31 May 2024

Climate Change Commission
haveyoursay@climatecommission.govt.nz

Tēnā koe,

Grow to zero: setting an ambitious and beneficial decarbonisation agenda for New Zealand

Powerco is committed to contributing to Aotearoa New Zealand's net zero 2050 targets. Powerco is one of Aotearoa's largest gas and electricity distributors and we have a key role in the energy sector's contribution to the target through supplying around 357,000 (electricity) and 114,000 (gas) urban and rural homes and businesses in the North Island. These energy networks provide essential services to around 1 million kiwis and will be core to Aotearoa achieving a net-zero economy in 2050.

We have commented on the key topics for the review of targets and setting Emissions Budget 4 (EB4) in the attached table. Our summary views are:

Relativity of New Zealand's targets for the global economy we operate in

- We need to be relative to other nations and ambitious in our target while reflecting the global economy New Zealand operates in. Both relativity and the implications of changing the target (vs stability) need significant analysis
- Mitigation and adaptation are both relevant in assessing global relativity, and pathway options
- Stability and certainty provide benefit for businesses and the wider population. We can meet or beat the target without changing it, and we are on track to do this
- Keeping the target as it is, is the best course for New Zealand at this review point.

A best buy pathway has strong economic growth and all energy options

- We view EB4 as ambitious and feasible, however we need to be pursuing an emissions agenda which provides strong economic growth and co-benefits for economic wellbeing. We can grow the economy at least at the reference scenario rate, while meeting net zero 2050 targets
- Updated modelling is needed to reflect the current interaction more accurately between electricity and gas, anticipated impacts on electricity bills, the improved confidence in the role of biogas, and renewed readiness for CCS
- There is significant optionality in energy sector and a need to progress all options for New Zealand's decarbonisation. More clarity on options, and their emissions and economic impact, will assist decision-makers.

If you have any questions regarding this submission or would like to talk further on the points we have raised, please contact Irene Clarke (Irene.Clarke@powerco.co.nz). We give consent for the Commission to publish this submission in full.

Nāku noa, nā,

Emma Wilson
Head of Policy, Regulatory and Markets
POWERCO

Attachment 1 – Response to consultation documents

Table 1 Review of the 2050 emissions reduction target – setting a clear and stable direction for the economy

Topic and consultation questions	Powerco response
The 2050 target's contribution to efforts to limit warming to 1.5°C • *Do you agree with our approach to assessing how the current 2050 target contributes to global efforts to limit warming to 1.5°C?* • *What role do you think Aotearoa New Zealand's national circumstances should play in how the country contributes to global efforts to limit warming, as defined by the 2050 target?*	We acknowledge that the current New Zealand target will likely result in New Zealand emissions contributing to warming after 2050. We also note that New Zealand can't make up for global efforts not meeting global targets. In considering global contribution and relativity, we need to look at our target's place in the global economy which New Zealand's economy operates in, and the cost of mitigation/adaptation for our target alongside our economic partners. The discussion document does not appear to assess this. There is a key risk if we go ahead of the global 2050 target for emissions leakage and shifting the problem.
Significant changes – assessment for global action and technology development • *Do you agree with our approach to looking for significant change? Are there any other approaches or pieces of evidence you think we should include in our final review?* • *Do you agree with our initial findings related to significant change? Have we missed any important information or evidence?*	<u>Global action</u> We acknowledge the two elements of the change – relative ambition of New Zealand target has reduced, and likelihood that global temperature will rise above 1.5°C has increased. As noted above, in considering global contribution and relativity, we need to **look at our target's place in the global economy which New Zealand's economy operates in**, and the cost of both mitigation and adaptation for our transition alongside our economic partners. We view this as a key part of the assessment. An aspect of global action which does not appear to be considered in the document is the significant changes in the insurance market since 2019. New Zealand's exposure to insurance risk and cost has changed, impacting economic and potentially fiscal circumstances, and underscoring the importance of the combined mitigation/adaptation efforts. We need to be relative and ambitious in our target, but the test of relativity and the implications of changing the target (vs stability) need significant analysis.

Topic and consultation questions	Powerco response
	Technology development We endorse a technology optimistic approach and looking to remove barriers for technology development to support emissions reduction. We expect technology development and market uptake will surprise us all. There is a role for the ETS, market tools and other actions to maximise innovation and technology development. We agree that the technologies and processes for electrification were foreseeable in 2019 and have not changed significantly since then. Price and availability have both increased and decreased in different aspects, and are not a significant change for consideration just now.
There are benefits and impacts in changing the target • *Are there any issues or impacts related to people and/or the climate that you want the Commission, and eventually the Government, to consider and prioritise when reviewing the 2050 target?*	**Stability and certainty** in the structure and timeframe and level of the target are all important and there is no evidence that the benefits of change would outweigh the costs. We support the split gas approach in the current structure. We agree there is no evidence to support weakening the target. If a strengthened target is being considered, analysis will be required of economic effects, social implications, environmental effects, and New Zealand's place in global action. While the target and policies to achieve it are two different things, it is difficult to analyse impacts of changing the target without also considering the policies that could support that or manage impacts. Scenario modelling is important so the target, assumptions, and actions are considered together in assessing the impacts of any change to the current target. The impact on economic growth for all scenarios is a key point of consideration. A higher rate of economic growth meeting the current target may outweigh a lower rate of economic growth for a strengthened target, particularly when the implications in the global market and to local social equity are assessed. To assess the additional mitigation cost, the full transition cost must be assessed as New Zealand is already facing large costs for adaptation which will be needed as well as costs for mitigation, and our adaptation costs are high relative to some countries.
The next step will look at alternative strengthened targets and their implications	**We can meet or beat the target without changing it.** We suggest looking at **ways to incentivise beating the target**, rather than changing it, as part of the next phase options/impact assessment. In particular, options to encourage those in the economy who can transition their activities to have net negative emissions to do so.

Topic and consultation questions	Powerco response
	The net 2050 target is well understood and adopted throughout New Zealand business and organisations. Changing this could impact both the actual chance of achieving it (due to instability) and the ability to bring New Zealanders together in aiming for a clear target. The next phase of analysis needs to look at the impacts and benefits of change vs stability. **Keeping the target as it is**, is likely the best course for New Zealand at this review point.

Table 2 Setting emissions budget 4: Grow to zero with all feasible options

Topic and Consultation questions	Powerco response
Recommended level for EB4 • *Do you agree with our assessment of the considerations that have informed our proposed budget level, including key judgements? If not, why not?* • *Are you aware of any further evidence that the Commission should consider in making its assessment of feasibility, cost, and implications of potential abatement options in the fourth emissions budget period?*	It is not clear that the proposed EB4 and the demonstration path are the 'best buy' (as discussed at the front of the document). The 2050 target will be achieved well before 2050 but with impacts. For example, a best buy pathway would include biogas and CCS as solutions which enable net-zero or low emissions but based on molecular combustion. New Zealand has an opportunity to realise lower cost transition pathways using net-zero combustion processes rather than those possible with pathways limited to curtailed or substituted combustion. We **broadly support the direction of the proposed EB4 to be ambitious and feasible, subject to adjustment to ensure economic growth remains strong**, and clearer information on the pathway options to inform government decisions. We agree with the recommendation that offshore mitigation in EB4 be limited to 0.0 MtCO2e. Offshore mitigation should be a last resort in exceptional circumstances beyond the government's control.
The path to the fourth emissions budget • *Do you agree with the approach we have taken to developing our EB4 demonstration path? If not, why not?* • *Is there anything we haven't considered that we should be including in this approach?*	Using policy in place on 1 July 2023 is not an accurate reference scenario. The new government cannot make decisions in 2024 based on modelling policies that are not its own and does not reflect its own agenda on approach to climate policy. This needs to be updated with appropriate modelling in the final advice. A path that is technically and economically feasible, and beats the target, is not necessarily aligned to achieving the 2050 target while not undermining national energy security, enabling innovation and market led responses (priorities for current government).

