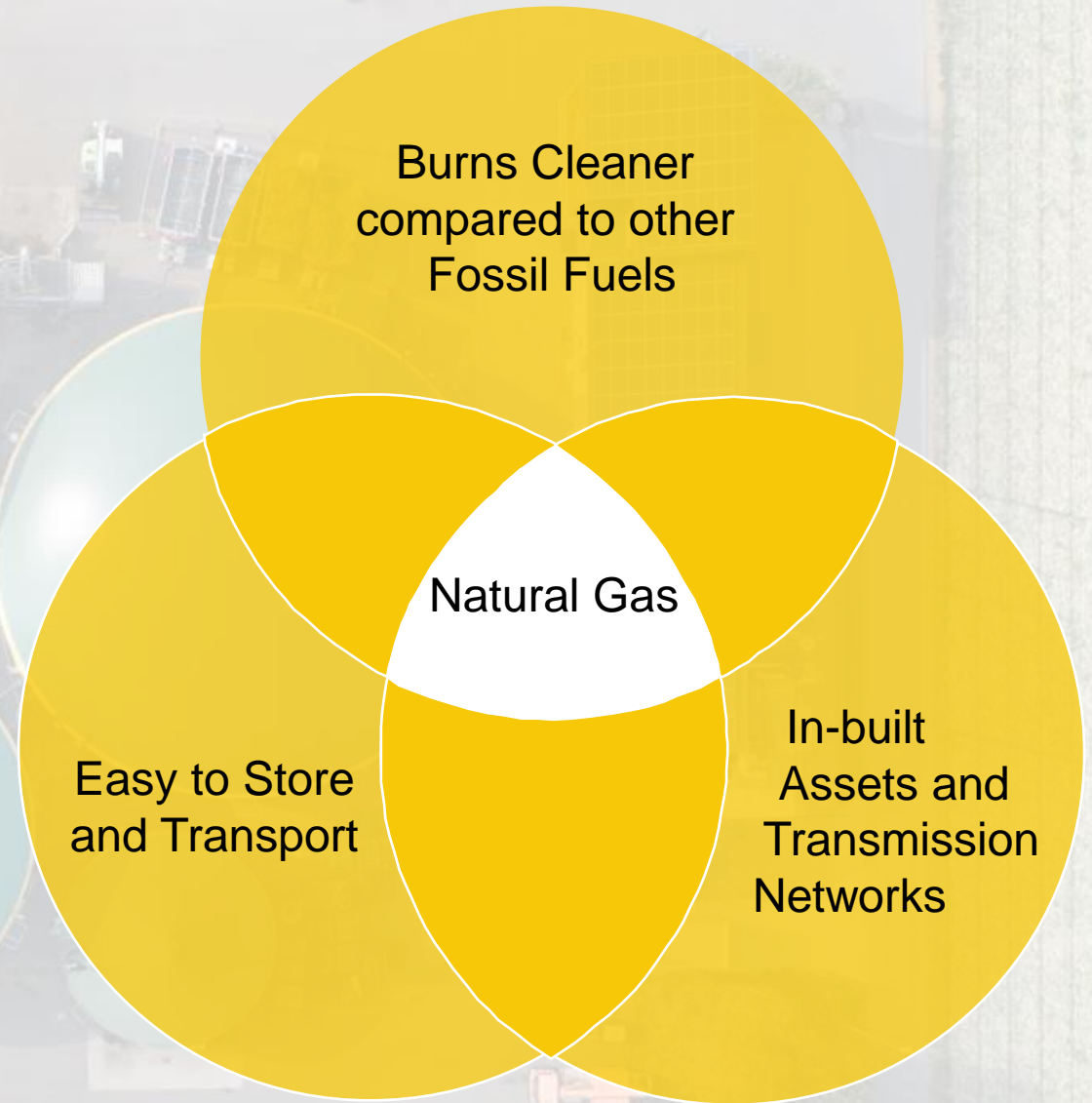
The Challenge

- To meet Paris Accord commitments, NZ will need to decarbonise its Energy Sector
- Requires a transition away from natural gas to low-carbon gases
- Hard to identify a clear-cut replacement, since natural gas has so many advantages



NZ Natural Gas Use 2020 (PJ)

