Vision for biogas in Aotearoa New Zealand

Final report document

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blunomy®

Executive summary

Biogas is a readily-available solution that can help New Zealand now to reach its commitments across energy, waste, and agriculture

Current context

New Zealand has committed to a range of targets across emissions, waste, energy – and to a lesser extent in agriculture, but **the path to meeting those targets is not yet explicit** and **efforts are fragmented between sectors** with different sets of objectives.

Without rapid and decisive action, **New Zealand will face a target gap of 3.3 Mt waste to landfill and 14-28 $MtCO_2$-e emissions in 2050** (excluding emissions offset) across the waste, energy, and agriculture sectors.

Biogas potential

As a readily-available solution with a track record of success overseas, **biogas can offer crucial support to narrow these gaps**, providing a means of diverting waste away from landfill, supplying reliable renewable energy, and creating value for businesses across industry and agriculture.

Currently **around 4.9 PJ of biogas is produced in New Zealand**, a significant proportion of which is flared with no beneficial use, since the focus is on waste processing rather than energy supply. There is a further **9.5 PJ/yr of untapped potential in the North Island**, and **9.1 PJ/yr in the South Island** (set against a total 2022 natural gas supply of 143 PJ).

This study considered one possible option for the development of biogas in NZ, **a 'North Star' scenario realising New Zealand's ~23.5 PJ/yr biogas potential,** with a network of regional facilities in the North Island producing biomethane that is injected into the gas distribution network, upgrades to existing facilities to make beneficial use of biogas already being produced, and maximizing local capture and use in the South Island.

North Star benefits

The North Star scenario explored demonstrates **biogas and biomethane can make a significant contribution to achieving the suite of targets to which New Zealand has committed** – and can create additional value at the same time:

- The North Star could deliver a **3.7 $MtCO_2$-e reduction** in emissions by 2050, **13-27% of the gap** between New Zealand's reduction commitments and the Emissions Reduction Plan baseline scenario (excluding emissions offsets), and go **46% of the way to meeting the lower limit of the 2050 target for biogenic methane** (24% for the higher limit)
- Anaerobic digestion could provide **23% of the needed reduction in waste to landfill by 2030**, while producing high-quality, nutrient-rich digestate, **reducing dependence on fertiliser imports and exposure to price volatility**.
- The biomethane produced could bridge **9% of the gap to the target of 50% energy consumption from renewables by 2035**, while providing stable, reliable output and **supporting consumers and industries less able to electrify** due to cost or technical difficulty.
- Using un-tapped manure and crop residue feedstocks to produce biogas could **improve farmers' business resilience** (reducing operating costs and diversifying revenue) and **strengthen the viability and global appeal of New Zealand food exports,** by boosting their environmental credentials though **reduced on-farm emissions, decarbonised electricity generation** and **use of digestate use** in place of synthetic fertilisers.

We need to act now to secure the benefits biogas can bring, by building confidence and capability

Barriers and actions

Historically **low landfill costs and natural gas prices** have weakened business cases in the past and created an unfavourable environment for biogas developments. **This is compounded by additional practical barriers**: limited capacity for delivery in a nascent industry, potentially cumbersome permitting pathways, regulatory gaps around digestate use, and a lack of experienced investors.

There are **four key areas of action** to be explored to support the development of biogas in New Zealand:

- **Feedstock:** improve access to feedstocks by incentivising their diversion to biogas production rather than landfill, composting, or other uses – for example by continuing to increase the waste disposal levy or by ending disposal of organic waste in landfill.
- **Demand:** explicitly recognise biogas's potential value in policy, providing long-term confidence for investors, and develop support mechanism to trigger demand for biogas and by-products (renewable gas mandate, mandate for replacement of synthetic fertilizer, etc).
- **Supply:** explore policy mechanisms to shorten project payback periods (FiT, grants, etc) and streamline the development process for biogas facilities.
- **Awareness:** explicitly build biogas into New Zealand emissions and wastes reduction plans, highlighting its benefits and opportunities, in parallel of sharing knowledge across stakeholder groups (investors, farmers, industry players, local communities, etc).

Next steps

The time to act on biogas is now: waiting may make it more difficult to fully realise the benefits as simpler but less beneficial solutions to waste management and emissions reduction take up available capital, and the gas infrastructure and expertise needed to exploit biomethane production becomes less available.

Going forward, two key avenues have been identified to **further explore the different actions** and **secure the benefits of biogas for New Zealand:**

- **Ensure co-ordination** at the national level between departments responsible for environmental, energy, industrial, and agricultural policy, as well as with local government, **to centrally pilot the exploration of the different identified actions** – for example by establishing a cross-agency working group that can coordinate the Government's response to biogas development.
- **Consider biogas** as one of the key levers to achieve New Zealand's commitments and deliver wider value, and **explicitly building it into strategies** for emissions reduction, energy transition, and waste management.

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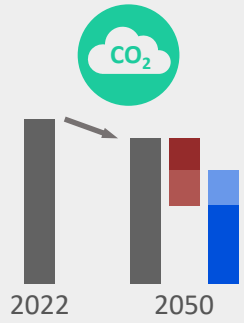
North Star scenario one pager

The challenge

The situation today and projections to 2050 if no action is taken vs targets.

63.6 $MtCO_2$-e emissions[2] today

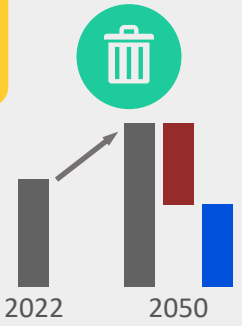


57 $MtCO_2$-e emissions in 2050

vs a target of **29-43 $MtCO_2$-e**

In 2019 New Zealand ranked as the **third worst on the Global Waste Index**[1]

3.8 Mt of waste to landfill today



5.8 Mt of waste to landfill in 2050

vs a target of **2.5 Mt**

Effort needed

reduction in emissions of **14-28 $MtCO_2$-e** needed by 2050

reduction in waste to landfill of **3.3 Mt** needed by 2050

North Star scenario

Regional facilities for biomethane in North Island; local biogas use in South Island

Biogas offers a **readily-available solution with a track record of success overseas** to help **close the gaps** between New Zealand's commitments and its current trajectory.

A North Star scenario is **implementable today** and can make a significant contribution to these targets while **delivering wider benefits** for the transition, economic development, energy equity, and security of supply.

Now is the time to act to secure these benefits. Delay risks missing the 'greenfield opportunity' and seeing critical expertise fade.

North Star benefits

Support NZ energy transition/targets

addressing multiple commitments across multiple sectors through a single initiative:

- **13-27% of emissions cuts needed**, incl. 24-46% of those for biogenic methane
- **23% of the committed reductions in waste** to municipal landfill
- **9% of the increase in renewable energy** needed to reach 50% of consumption

Support NZ economic development

- **creating c.5,500 to 6,000 biogas jobs**
- cutting farmers' **operating costs** by **avoiding emissions charges, supplying fertiliser**, and **generating power and heat**
- **reducing disposal costs** for organic waste from NZ's agri-food industry while making it greener, **improving marketability**

Provide energy equity for customers

- providing **additional decarbonised energy options** to consumers and industries with hard-to-abate gas uses.
- improving energy affordability and access, by **reducing the pressure** on households to spend on electrification

Provide a reliable energy supply

- producing enough biomethane to meet up to **36% of 2022 industrial demand**
- providing a **buffer for increasingly uncertain fossil gas** production
- ensuring a **renewable option for electricity generation** from gas to meet peak demand

[1] in 2018 New Zealand had the highest waste emission per person of all OECD members; [2] Emissions from Waste, Agricultural and the Energy & Industrial sectors;

Sources: Low-emissions economy, New Zealand Productivity Commission 2018, Aotearoa New Zealand's First Emissions Reduction Plan, 2022; Gas Transition Biogas Research Report, 2023; Sensoneo Global Waste Index; Energy in New Zealand 2023

Core of the report

- Context and objectives
- Key findings from literature review
- The North Star and counterfactual scenarios
- Key barriers and recommendations
- Next steps

Evaluating the potential of a vibrant biogas industry in Aotearoa New Zealand

Context

New Zealand has committed to a suite of targets and objectives around net emissions, biogenic methane, energy, and waste, building a sustainable future and playing its part in limiting global warming. The Paris Agreement, the Zero Carbon Act, the First Emissions Reduction Plan, and the Waste Strategy all specify targets, although the path to meeting them is not yet explicitly set out.