Topic and Consultation questions	Powerco response
	The options and impacts of various actions between the demonstration path and alternative A and B are not always clear. **Making clearer the options and different impacts is important** for the government to mix and match (as all paths align with the proposed budget). Biogas is not adopted for the demonstration path. We are confident that biogas with be an integral part of the energy system by 2036, and comment on this further below in the section below on energy sector contribution.
Sector contributions on EB4 – Energy • *Do you agree the changes we assume for each sector are plausible and achievable? If not, why not?* • *Do you have any evidence or insights that could contribute to our analysis?*	Powerco **supports a pathway to reduce New Zealand's fossil gas use and shift to renewable energy options**. The transition is complex and may follow a number of possible scenarios with differing impacts and benefits. We query the **inputs on gas and electricity modelling**. The EY gas supply and demand study completed for GIC in December 2023 is a good source of data, scenario analysis and forecast needs for gas[1]. This report confirms the need for natural gas for a significant time yet, along with a role for LPG and biogas. The modelling or rationale behind the approach that deems oversupply of renewables more cost-effective than replacing gas peakers for security of supply at peak times is not clear. It would be helpful to set this out more clearly, including against a test of 'best-buy' for energy security. On **viability of gas distribution infrastructure**, it is not clear the CCC has modelled a managed transition away from fossil gas, what transition assumptions are used to get to the 2050 point, the impact on emissions, the interplay between gas infrastructure and low carbon gases (including biogas), the interplay between needing gas to support electricity supply and gas infrastructure (including pipelines) for that purpose, and where the costs are allocated. We refer to the Gas Infrastructure Future Working Group (GIFWG) separate submission to the Commission and reports [2] prepared over the last three years, for details on this. In addition, we refer to our separate submission[3] in 2023 to the consultation on the Gas Transition Plan issues paper. In this submission we have outlined our view on the gas transition

[1] GIC Gas Supply and Demand Study 2023 Gas Supply and Demand - Gas Industry

[2] The GIFWG is the grouping of three major gas pipeline businesses, Firstgas, Powerco and Vector, formed to work together on policy and supporting evidence to inform the gas transition. GIFWG reports are provided with the GIFWG submission to this Commission consultation including the Gas Transition Analysis Paper, June 2023,also available here: Gas-Infrastructure-Working-Group-GIFWG-Attachment -Gas-Transition-Analysis-Paper-13-June-2023-Submission-on-IM-Review-2023-Draft-Decisions-19-July-2023.pdf (comcom.govt.nz)

[3] Powerco submission on the Gas Transition Plan issues paper, November 2023 ministry-of-business-innovation-and-employment---gas-transition-plan-issues-paper.pdf (powerco.co.nz)

Topic and Consultation questions	Powerco response
	activities and timing for gas infrastructure, renewable gas, and natural gas use (refer submission page 3). We also provided information on the linkage between gas winddown and alternative energy sources requiring further consideration for example initial analysis indicating some of our feeders potentially experiencing more than 40% increase in peak demand as a result of residential conversion, and Wellington Electricity modelling a 52% increase in current 98 percentile demand if current gas customers convert of electricity on their network (refer submission page 28). We are **confident on an important role for biogas** in the transition by 2036 as it is developing quickly. It is not about choosing electricity or fossil gas or renewable gas. All will be needed to support a managed and equitable transition with security of supply. DETA technical report assumes some biogas use in process heat decarbonisation. The EY report referenced above also assumes some biogas as part of the supply mix. The discussion document does not address different use cases for gas including biogas. We provide the Blunomy report[4] for recent evidence on feedstock and cost/benefit. This analysis found that New Zealand already produces 4.9PJ of biogas, with a further 9.5PJ of untapped potential in the North Island and 9.1PJ in the South Island. The potential to produce 23.5PJ of biogas a year could reduce New Zealand's annual emissions by 3.7mtCO2-e. In March 2024, Powerco announced two initiatives underway to take steps towards using biogas in our gas network, clearly indicating that Powerco sees this energy option as one that is not only technical and economically feasible, but one that aligns with our commitment to net zero. **CCS has significant potential** and we see a renewed readiness for CCS to have a role. Development of biogas, change in demand/use of gas, CCS and linkages to electricity generation and security of supply, should all be points for future reviews. We note that a 34% increase in electricity demand in the reference scenario seems very low compared to all reasonable forecasts. The 59% used in the demonstration path is also lower than many forecasts (noting the Transpower's 68% forecast is referenced). We acknowledge that the demonstration path is one example of actions to meet EB4. There is significant optionality in energy and a need to progress all available options for New Zealand's decarbonisation. We encourage the Commission to **more clearly recognise the options to assist decision makers**.

[4],Vision for biogas in Aotearoa New Zealand, Blunomy October 2023. Attached in Attachment 1 and also available on our website

Topic and Consultation questions	Powerco response
	We note that the pending **Sector and Government Energy Transition Framework** (with the Commission is a party to) provides an important opportunity to collaborate in decarbonising the energy sector.
Sector contributions on EB4 – transport and waste	Assumptions on EV uptake are probably too ambitious, considering latest uptake data and current policy. EV uptake seems very sensitive to price, policy, infrastructure and other variables. It will be important to keep this under review. The estimate on diversion of organic waste and anaerobic digestion (AD) doesn't seem to align with conclusions on biogas. Noting that not all AD produces biogas, but this is an opportunity for its use.
Economic impact of EB4 compared to reference scenario • *Do you agree with our assessment of the impacts?* • *Are there other impacts the Commission should consider, or give more prominence?* • *Are there other specific effects on iwi/Māori we should be considering? Are there other matters about the Crown–Māori relationship, or for te ao Māori, that we should be considering?*	We **need to be pursuing an emissions agenda which provides strong economic growth and co-benefits for economic wellbeing**. We should aim to (and can) grow the economy at least at the reference scenario rate, while meeting net zero 2050 targets. New Zealand has a renewable endowment that can be leveraged to attract new business and investment. To support an ambitious and feasible path, policy settings must be directed towards **enabling confidence in investment and economic growth as a bottom line**. Ensuring strong economic growth while we decarbonise is the only way that New Zealand will thrive in the global economy. Consumer benefit will be required to provide the **social licence needed** for ambitious decarbonisation actions. This will only materialise through strong economic growth. New Zealand and foreign investors can leverage our renewable resources to provide growth needed to support consumer benefit and fund New Zealand's adaptation challenge. **Biogas and CCS both provide opportunities for growth**, decarbonisation and co-benefits (eg regional development and waste solutions). Further **economic and emissions modelling and/or description of modelling results would assist** to better understand options for pathways and actions, including links between sectors, and regional variations. Understanding economic growth opportunities and impacts of different choices is fundamental.
Impact of EB4 on Māori, regions and communities	We note the assessment of these impacts and agree there are opportunities and challenges for Māori, impacts on work and jobs that varies between regions, and there are distributional and equity impacts. The opportunities with biogas development and production will bring regional benefits to some regions and align with the bioeconomy. This is an example where regional differences in the energy sector need to be considered and could