■ Primary Energy ■ Electricity Generation ■ Chemical Feedstock



The Study

Review of Biomethane Technology

Research Use and Uptake Internationally

Review Available Technology for Biogas and Biomethane Generation

Estimate Size the Prize in New Zealand

Analyse Available Feedstocks for Biogas Generation

Calculate Achievable Biogas Generation + Benefits

Assess Uptake of Biomethane in New Zealand

Technical and Economic Assessment

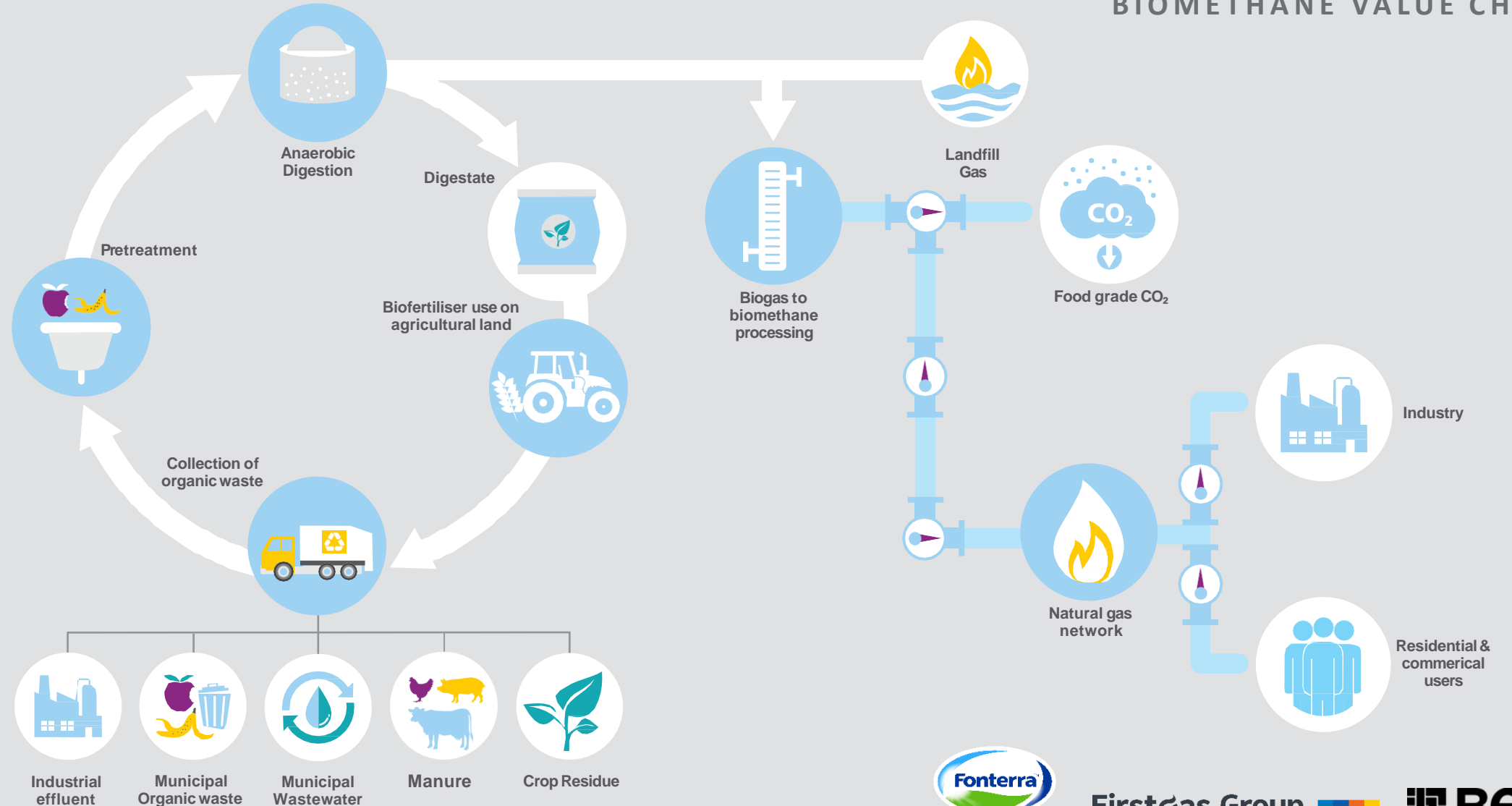
Forecast Potential to 2050 and Highlight Barriers & Enablers

The Technology

Unlocking New Zealand's Biomethane Potential



BIOMETHANE VALUE CHAIN



- Industrial effluent
- Municipal Organic waste
- Municipal Wastewater
- Manure
- Crop Residue



The Benefits

Economic Benefits

- Creates value from waste
- Circular, self-sustaining economies
- Decreased capital to decarbonise operations
- Provides green methane as a feedstock
- Continued use of assets, appliances