Previous studies[1] have shown that New Zealand has a biogas potential of up to 23.4 PJ per year. However, there is a lack of alignment and common incentives for the industries and sectors of New Zealand's economy to support the development of a local biogas economy.

Firstgas, Powerco, and EcoGas are keen to develop a vision for the energy, agriculture and waste sectors to illustrate the potential benefits biogas can deliver for New Zealand and help policy-makers to take concrete steps to secure them.

Blunomy has prepared this report on behalf of Firstgas, Powerco, and EcoGas to further that aim. Blunomy is an independent strategy consultancy with extensive expertise in bioenergy in Australia and Europe. Blunomy has a track record capturing and communicating the state of the industry as well as our clients' perspectives through multiple publications on the topic.

Objectives

The primary objective of this study is to develop a comprehensive vision for the biogas industry, across three key sectors – energy, agriculture and waste. This includes providing recommendations for policy objectives and strategic directions for the Gas Transition Plan and National Energy Strategy.

The study takes as its inputs two central assumptions from Firstgas, Powerco and EcoGas to develop this vision:

- A theoretical biogas potential based on an existing assessment of 23.4 PJ per year across the North and South Islands[1].
- For the realisation of that potential, a scenario including a network of regional facilities to produce biomethane for injection into the gas distribution network.

[1] Gas Transition Plan – Biogas Research Report, Wood Beca, Feb 2023

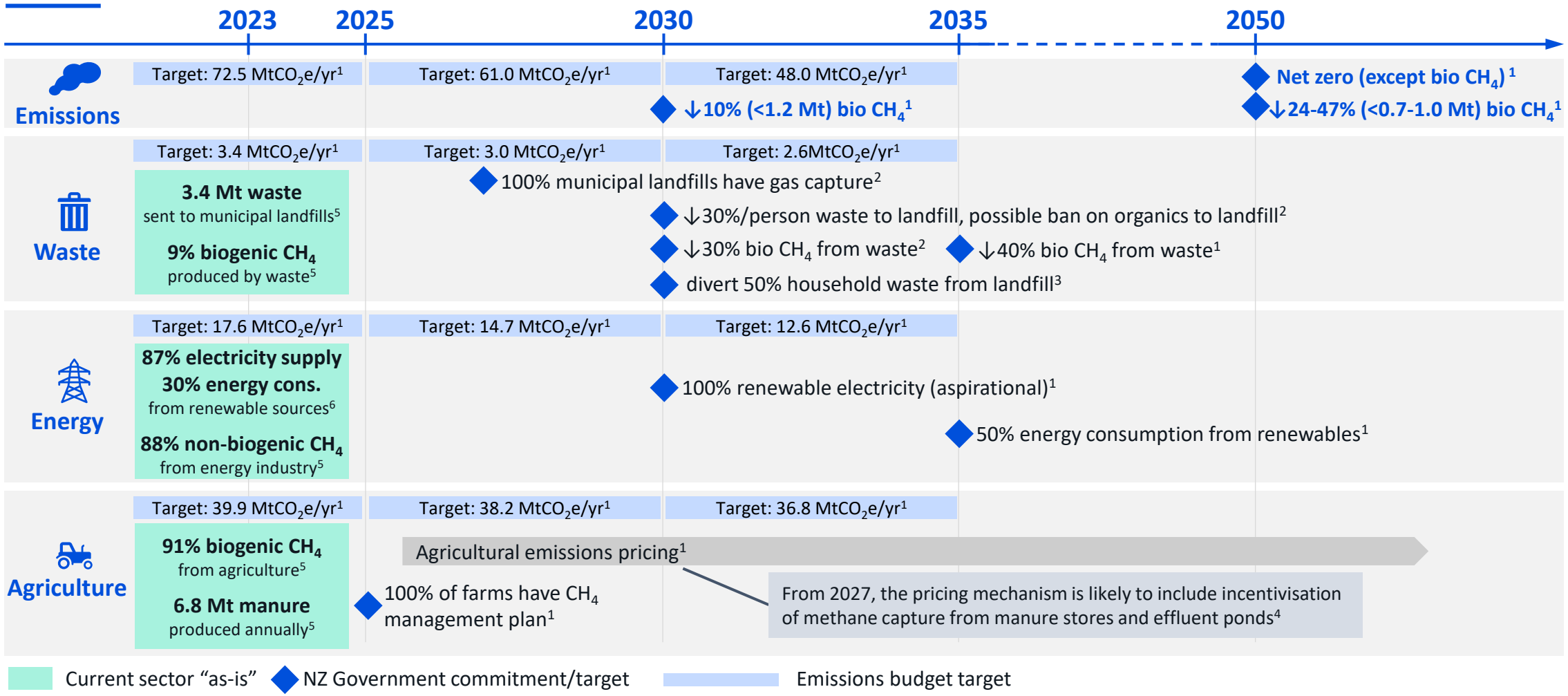
New Zealand's current policies and targets to decrease emissions are primarily targeting the waste industry

Plan/program	Main target/policy description	Energy	Waste	Agriculture
Global Methane Pledge	Reduce 30% of total emissions in NZ compared to 2020 levels by 2030	✓	✓	✓
Aotearoa New Zealand's first emissions reduction plan	50% of NZ's total final energy consumption to come from renewable sources by 2035	✓	✓	✓
	Require all municipal (Class 1) landfills to have LFG capture systems by 31 December 2026		✓	
	• Reduce 40% of biogenic methane in the waste sector compared to 2017 levels by 2035		✓	

	• Reduce biogenic methane emissions to
	  • 10% below 2017 levels by 2030
	  • 24-47% below 2017 levels by 2050
	  • Elimination of non-biogenic methane emissions by 2050
			✓	✓

	All NZ farms to have a plan in place to measure and manage their emissions by 2025			✓
Waste Disposal Levy	Increase waste disposal levy for municipal waste from 50 NZD/tonne to 60 NZD/tonne as of 1 July 2024 with willingness from authorities to continue increasing levies post 2024		✓	
Te Rautaki Para – Waste Strategy	• *Goal 2*: Infrastructure – Develop a comprehensive national network of facilities that supports the collection and circular management of products and materials by 2030		✓	
	• *Goal 6*: Recovering value – Look for ways to recover any remaining value from residual waste, sustainably and without increasing emissions, before final disposal by 2030		✓	
	• *Goal 7.1*: Create less organic waste by 2030 • *Goal 7.2*: Recycle organic material instead of sending it to landfills by 2030		✓	
He Waka Eke Noa Recommendations Report	Introduce a pricing mechanism that provide incentives for the implementation of emissions reduction systems, including effluent methane capture, for agricultural emissions • Simple pricing mechanism by 2025 based on emissions and methane calculated through a single 'stage 1' centralised calculator • Detailed pricing mechanism by 2027 looking into the management of emissions across full farm-level, taking into account emission reduction systems			✓

New Zealand has committed to a range of targets across emissions, waste, energy, and agriculture