Topic and Consultation questions	Powerco response
	look quite different to the reference scenario, such as impacts from use of renewable gas for heating in the South Island. The report appears to take a national approach only in commentary and modelling of energy. We encourage **nuanced analysis is needed to identify and assess distributional and equity impacts** of EB4 and the demonstration path.
Impact of EB4 on households - electricity bills and changing gas supply	It seems **only some aspects (wholesale price) of electricity cost have been subject to detailed modelling** so concluding that electricity bills are unlikely to significantly change based on this could be misleading. **Higher investment is needed in transmission and distribution than generation** (BCG[5]) These costs will be location and asset specific and vary across the country. There are also costs for decommissioning fossil gas which do not appear to be accounted for. While demand response options can reduce the need for some network build, our view is that **both demand response and build are needed** (confirmed in the BCG report) and it is important to be clear how the Commission has accounted for both flex and build impacts on electricity prices (plus gas in support). Also note that behind the meter and flex solutions still require investment in systems by distributors or other providers. while the Electricity Authority work programme anticipates distribution reform concluding by December 2025, however it is not yet clear the timeframe and pace for the market to develop, roles to become embedded, enabling features to be in place (such as standards and data) and for distributed resources to begin to play a significant role in the electricity system. The Commission should consider including uptake of demand response as an item for future reviews. **More robust modelling is needed of both electricity and gas costs**, including distribution build (electricity) and decommissioning (gas). This is needed to inform decisions on pathways and policy options. A managed transition path to address costs is not clear. The **transition challenge has been explored in various modelling and analysis by the GIFWG[6]**. With Biogas in the energy mix in 2036-40, it is only appliances that are uneconomic with biogas that need to be discouraged. As biogas is almost identical to natural gas molecules, there is not a need to replace appliances with blended or 100% biogas in network supply.

[5] The Future is Electric (BCG, October 2022). Report availalbe on BCG website: Climate Change In New Zealand | The Future Is Electric | BCG

[6] See footnote 2 above for description of the GIFWG.

Topic and Consultation questions	Powerco response
	We agree there will be inequities between households and there is a role for Government to support those most affected. We also agree that acting to reduce emissions and **adapting to climate change** will be crucial together, to ensure one goal does not undermine the other, that inequities are not exacerbated, and that the cost of the transition (both mitigation and adaptation) is considered in assessing policy options.
Proposals for EB1, EB2, EB3 • *Do you agree with the Commission's approach to assessing changes?* • *Do you agree that all set budgets should be revised to account for methodological changes and the significant changes that have occurred?*	We acknowledge the approach to assess methodological changes and significant changes. This seems reasonable. A discussion on the impact of the proposed changes would also assist to understand the implications of the proposals. We have recommended some specific factors above that will be important for future reviews and we would seek these be included in table 6.2 for future reviews, for example development and uptake of biogas.
Measuring progress • *Do you agree with our assessment?*	We note the proposed two principles of additionality and permanence to be added to the accounting rules, and the recommendation to develop long term plans for emissions monitoring. We have no future comment on this proposal.

Attachment 2 – Vision for biogas in Aotearoa New Zealand (Blunomy)

Vision for biogas in Aotearoa New Zealand

Final report document

October 30, 2023

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 **11 PJ/yr of untapped potential in the North Island**, and **8 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 24 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.

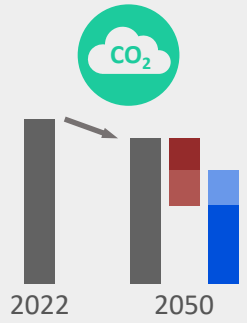
2

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



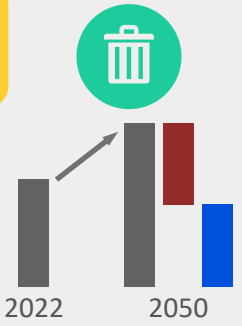
57 $MtCO_2$-e emissions in 2050

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 24 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 24 PJ per year across, North and South Island[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

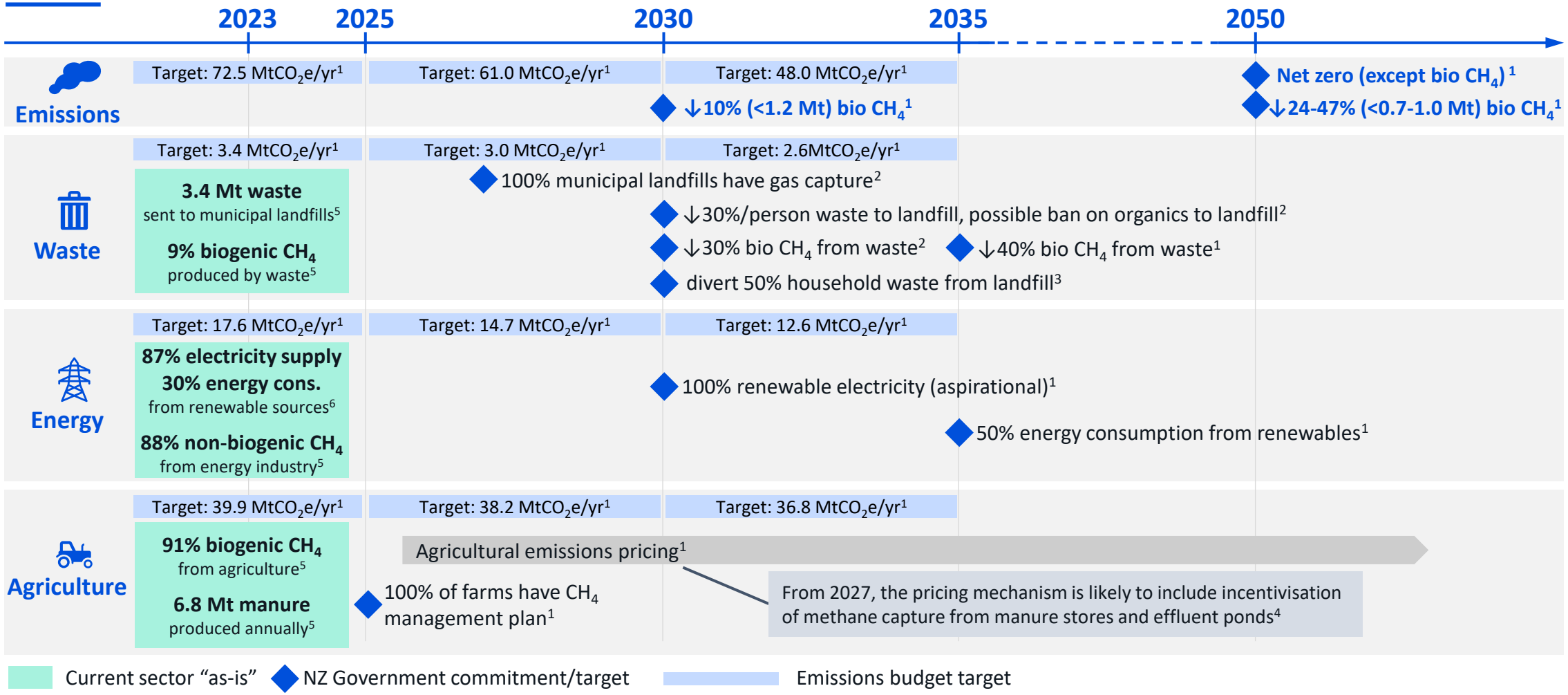
New Zealand's current policies and targets to decrease emissions are primarily targeting the waste industry