Social Benefits

- Job creation across dispersed locations, both urban and rural.
- Opportunities to utilise skills from industries at risk e.g. oil and gas industry
- Energy supply to consumers protected
- Less land required for new landfills

Carbon Savings

- Almost eliminates emissions from gas-fired process heat, electricity generation, residential/commercial heating
- Reduced Landfilling and Waste Emissions
- Reduction in agricultural emissions
- Green CO₂ generation

Other Environmental Benefits

- Better management of organics in wastewater
- Digestate product
 - Supplements chemical fertilisers
 - Improves soil health
 - Carbon stored in soil

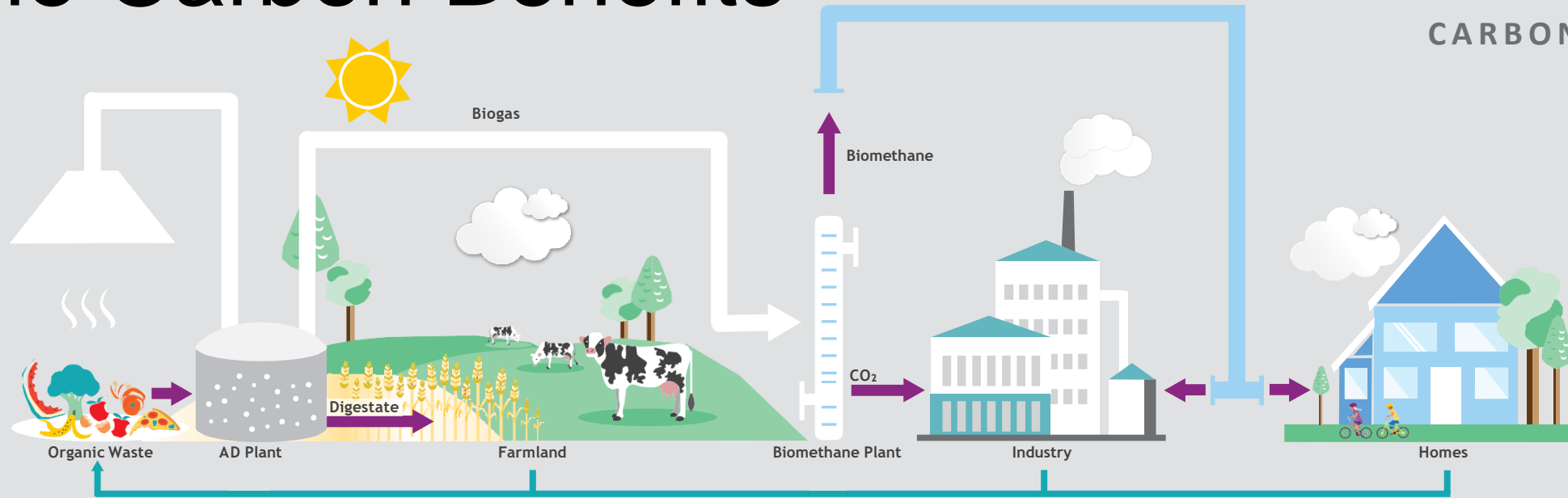


The Carbon Benefits

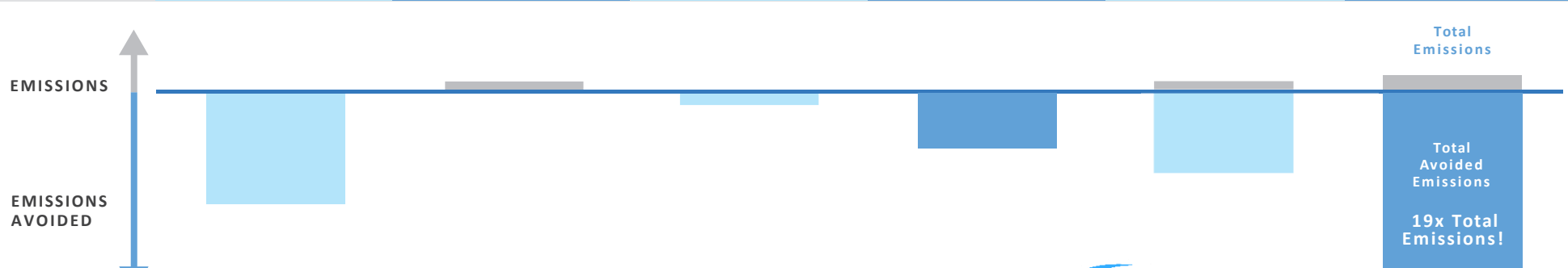
Unlocking New Zealand's Biomethane Potential