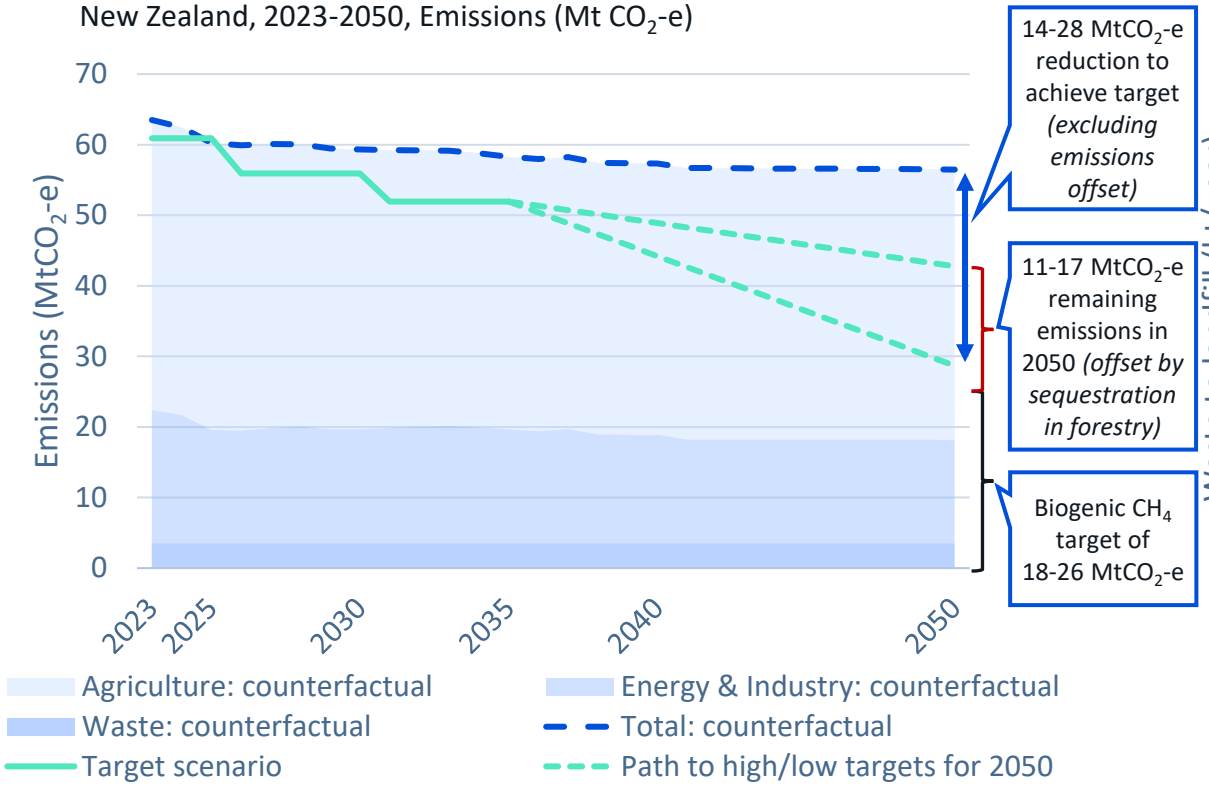


[1] Aotearoa New Zealand's first emissions reduction plan, NZ MfE, May 2022. The 2050 net zero target covers all greenhouse gas emissions except biogenic methane. Reductions in biogenic CH_4 are relative to 2017 levels; [2] Te Rautaki Para – Waste Strategy, NZ MfE, Mar 2023; [3] Improving household recycling and food scrap collections, NZ MfE, Mar 2023; [4] Recommendations for pricing agricultural emissions, He Waka Eke Noa, May 2022; [5] New Zealand Greenhouse Gas Inventory 1990-2020, NZ MfE, Apr 2022; [6] Energy in New Zealand 2023, NZ MBIE, Aug 2023

Without action, New Zealand will face a target gap of 3.3 Mt waste and 14-28 $MtCO_2$-e in 2050 across waste, energy, and agriculture sectors

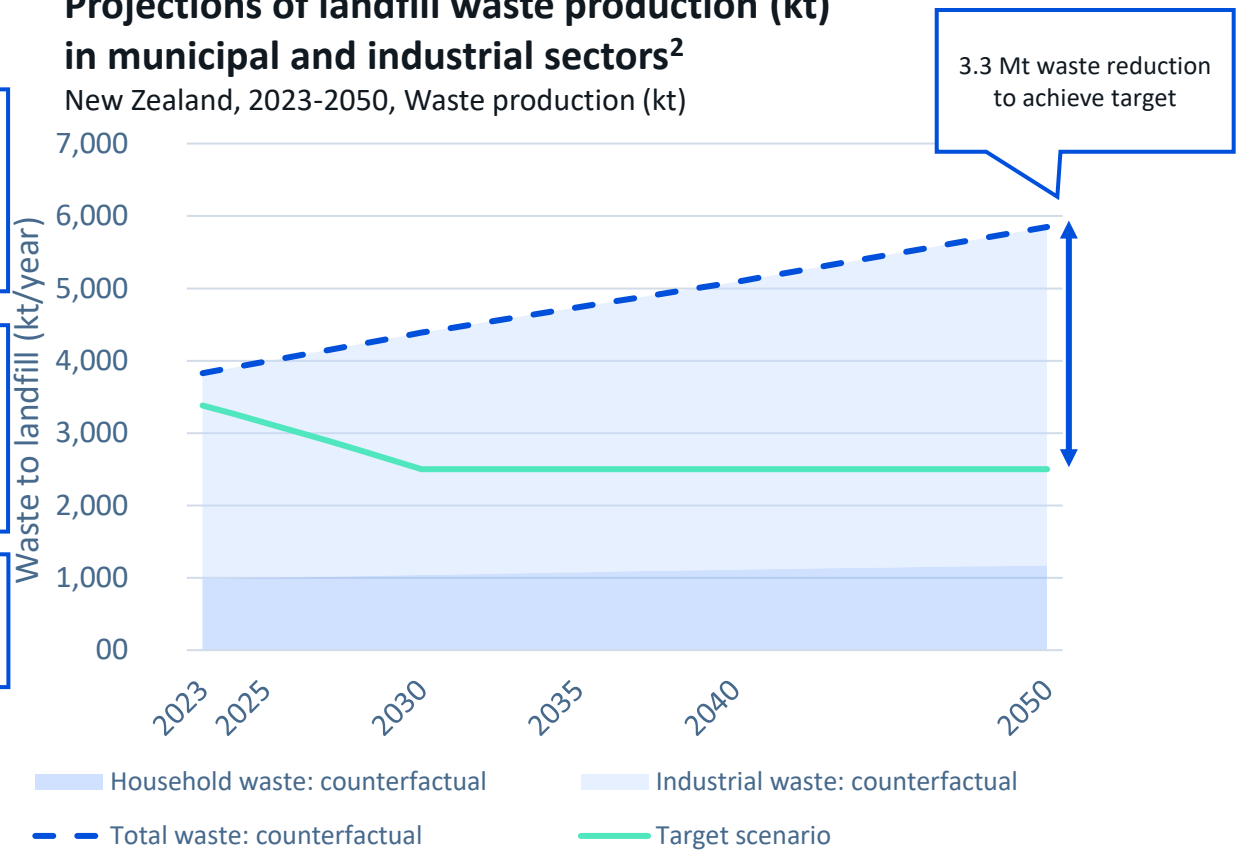
Projections of CO_2 emissions (equivalent) across the waste, energy and industry, and agriculture sectors[1]

New Zealand, 2023-2050, Emissions (Mt CO_2-e)



Projections of landfill waste production (kt) in municipal and industrial sectors[2]