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

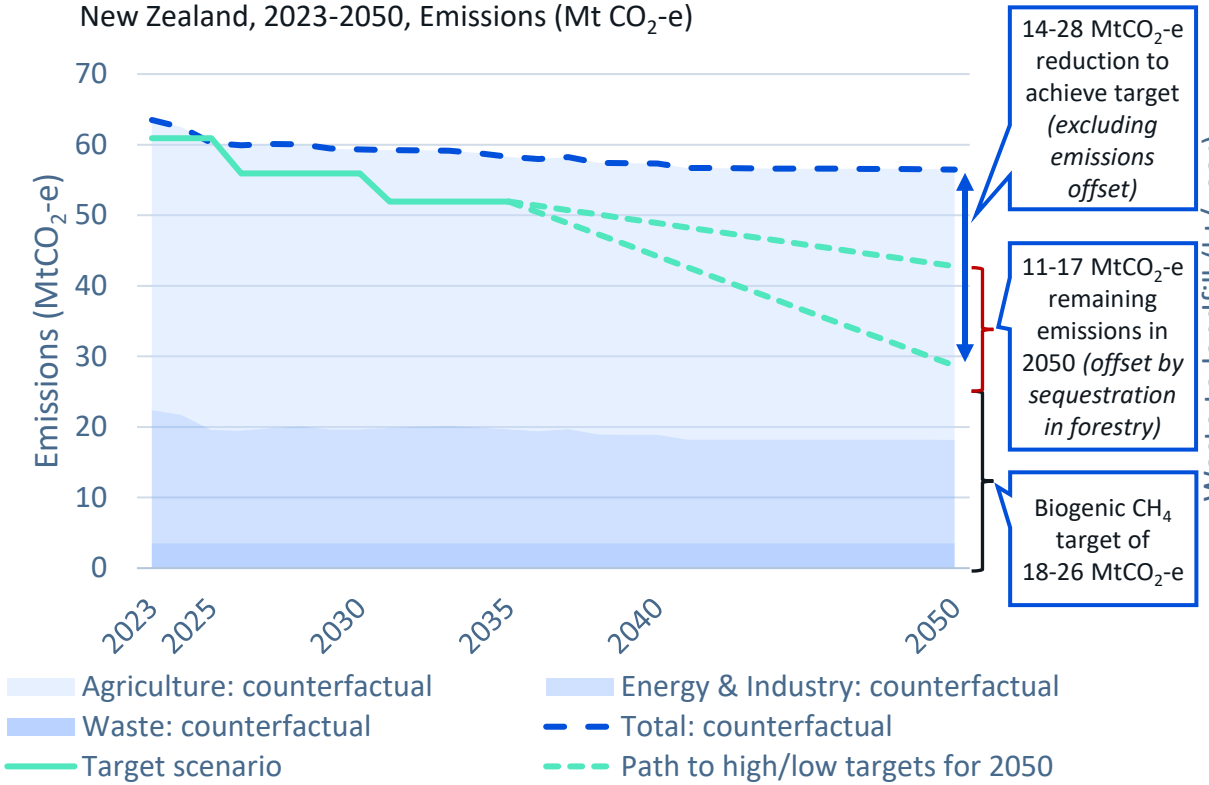


[1] Aotearoa New Zealand's first emissions reduction plan, NZ MfE, May 2022. The 2050 net zero target covers all greenhouse gas emissions except biogenic methane. Reductions in biogenic CH_4 are relative to 2017 levels; [2] Te Rautaki Para – Waste Strategy, NZ MfE, Mar 2023; [3] Improving household recycling 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

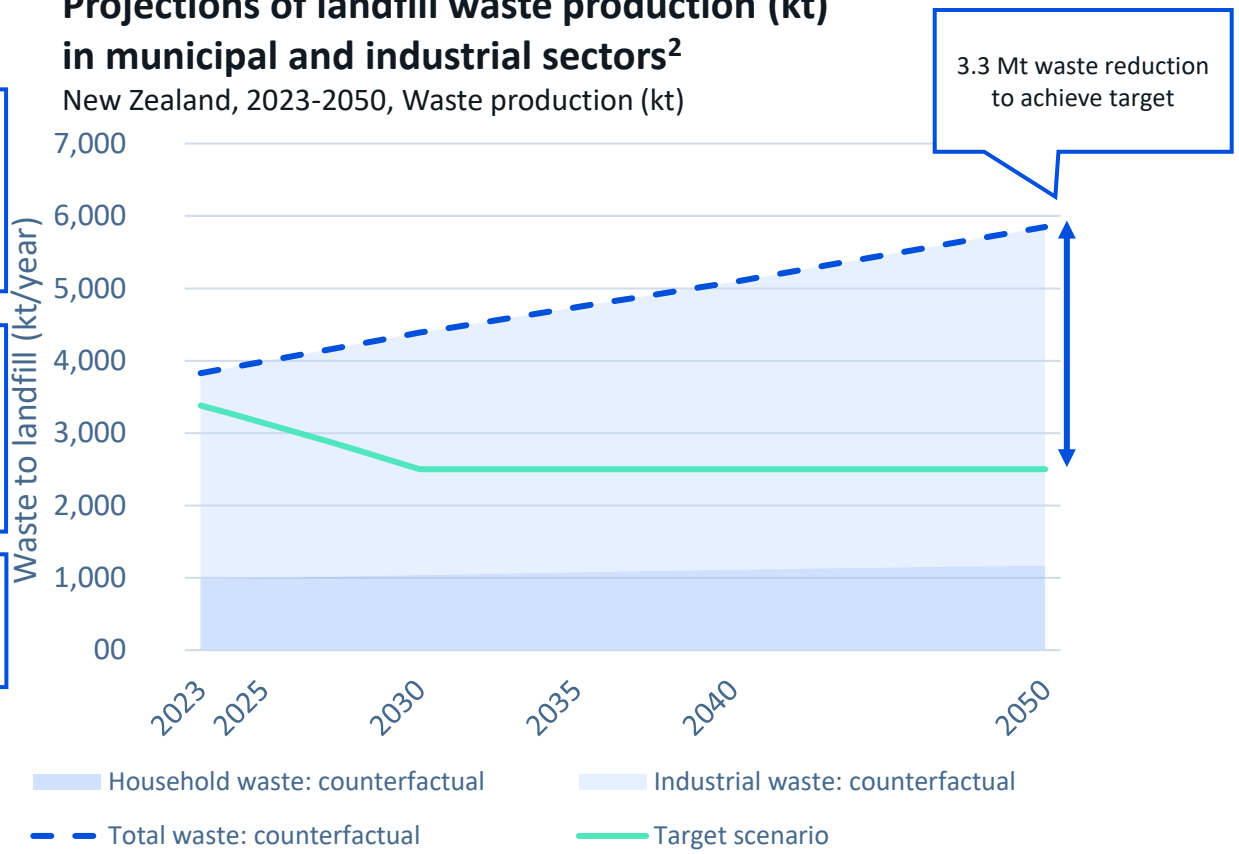
Projections of CO_2 emissions (equivalent) across the waste, energy and industry, and agriculture sectors[1]