CARBON BALANCE

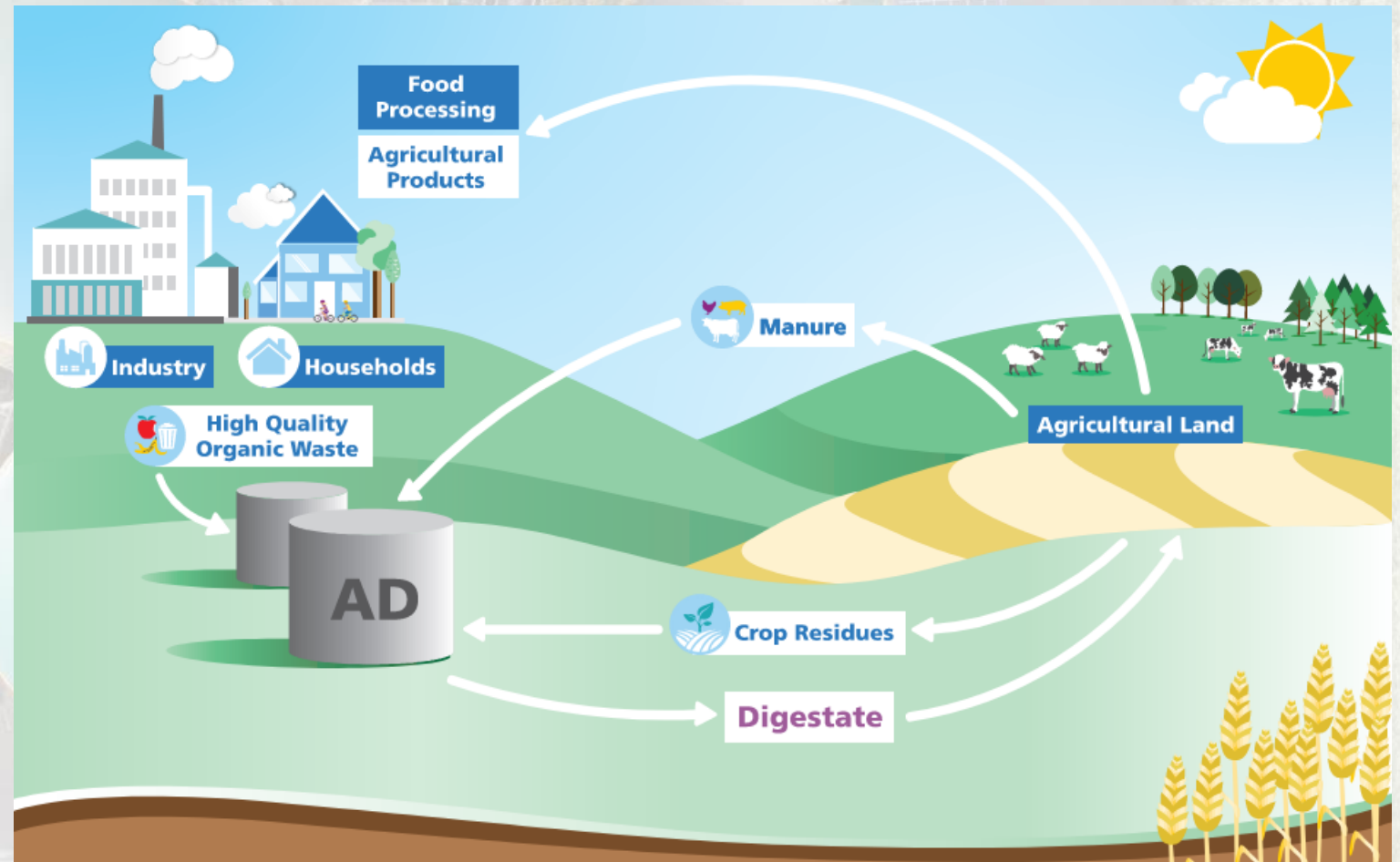


CARBON BALANCE	CAPTURED BIOGENIC WASTE EMISSIONS	EMISSIONS FROM PROCESSING WASTE	CARBON SEQUESTERED BY DIGESTATE	CARBON SAVED USING GREEN CO ₂	CARBON SAVED BY USING RENEWABLE BIOMETHANE FUEL	TOTAL EMISSIONS
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A Quick Word on Digestate

- Digestate is a key part of AD lifecycle – circular nutrient economy that can support agriculture
- BANZ have led drive for uptake with publishing Technical Guide 8; adaptation of PAS 110 standard
- Doesn't have to compete with compost!