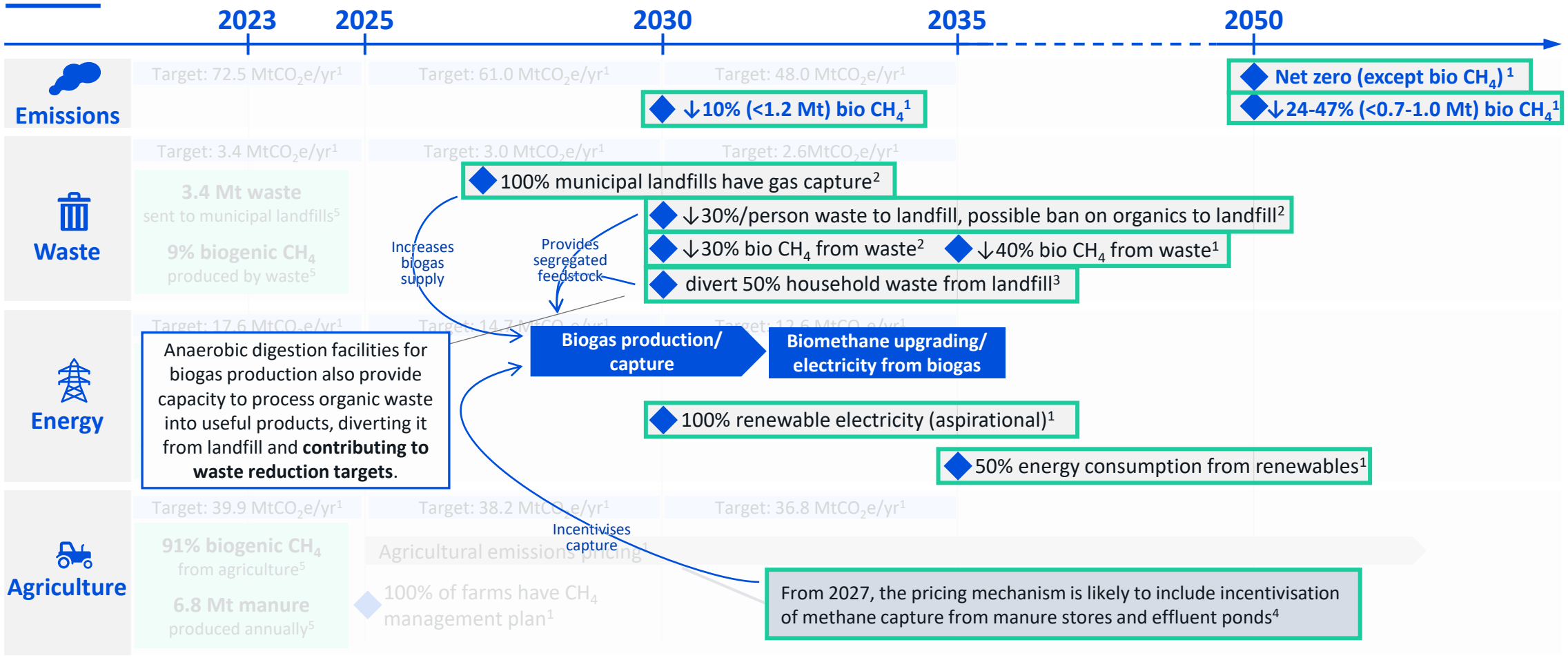
New Zealand, 2023-2050, Waste production (kt)



Notes: [1] Targets for 2050 taken from Inaia Tonu Nei headwinds/tailwinds scenarios for paths to net zero, together with the 24-47% biogenic CH_4 reduction target: emissions in these sectors are offset by negative emissions from the forestry sector to achieve net zero. [2] Projections for counterfactual scenarios regarding municipal and industrial landfill waste were derived using population and GDP growth rate respectively. A flat trajectory for target waste was assumed post 2030 for the target scenario, foreseeing further, more ambitious targets.

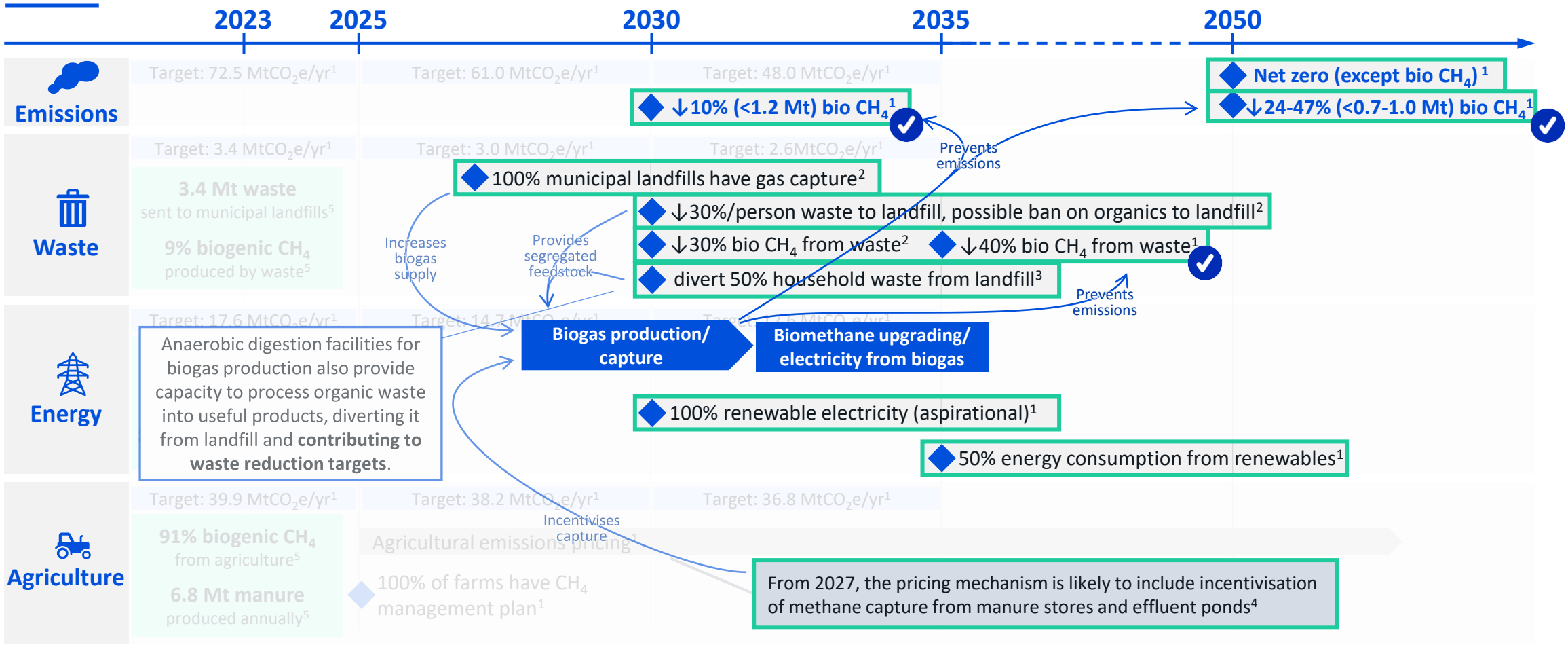
Sources: New Zealand's First Emissions Reduction Plan, MfE 2022; Gas Transition Plan - Biogas Research Report, Wood Beca 2022; New Zealand's Greenhouse Gas Inventory, MfE 2020

Biogas is a key lever to support New Zealand reaching its targets, creating value from waste streams and linking across sectors (1/3)



Source: Blunomy analysis

Biogas is a key lever to support New Zealand reaching its targets, creating value from waste streams and linking across sectors (2/3)