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



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

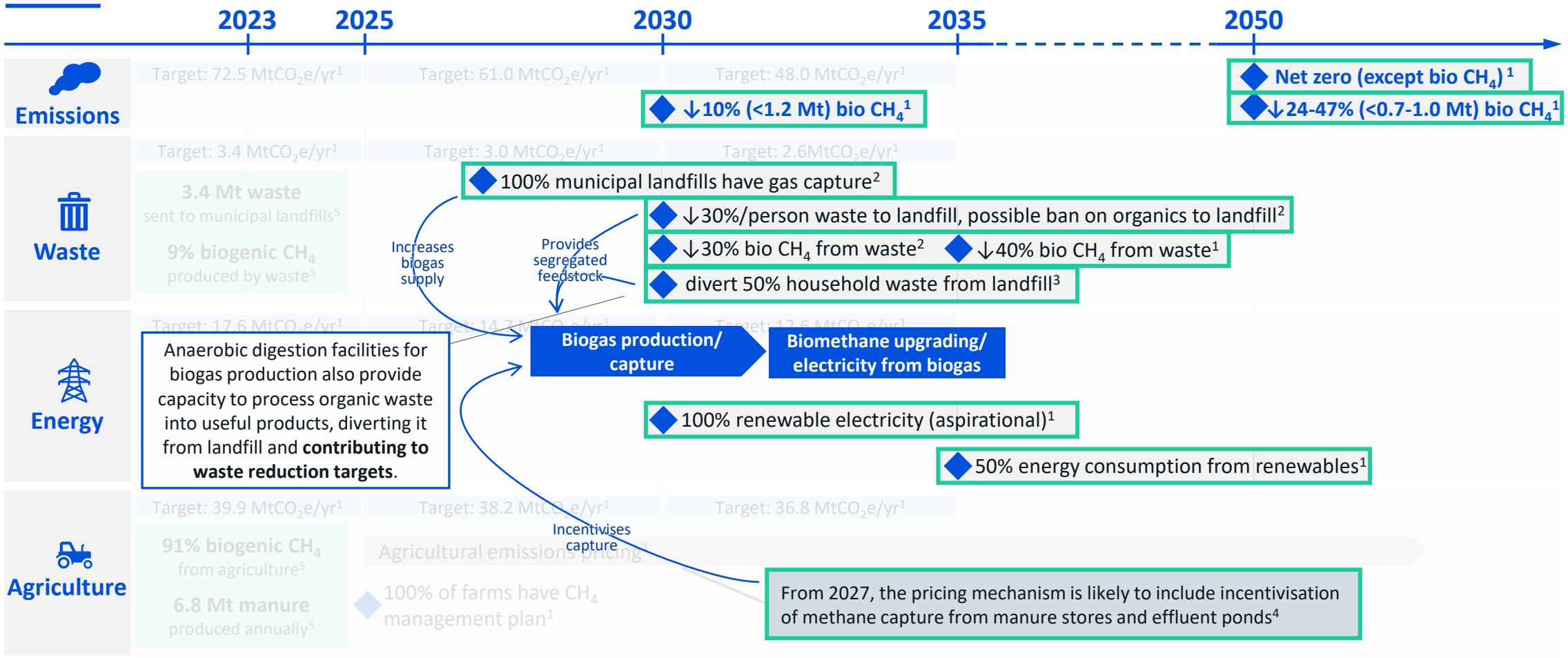
New Zealand, 2023-2050, Waste production (kt)



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)



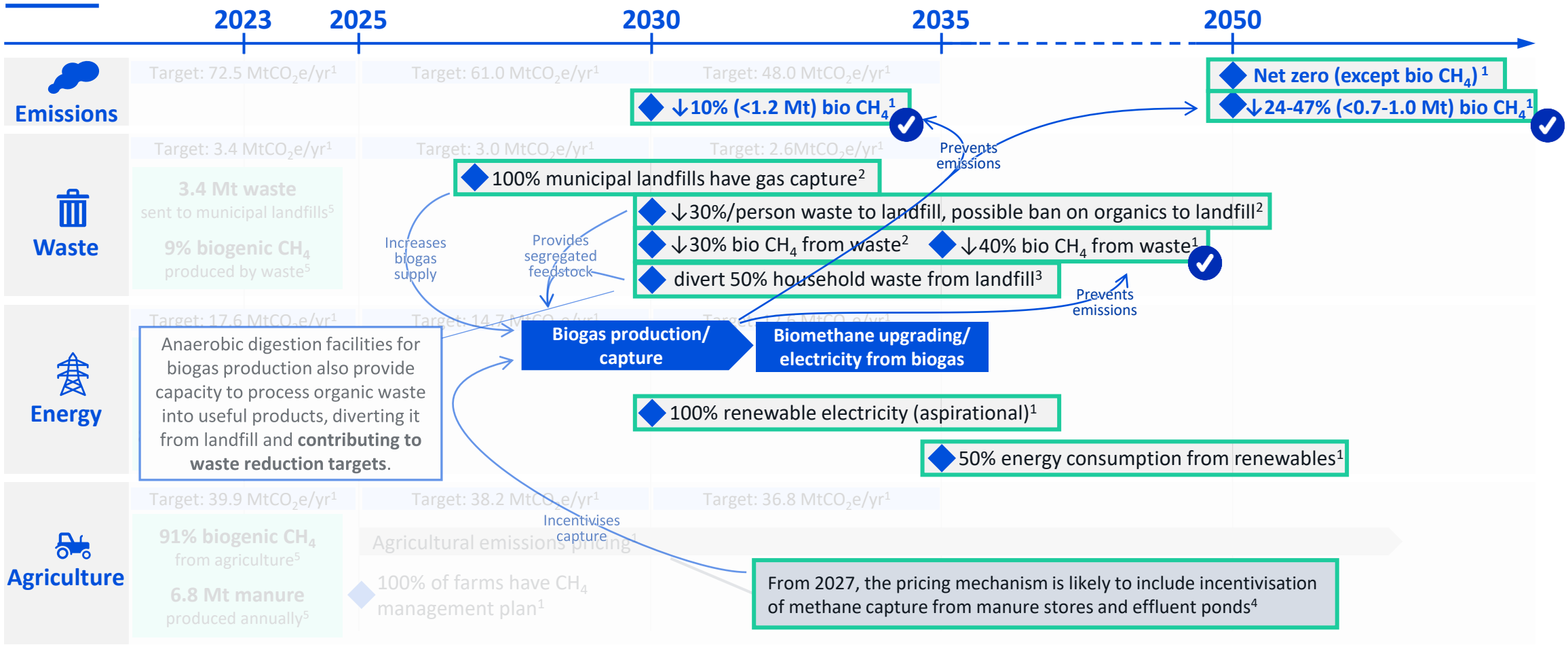
Biogas can support the NZ commitment/target

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 (2/3)



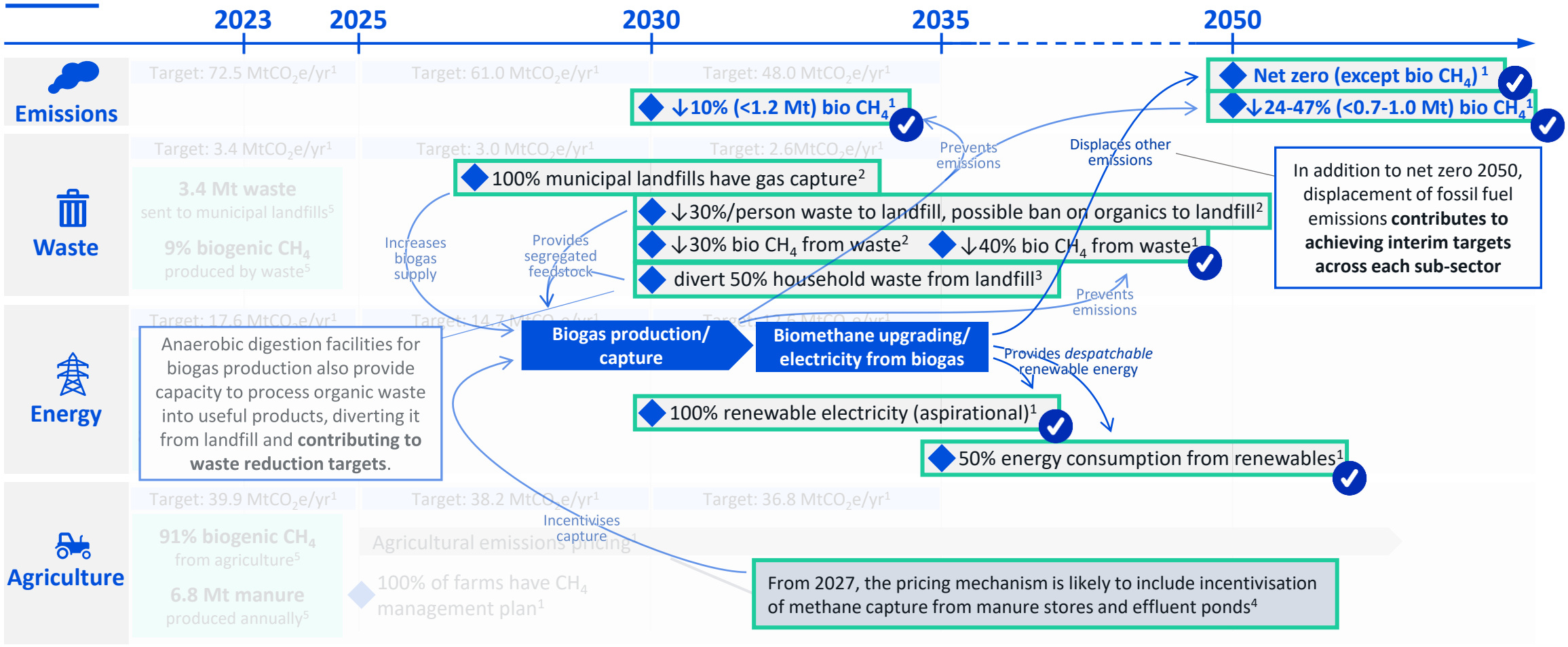
Biogas can support the NZ commitment/target