The Size of the Prize

BIOGAS IN NEW ZEALAND



MUNICIPAL WASTEWATER



MUNICIPAL ORGANIC WASTE



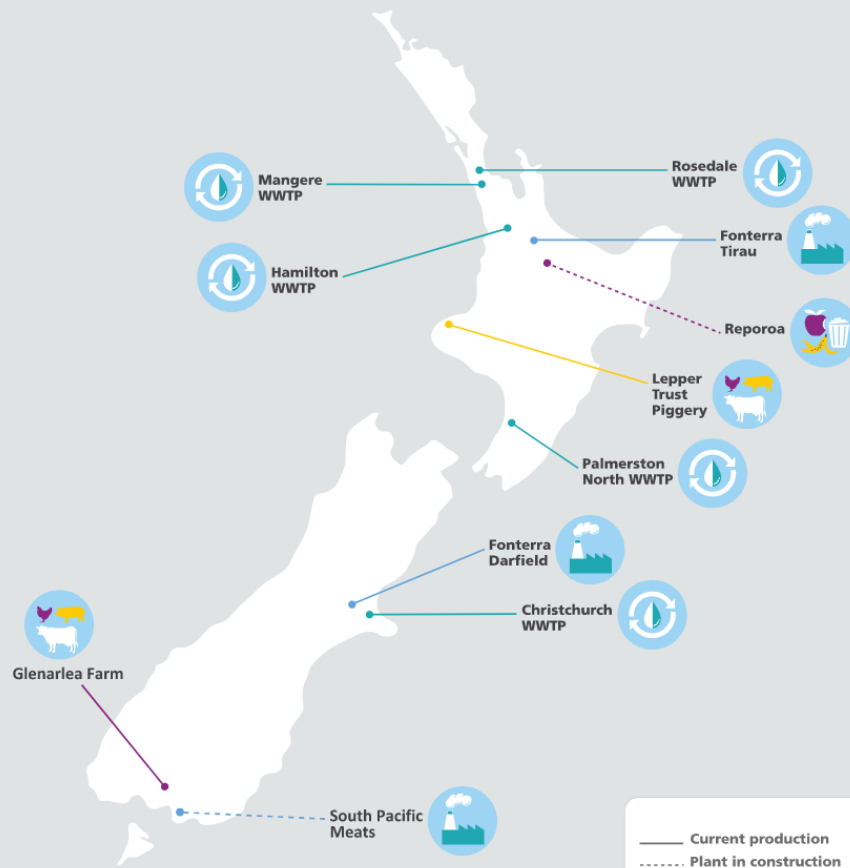
MANURE



CROP RESIDUE



INDUSTRIAL EFFLUENT



- Biogas is being made in New Zealand today, championed by WWTPs, agricultural operations and dairy plants
- First large-scale Food Waste digester coming online next year, and Southland bigas project successful in EECA GIDI fund application