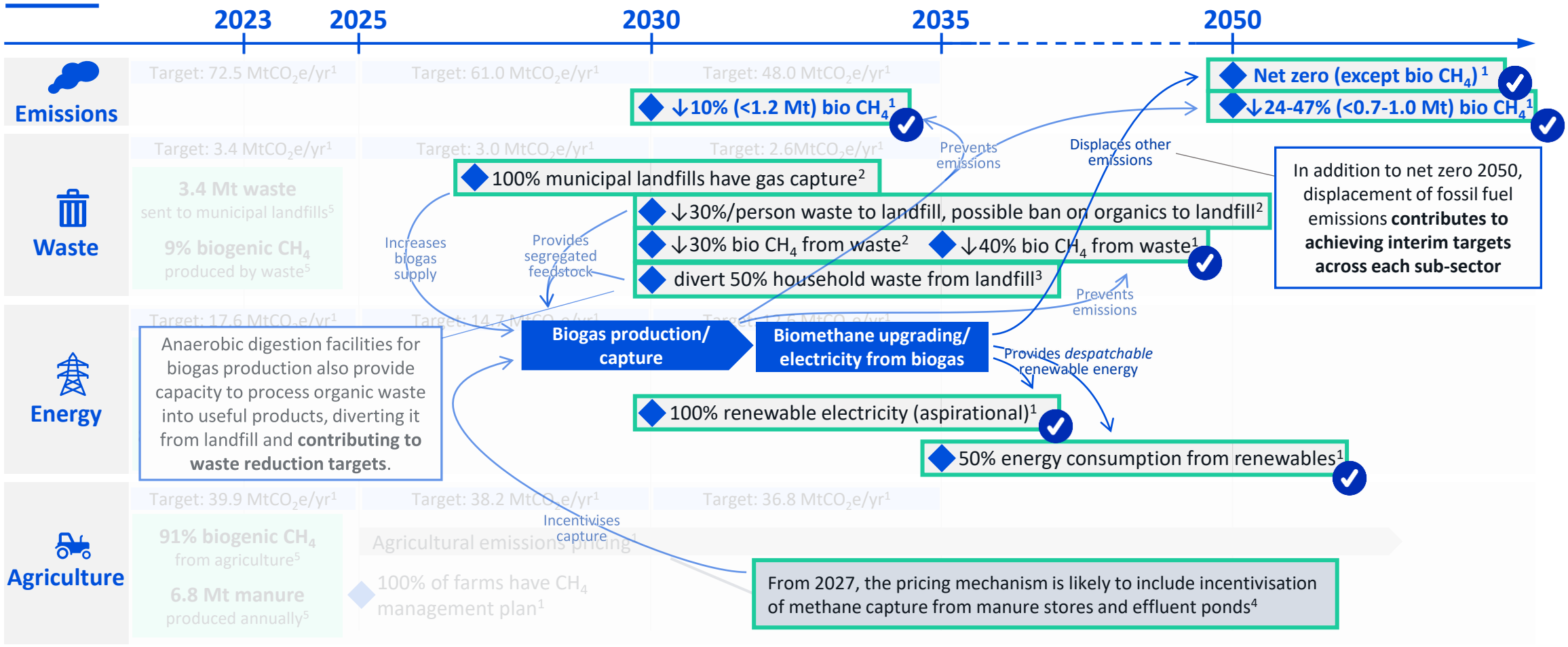
Biogas can support the NZ commitment/target

Link between biogas initiatives

xxx Biogas value chain

Source: Blunomy analysis

Biogas is a key lever to support New Zealand reaching its targets, creating value from waste streams and linking across sectors (3/3)



Biogas can support the NZ commitment/target

Link between biogas initiatives

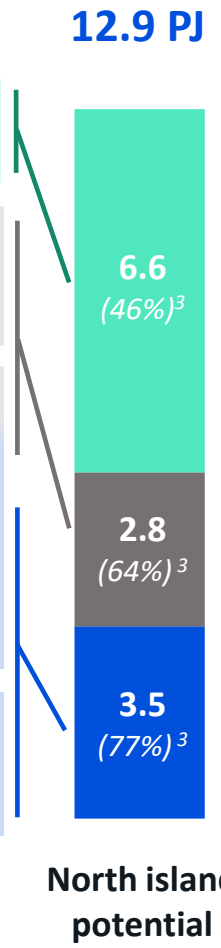
xxx Biogas value chain

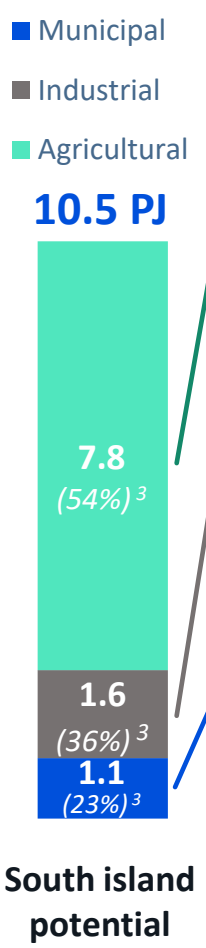
Source: Blunomy analysis

Currently ~4.9 PJ of biogas is produced in NZ, with a further ~9.5 PJ of untapped theoretical potential in the North Island alone

Current biogas production – *North Island*

Agricultural • 1 piggery digesting manure	**<0.01 PJ**
Industrial - wastewater • 1 dairy processing site (Tirau dairy site, but decommissioned)	-
Industrial – solid waste *Large part collected into landfills*	**~0.6 PJ**[2] *arising from industry*
Municipal - solid waste • 1 purpose-built organic waste digestion facility (not yet fully operational) • 9 landfill sites are currently capturing gas[1]	**~2.0 PJ** *arising from landfill*
Municipal – wastewater • 10 WWTP currently utilising anaerobic treatment processes	**~0.8 PJ**





Current biogas production – *South Island*

<0.01 PJ	**Agricultural** • 1 dairy farm digesting manure
<0.1 PJ	**Industrial – wastewater** • 1 site digesting cream cheese whey
~0.3 PJ[2] *arising from industry*	**Industrial – solid waste** *Large part collected into landfills*
~0.9 PJ *arising from landfill*	**Municipal – solid waste** • 8 landfill sites are currently capturing gas[1]
~0.2 PJ	**Municipal – wastewater** • 5 WWTP currently utilising anaerobic treatment processes

Notes: [1] out of 47 sites listed in the *Gas Transition Plan – Biogas Research Report* [2] Total industrial biogas is 0.9 PJ in NZ. Split between North Island and South Island based on population

Sources: Gas Transition Plan – Biogas Research Report, Wood Beca; Biogas and Biomethane in New Zealand, EECA, Beca, Fonterra & Firstgas Group [3]: % split between North and South Island

Current biogas production realises only a small part of the potential, and is almost exclusively focussed on waste processing

Biogas potential by territorial authority[1]

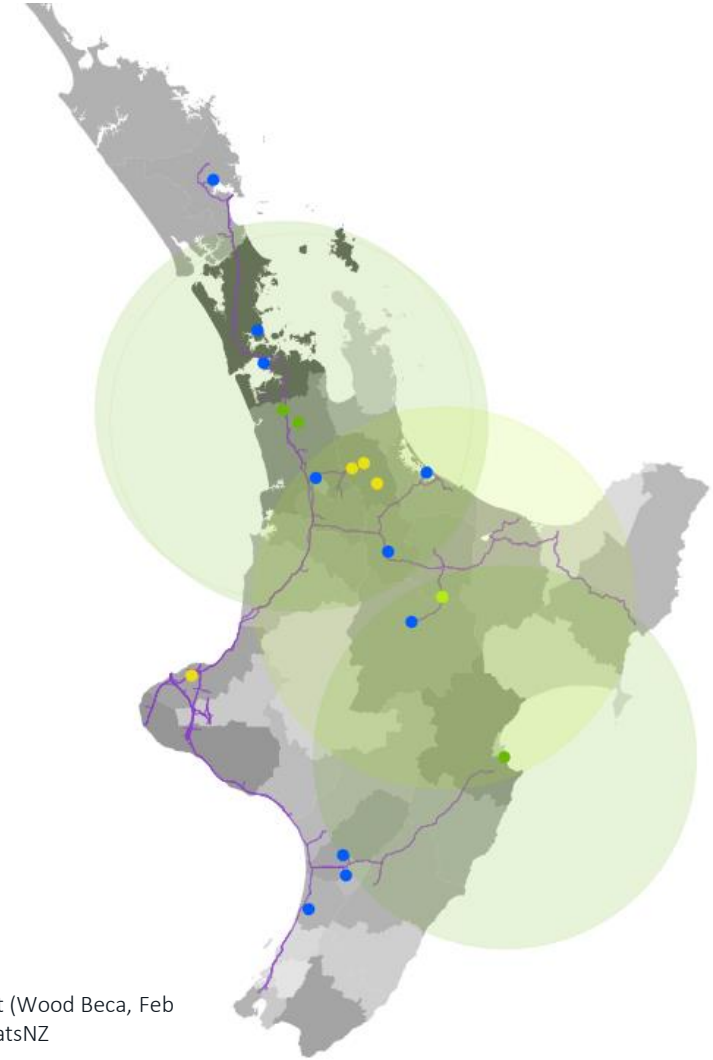
Low — High

Current facilities[2]

- Gas transmission pipelines
- Composting site
- AD site (EcoGas)

With policy-defined 150km collection radius

- Major WWTP with AD/gas capture
- Other AD site



Key considerations

Existing facilities are linked to waste treatment: organic waste to composting and AD, and WWTPs.