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)



Source: Blunomy analysis

Currently ~4.9 PJ of biogas is produced in NZ, with a further ~11 PJ of untapped theoretical potential in the North Island alone

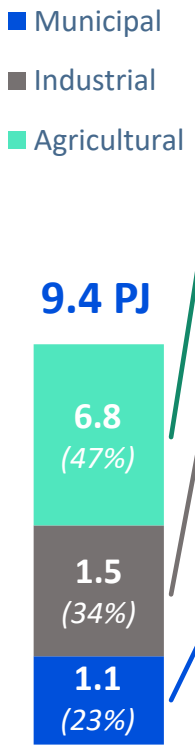
Current biogas production – *North Island*

Agricultural • 1 piggery digesting manure	**<0.01 PJ**	**7.6** *(53%)*
Industrial - wastewater • 1 dairy processing site (Tirau dairy site, but decommissioned)	**-**	**2.9** *(66%)*
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*	**3.5** *(77%)*
Municipal – wastewater • 10 WWTP currently utilising anaerobic treatment processes	**~0.8 PJ**	

14 PJ

North island potential

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	

South island potential

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

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]

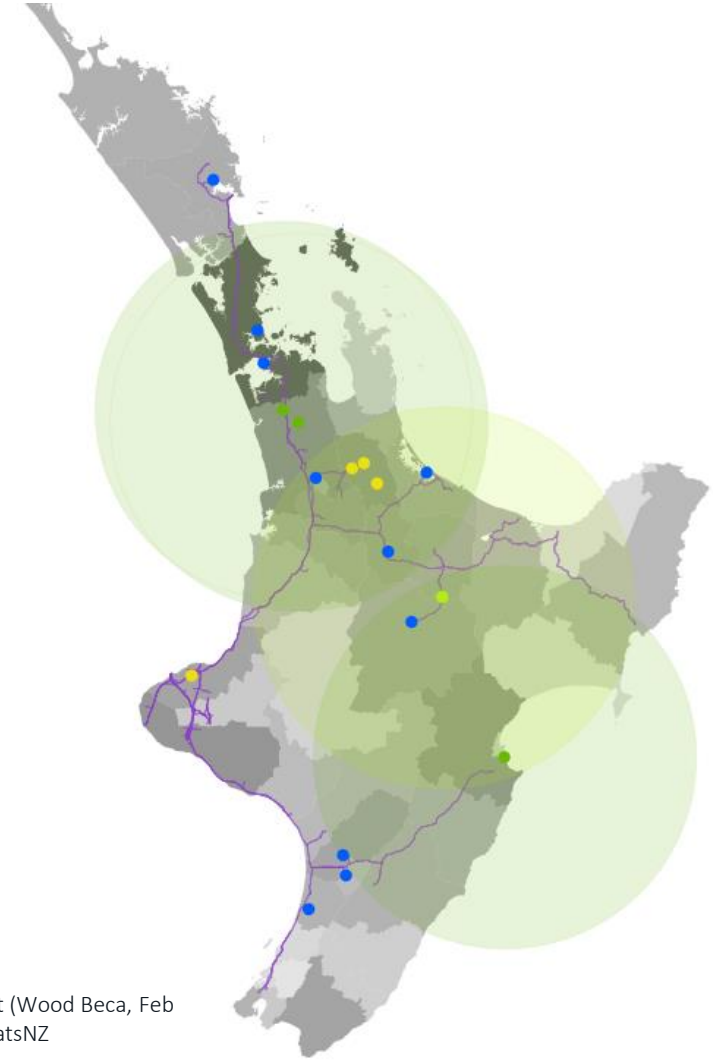
Low — High

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]