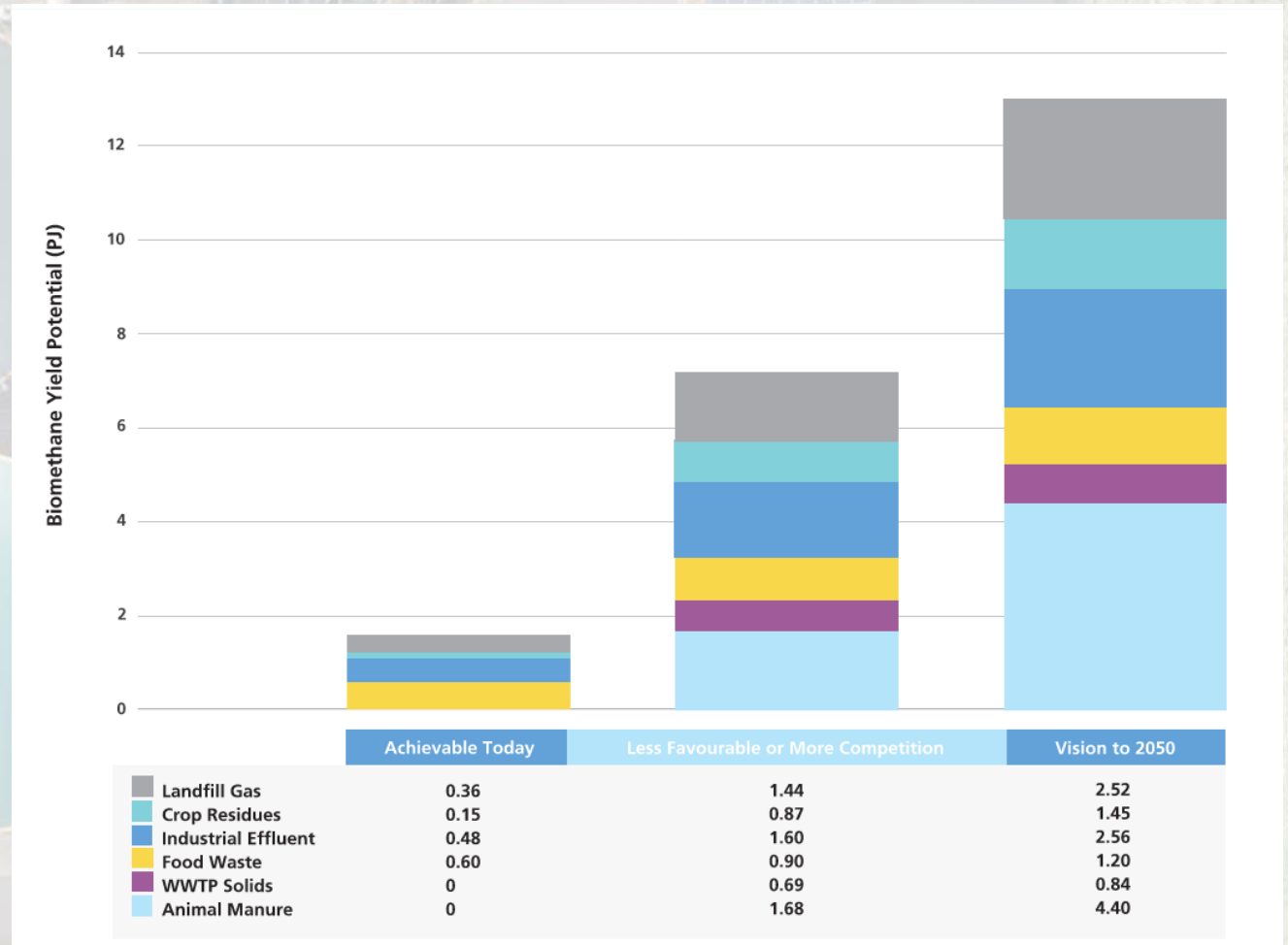
The Size of the Prize

- Best Anaerobic Digestion feedstocks are Source-Segregated Food Waste, Dairy Manure and Industrial Wastewaters
- Food Waste, Dairy Wastewater and Pig Manure digestion plants all exist in NZ already, or in construction

Category	Feedstock type	Biogas Potential (PJ/year)
Municipal Waste	Municipal waste water	0.6 to 0.9
	Source-segregated food waste	1.5
Industrial Wastewater	Dairy	1.1 to 1.9
	Meat	0.7
	Pulp and Paper	0.6
Agricultural Waste	Dairy manure	5 to 6.8
	Pig manure	0.4
	Poultry manure	1.3
	Crop residue	1.4 to 2.9
Total		12.6 to 16.9 PJ
Landfill Gas	Existing Landfill Gas Capture	3
Total		15.6 to 19.9 PJ

The Opportunity in Context

- Economics of biogas and biomethane strongly influenced by available revenue streams e.g. gate fees, digestate
- Some streams available and economic now, some require higher biomethane sale prices to make viable
- 13PJ of biomethane offsets 2% of NZ's current gross emissions



The Barriers

- **Economic Barriers**

- High Capital Costs of Plants
- Low Price of Carbon Compared to Overseas Countries
- Logistical Challenges for Feedstock Collection
- Connecting to Existing Gas Network/Users in Some Regions



- **Regulatory Barriers**

- Certification Schemes for Digestate and Green Gas
- Organic Waste Management Policies – Low Waste Value
- Few Financial Incentives e.g. Feed-In Tariffs
- Fuel-Agnostic Sustainable Energy Support



Key Takeaways



Biogas and Biomethane are significant, untapped resources in New Zealand, with potential to replace up to 20% of our grid by 2050



Successful uptake will require partnership within Industry, across communities and between public and private sector



We are excited about the future of biomethane in New Zealand, and continuing conversations generated by this study



Firstgas Group 



Q&A