[1] Blunomy analysis, based on Gas Transition Plan Biogas Research Report (Wood Beca, Feb 2023) and data on industry and agriculture by territorial authority from StatsNZ

[2] Sources: Firstgas, WaterNZ, Alzbeta Bouskova, MfE

North Star scenario: a network of regional facilities, covering a large proportion of the North Island to capture the untapped potential

Biogas potential by territorial authority[1]

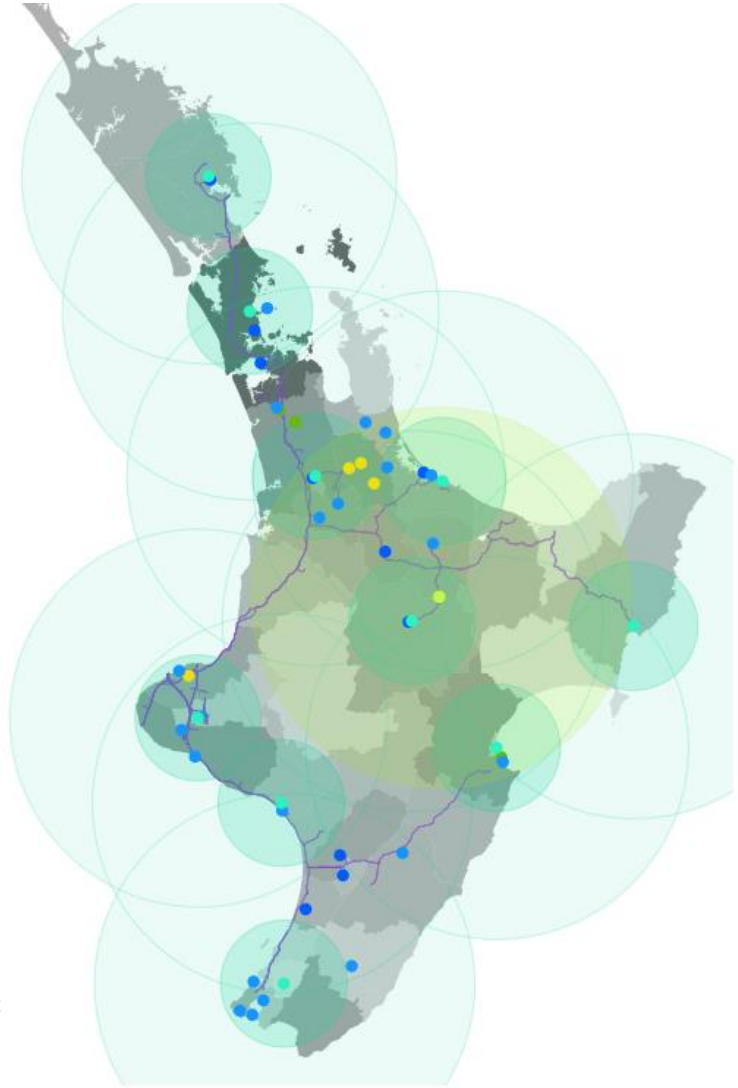
Low — High

Current facilities

- Gas transmission pipelines
- Composting site
- AD site (EcoGas) with 150 km collection radius
- Major WWTP with AD/gas capture
- Other AD site

Vision facilities

- Potential regional facilities (showing 50 km and 150 km radii)
- Additional major WWTPs (>1 Mm^3/yr wastewater) to be equipped with AD/gas capture



Key considerations

Assumption: maximising biogas upgrading to biomethane for gas grid injection

Corollary: facilities must be within reach (~1km) of the gas distribution network.

Selecting locations to maximise coverage of:

- areas of high population density, based on 150 km policy-defined radius for organic waste (assumption: AD is preferable to composting for highly methanogenic waste)
- industrial feedstock sources (industrial solid and liquid waste)
- areas of high livestock density (swine in Taranaki; cattle in Manawatu, Northland, and Bay of Plenty), based on 50 km estimated economic radius for manure transport
- areas of high arable farming density (maize in Gisborne and Waikato), based on 150 km estimated economic radius for crop residue

Unmapped:

- Landfill sites

[1] Blunomy analysis, based on Gas Transition Plan Biogas Research Report (Wood Beca, Feb 2023) and data on industry and agriculture by territorial authority from StatsNZ

The dimensions being explored in the Gas Transition Plan consultation have been translated into criteria for assessment of the North Star's impact

MBIE[1] Criteria

Assessment criteria

	1 Support NZ energy transition					2 Eco. Development / Production growth			3 Energy supply	4 Energy equity
	Biogas/biomethane (PJ)				Waste to landfill *(kt)*	Net effect on emissions *(CO2 eq)*	Required investment *(NZD)*	Economic dev. *(# of jobs)*	Value added	Resilience	
	Regional facilities	Landfill	BTM	Flared						Security of supply	Customer choice
North Star scenario											
Counterfac-tual											
Net impacts											

Criteria assessment

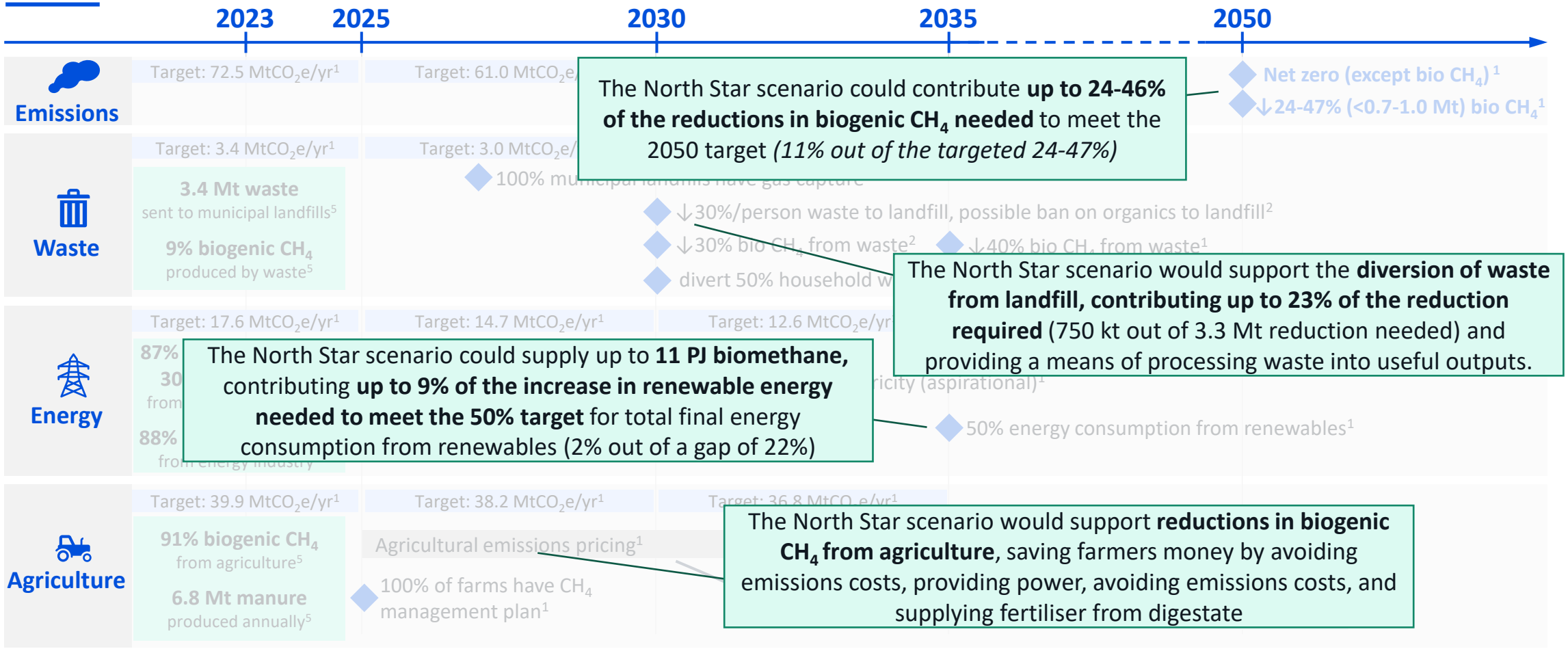
The North Star scenario has a strong impact against the criteria, with variation between high and low scenarios