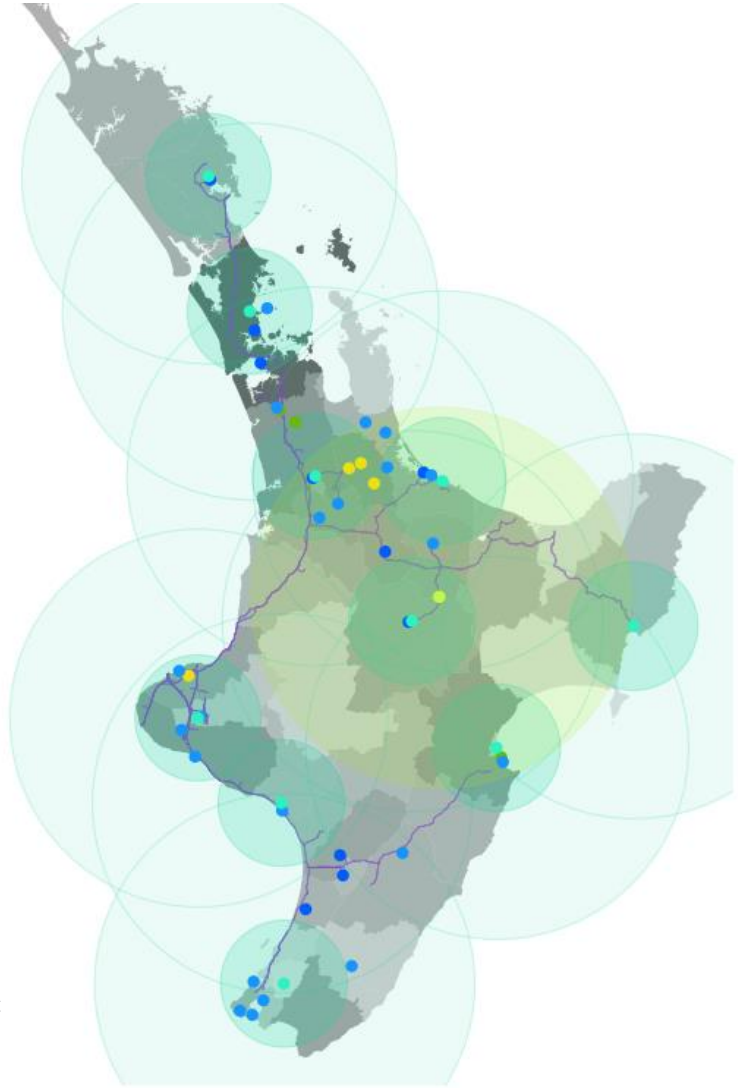
Low — High

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

[1] : Ministry of Business, Innovation and Employment

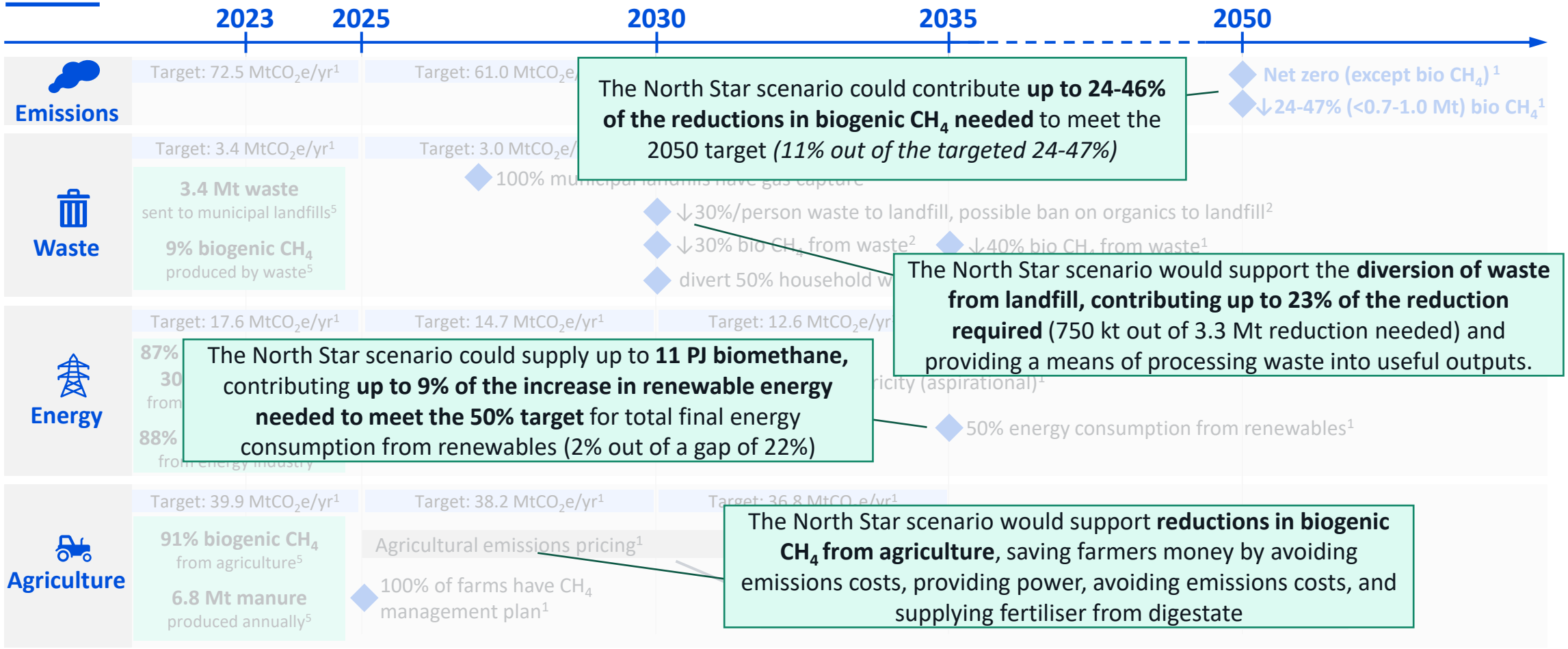
The North Star scenario has a strong impact against the criteria, with variation between high and low scenarios