		Biogas/biomethane (PJ)									Waste to landfill (kt)[1]	Net effect on emissions ($ktCO_2e$)[2]	Required investment (NZD)	Economic development (no. of jobs)	Value added	Resilience	
		North Island					South Island									Security of supply	Customer choice
		Regional facilities	Landfill	WWTPs	BTM use	Flared	Landfill	WWTPs	BTM use	Flared							
Counterfactual scenario (2050)		0.0	2.0	0.8	0.0	0.7	0.7	0.3	0.0	0.2	1,010	3,470	-	-	-	-	-
North Star	High Scenario	8.9	0.9	1.2 $bioCH_4$	1.9	0.0	0.3	0.4	9.8	0.0	260	-260 *(owing to displaced emissions)*	~2.4-3.2B	Creation of ~5,500 to 6,000 jobs	Supports farmers by reducing operating costs, supplying more bio-available / less emissive organic fertiliser / increasing revenue; Supports waste targets by creating capacity to treat organic waste streams from the agri-food industries	Improves security of supply: biomethane can meet 36% of 2022 industrial demand[3] in high scenario (22% in low scenario) Reduces dependency on synthetic N fertilisers Provides a green and NZ-produced source of CO_2	Provides additional decarbonised energy options to end-customers, beyond electrification
	Net impact	**+8.9**	**-1.1**	**+0.4**	**+3.0**	**-0.7**	**-0.4**	**+0.1**	**+9.8**	**-0.2**	**-750**	**-3730**					
	Low Scenario	6.4 $bioCH_4$	0.9	1.2	4.4	0.0	0.3	0.4	9.8	0.0	270	-80 *(owing to displaced emissions)*					
	Net impact	**+6.4**	**-1.1**	**+0.4**	**+4.4**	**-0.7**	**-0.4**	**+0.1**	**+9.8**	**-0.2**	**-740**	**-3550**					

$bioCH_4$ Biogas upgraded to biomethane and injected into the gas distribution network

[1] 'Waste to landfill' reflects the weight of the total potential feedstock material is sent for final disposal in landfill, including biosolids from wastewater treatment. [2] Net effect on emissions characterises the overall contribution of the feedstock material to NZ emissions, including displaced emissions from electricity generation or natural gas use and biogenic methane capture, but excludes potentially-displaced emissions from digestate use. [3] Source for demand: Gas Supply and Demand Projections 2022, Concept Consulting, Jul 2022.

The North Star scenario would make a significant contribution towards meeting NZ's ambitious targets

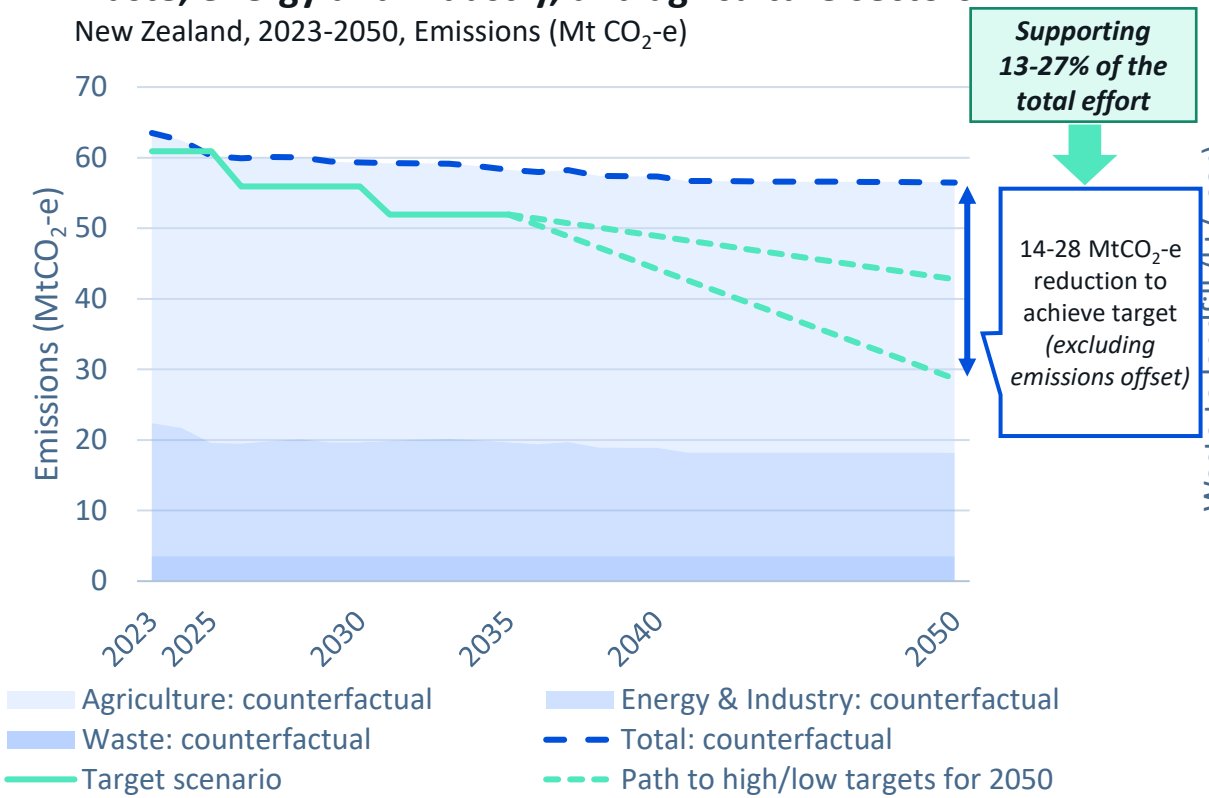


Sources: Blunomy analysis

The North Star scenario could support addressing up to 27% of efforts for emissions reduction and 23% of efforts for wastes reduction

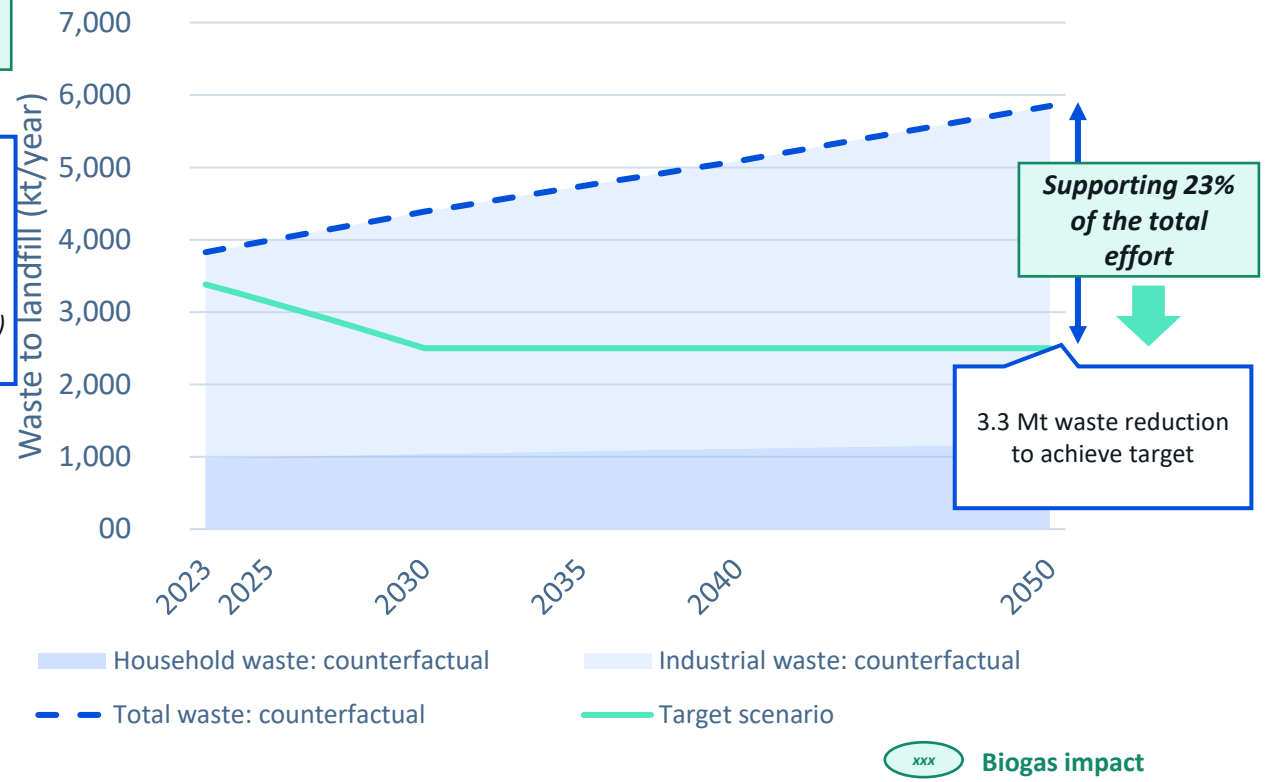
Projections of CO_2 emissions (equivalent) across the waste, energy and industry, and agriculture sectors[1]

New Zealand, 2023-2050, Emissions (Mt CO_2-e)



Projections of landfill waste production (kt) in municipal and industrial sectors[2]

New Zealand, 2023-2050, Waste production (kt)



Notes: [1] Targets for 2050 taken from Inaia Tonu Nei headwinds/tailwinds scenarios for paths to net zero, together with the 24-47% biogenic CH_4 reduction target: emissions in these sectors are offset by negative emissions from the forestry sector to achieve net zero. [2] Projections for counterfactual scenarios regarding municipal and industrial landfill waste were derived using population and GDP growth rate respectively. A flat trajectory for target waste was assumed post 2030 for the target scenario, foreseeing further, more ambitious targets.

Sources: New Zealand's First Emissions Reduction Plan, MfE 2022; Gas Transition Plan - Biogas Research Report, Wood Beca 2022; New Zealand's Greenhouse Gas Inventory, MfE 2020

10 key challenges are hindering the development of the North Star scenario in New Zealand

		Key challenges and barriers	Sector		
			Energy	*Waste*	*Agriculture*
Across all subsectors	1	**Nascent biogas/biomethane industry in NZ**: limited biogas/biomethane infrastructure and supply chain in place for feedstock sourcing (including feedstock assessment, feedstocks suppliers, etc.)	✓	✓	✓
	2	**High upfront costs combined with inexperienced investors can be perceived as high risk:** the uncertainty surrounding feedstock supply and complexities across the value chain can increase costs involved in biogas development in order to manage potential risks	✓	✓	✓
	3	**Low wholesale price of natural gas:** can deter a move towards the uptake of biogas	✓	✓	✓
	4	**Lack of knowledge and visibility regarding existing opportunities:** minimal knowledge sharing across stakeholder groups (i.e. farmers, investors, local communities, etc) of the biogas real benefits, including the associated carbon footprint, preventing the rapid emergence of the sector	✓	✓	✓
Specific to one subsector	5	**No explicit willingness to use biogas to support renewable energy targets in New Zealand:** the Government has not yet provided a clear commitment on the role biogas has in the renewable energy mix	✓		
	6	**Regulatory barriers:** lack of regulation regarding the use of digestate and uncertainties surrounding existing technical standards may delay or impact the progress of biogas projects	✓		✓
	7	**Lack of national policy/actions to support waste reduction targets :** despite an ambitious reduction of waste target, there are limited national initiatives in place to support the various stakeholders in achieving the target.		✓	
	8	**Low landfill levies:** discourages initiatives and actions to be taken to reduce waste sent to landfill		✓	
	9	**Uncertainty around regulation for digestate:** lack of clarify of specific regulation supporting the uptake of the digestate in New Zealand (e.g. certification, mandate for replacement of synthetic fertilizer, etc)		✓	✓
	10	**No clear direction for the agricultural sector in relation with the biogas adoption:** no specific guidance has been announced for the agriculture sector in terms of the production and uptake of biogas			✓

We have identified 4 key areas of actions to be further explored to support the development of the North Star scenario

Areas	Key actions to be further explored
Feedstock 	• Assess ways to **incentivise feedstocks "owners"** (i.e. farmers, industrial players, etc) to leverage their wastes to produce **biogas and biomethane** • Identify opportunities to **align the national regulation for waste and "operationalise" the NZ commitments** (going beyond NZ commitments, detailing national classification, collection and recycling) • Assess the needs to have more **detailed feedstock assessment at national level** to better characterise the biogas potential both North and South Island within economic radius
Demand 	• Maximise the opportunities for biogas/biomethane to be **an explicit lever for NZ energy targets and commitments** • Assess the relevance of **possible policy mechanisms to support the uptake of biogas** from a demand perspective (e.g. renewable gas mandate, certification schemes such as Guarantee of Origin, etc) • Explore the **opportunities to support the local uptake of biogas/biomethane by-products, such as digestate and biogenic CO2** (i.e. favor market conditions with certification, mandate for replacement of synthetic fertilizer)
Supply 	• Assess the relevance of **possible mechanisms to support the development of biogas/biomethane projects** (e.g., electricity FiT, biogas FiT, grants for project capex) • Further evaluate the **expected benefits from the North Star scenario at regional level for New Zealand** (i.e. jobs created at regional level, expected development impact, etc) • Identify the needs to **streamline the current development process** for biogas/biomethane projects (e.g. length of approval process, administrative burden, etc)
Awareness 	• Explore different communication **pathways and channels to share knowledge about the biogas/biomethane sectors** across different stakeholder groups to highlight opportunities and benefits • Evaluate the requirements to advance the bioenergy industry in New Zealand, **highlighting and mapping current capability and skills compared to future needs**

To support exploring further the different actions, two main avenues have been identified for next steps

Areas	Key actions to be further explored
Feedstock	• Assess ways to **incentivise feedstocks "owners"** (i.e. farmers, industrial players, etc) to leverage their wastes to produce **biogas and biomethane** • Identify opportunities to **align the national regulation for waste and "operationalise" the NZ commitments** (going beyond NZ commitments, detailing national classification, collection and recycling) • Assess the needs to have more **detailed feedstock assessment at national level** to better characterise the biogas potential both North and South Island within economic radius
Demand	• Maximise the opportunities for biogas/biomethane to be **an explicit lever for NZ energy targets and commitments** • Assess the relevance of **possible policy mechanisms to support the uptake of biogas** from a demand perspective (e.g. renewable gas mandate, certification schemes such as Guarantee of Origin, etc) • Explore the **opportunities to support the local uptake of biogas/biomethane by-products, such as digestate and biogenic CO2** (i.e. favor market conditions with certification, mandate for replacement of synthetic fertilizer)
Supply	• Assess the relevance of **possible mechanisms to support the development of biogas/biomethane projects** (e.g., electricity FiT, biogas FiT, grants for project capex) • Further evaluate the **expected benefits from the North Star scenario at regional level for New Zealand** (i.e. jobs created at regional level, expected development impact, etc) • Identify the needs to **streamline the current development process** for biogas/biomethane projects (e.g. length of approval process, administrative burden, etc)
Awareness	• Explore different communication **pathways and channels to share knowledge about the biogas/biomethane sectors** across different stakeholder groups to highlight opportunities and benefits • Evaluate the requirements to advance the bioenergy industry in New Zealand, **highlighting and mapping current capability and skills compared to future needs**

List of actions to be further explored the North Star scenario

Ensure co-ordination at the national level between departments responsible for environmental, energy, industrial, and agricultural policy, as well as with local government, to **centrally pilot the exploration of the different actions** to support the development of the North Star scenario.

For example, by establishing a **cross-agency working group that can coordinate the Government's response** to biogas development.

Consider biogas as one of the key levers to achieve **New Zealand's commitments and deliver wider value**, and **explicitly build biogas** into New Zealand strategies for emissions reduction, energy transition, and waste management.

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