		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

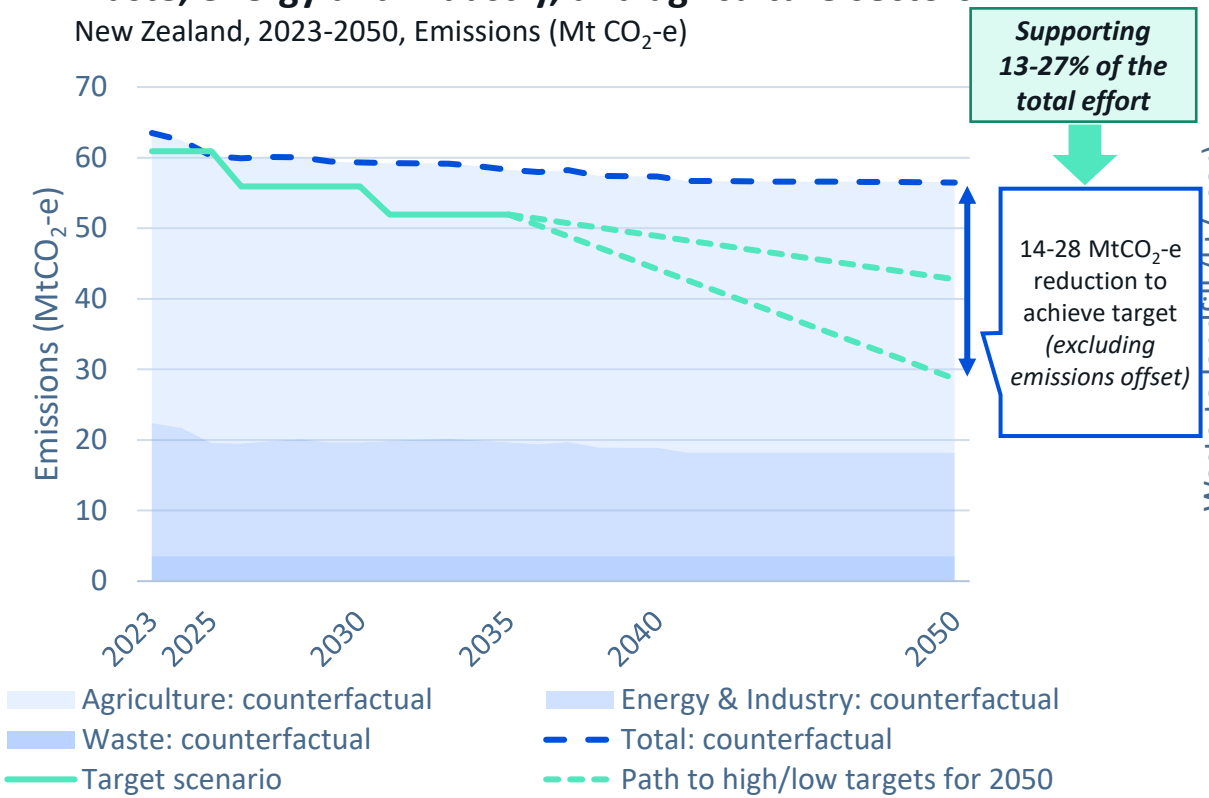


Sources: Blunomy analysis

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

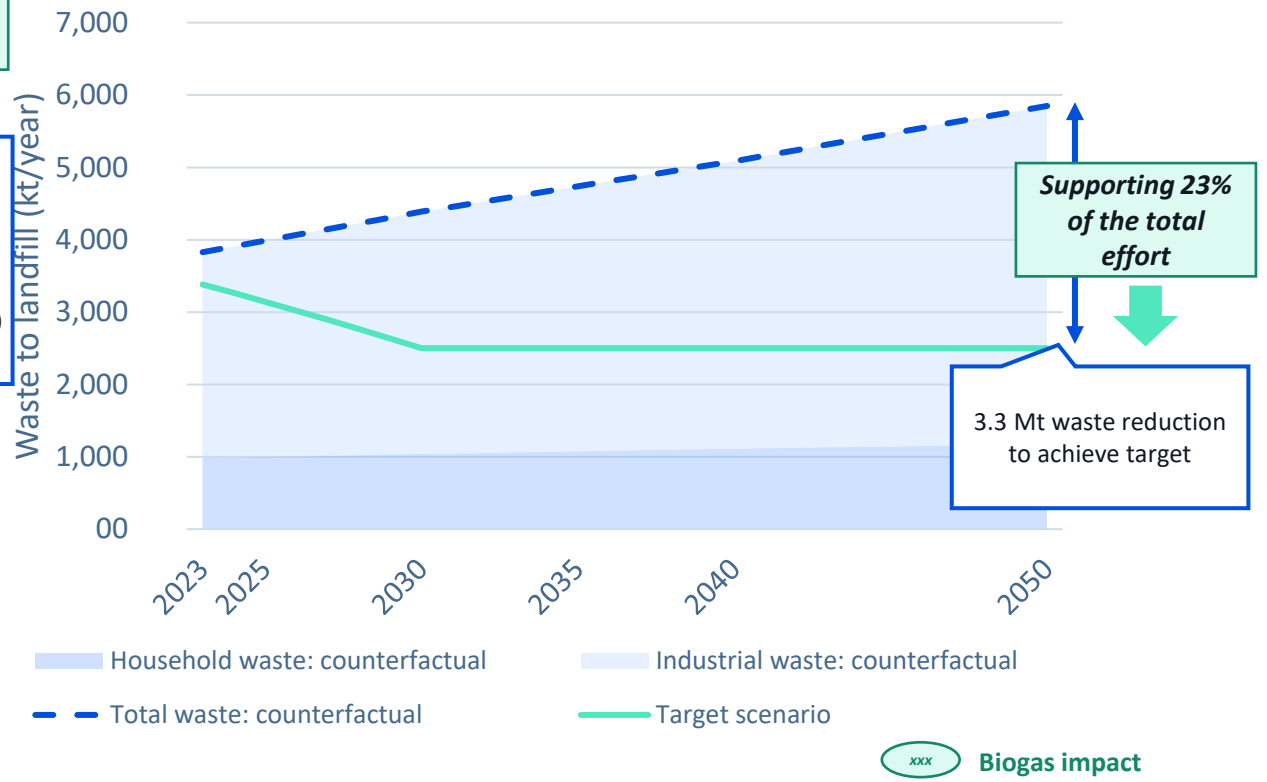
Projections of CO_2 emissions (equivalent) across the waste, energy and industry, and agriculture sectors[1]

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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Attachment 3 – Information about Powerco and our network

Providing an essential service

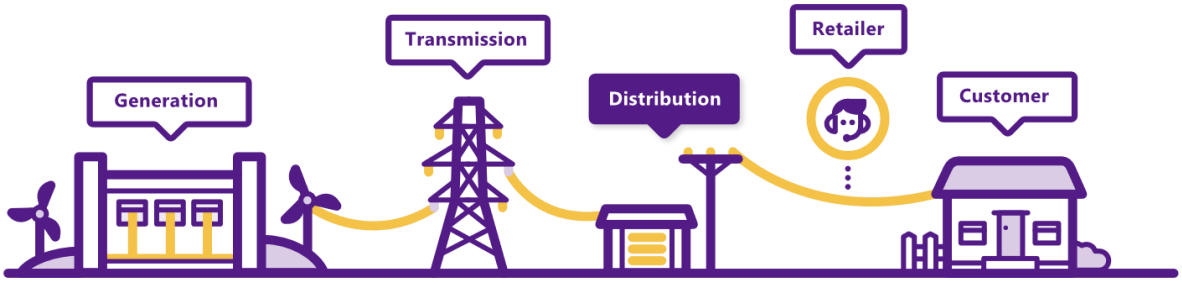
We bring electricity and gas to around 1 million kiwis across the North Island. We're one part of the energy supply chain. We own and maintain the local lines, cables and pipes that deliver energy to the people and businesses who use it. Our networks extend across the North Island, serving urban and rural homes, businesses, and major industrial and commercial sites. We are also a lifeline utility. This means that we have a duty to maintain operations 24/7, including in the case of a major event like an earthquake or a flood.

The cost of operating our business is not dependent on the amount of gas or electricity we distribute in our networks. These costs reflect the need to maintain the safe operation of the network and are mostly driven by compliance with safety regulations. This includes replacing assets when they reach their end of life. Additional costs to grow the size or the capacity of the network are often met by customers requiring the upgrade or new connection.

Under Part 4 of the Commerce Act, Powerco's revenue and expenditure are set by the Commerce Commission as part of monopoly regulation. We are also subject to significant information disclosure requirements, publicly publishing our investment plans, technical and financial performance, and prices. The regulatory regime allows us to recover the value of our asset base using a regulated cost of capital (WACC) set by the Commission, and a forecast of our expenditure. Every five years, the Commission reviews its forecasts and resets our allowable revenue. This process is designed to ensure the costs paid by customers for us to manage and operate our network is efficient given we are a monopoly and an essential service.

Our electricity customers

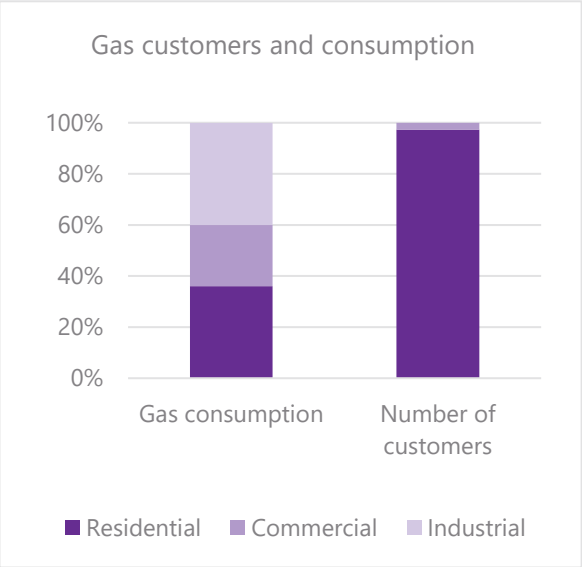
Powerco is New Zealand's largest electricity utility by the area we serve. Our electricity networks are in Western Bay of Plenty, Thames, Coromandel, Eastern and Southern Waikato, Taranaki, Whanganui, Rangitikei, Manawatu and Wairarapa. We have over 29,000 km of electricity lines and cables connecting around 357,000 homes and businesses. Our place in the electricity sector is illustrated below.



Our network contains a range of urban and rural areas, although is predominantly rural. Geographic, demographic, and load characteristics vary significantly across our supply area. Our development as a utility included several mergers and acquisitions that have led to a wide range of legacy asset types and architecture across the network.

Powerco is one of 29 electricity distribution companies. Our customers represent around 13% of electricity consumption (similar in magnitude to the Tiwai aluminium smelter) and around 14% of system demand. Powerco's network is almost three times the size of Transpower's in terms of circuit length. The peak demand on our combined networks (2023) was 974 MW, with an energy throughput of 5,225 GWh.

Our gas customers



Powerco is New Zealand's largest gas distribution utility. Our gas pipeline networks are in Taranaki, Hutt Valley, Porirua, Wellington, Horowhenua, Manawatu and Hawke's Bay. We have over 6,200 km of gas pipes connecting to around 114,000 homes and businesses. Our customers consume around 8.6 PJ of gas per year.

Our industrial customers are less than 1% of our customer base and consumer approx. 40% of gas on our network. Our residential customers are 97% of our customer base and consume approx. 35% of gas on our network. The remaining 25% of gas is consumed by our commercial customers.

Around 30% of our larger customers are in the food processing sector, around 20% in the manufacturing sector and around 10% in the healthcare sector.

Our network footprint

Our network represents 46% of the gas connections and 16% of the electricity connections in New Zealand. We operate assets within six regions and across 29 district or city council areas.