SUBMISSION ON GAS TRANSITION PLAN ISSUES PAPER

For Ministry of Business, Innovation and Employment
November 2023

Tēnā koe e te tumuaki

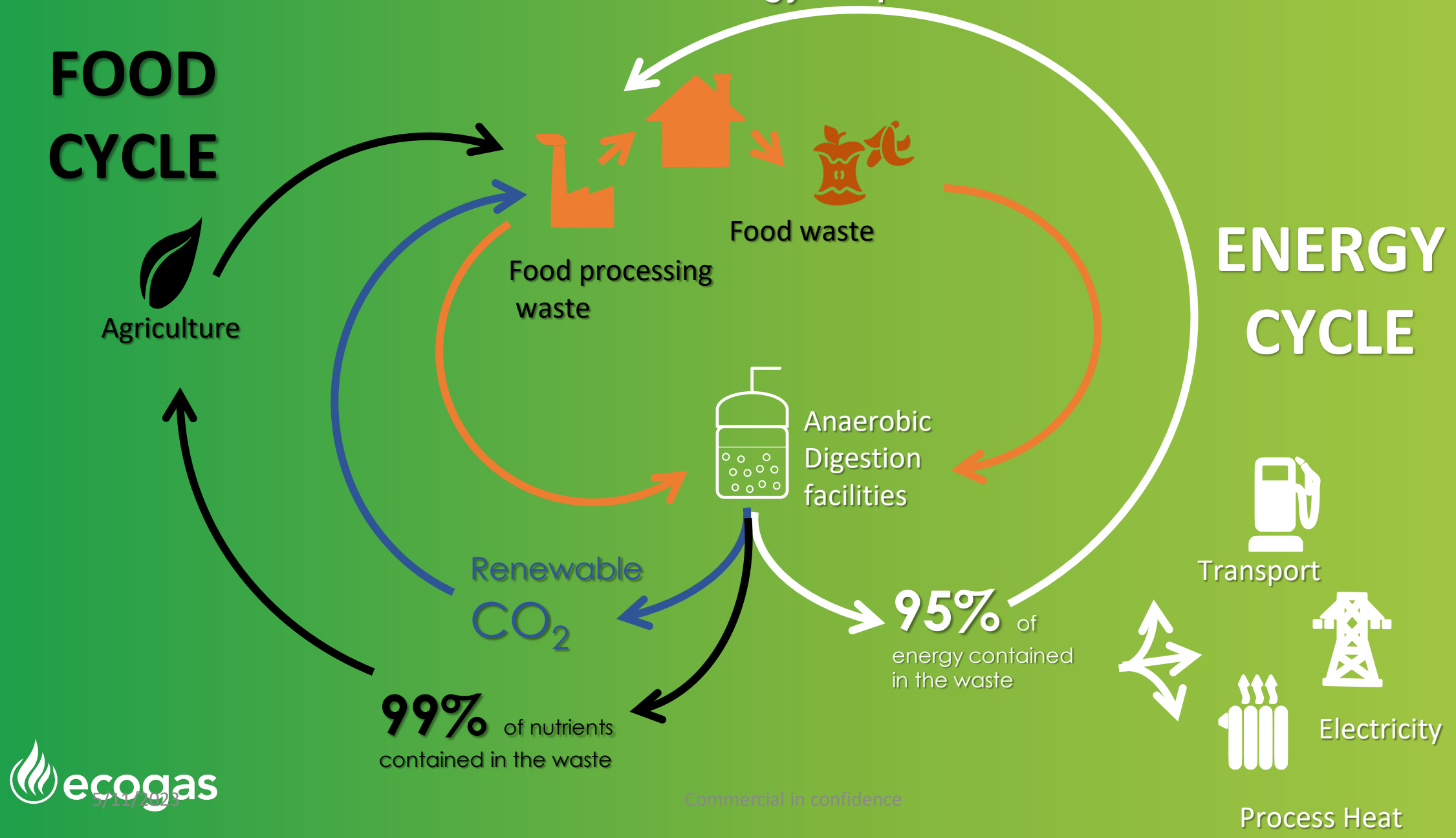
Thank you for the opportunity to submit on the Gas Transition Plan Issues Paper.

Our aim is to share our learnings from bringing the first full-scale waste to biogas/biomethane plant to life in order to inform future government strategies and policies.

THE ECOGAS STORY

- Partnership between EcoStock and Pioneer Energy
- 100% New Zealand Owned
- 85% Community Owned by Central Lakes Trust
- Our mission: **To repurpose organic waste into quality, renewable energy, CO_2 and fertiliser**

Our vision: To close the food and energy loop for a sustainable future.



SHIFTING THE DIAL

Emissions avoidance

ZERO

Emissions production

REDUCTION

ELIMINATION

AVOIDANCE

Landfill Gas Recovery for Heat or Power

Composting for Soil Conditioning

Anaerobic Digestion (AD) for Biofertiliser, energy and CO_2

Anaerobic Digestion (AD) enhances the pursuit of emissions reduction via production of near-direct substitutes to fossil-derived products (natural gas, liquid fertilizer),

Commercial in confidence

ecogas

OUR JOURNEY

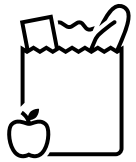
OUR JOURNEY HAS BEGUN

Papakura Sorting and Consolidation Facility

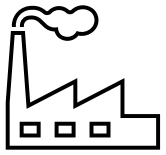
Ecogas Reporoa Organics Processing Facility

ECOGAS REPOROA

Household food scraps
Owner: Councils
BAU: Landfill

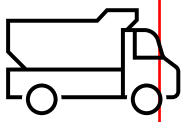


Pre-consumer waste
Owner: Supermarkets, waste collectors
BAU: Landfill

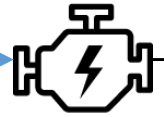


Industrial waste
Owner: Industrial clients
BAU: Land spreading, landfill

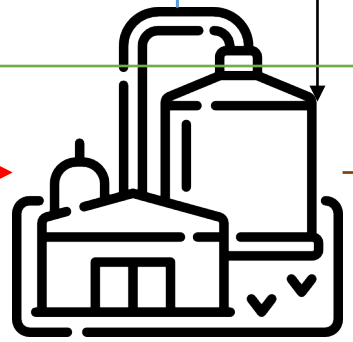
Consolidation facility Auckland
Owner: Ecogas



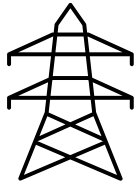
Waste Trucking
Owner: Sayes
BAU: one-way trucking
of aggregate Taupo-Ackl



Heat & Power generation
Owner: LMS



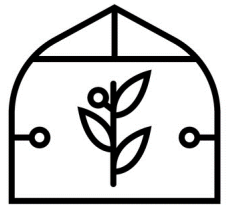
AD facility
Owner: Ecogas



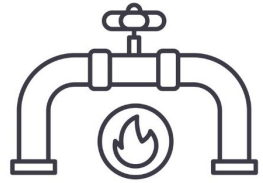
Excess electricity
Exported to grid

Renewable CO_2

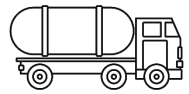
Gas Upgrading
Owner: FirstGas



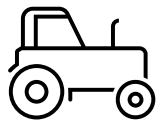
Glasshouse 5 Ha
Owner: T&G Fresh
BAU: Natural gas



Gas pipeline
Owner: FirstGas
BAU: Natural gas

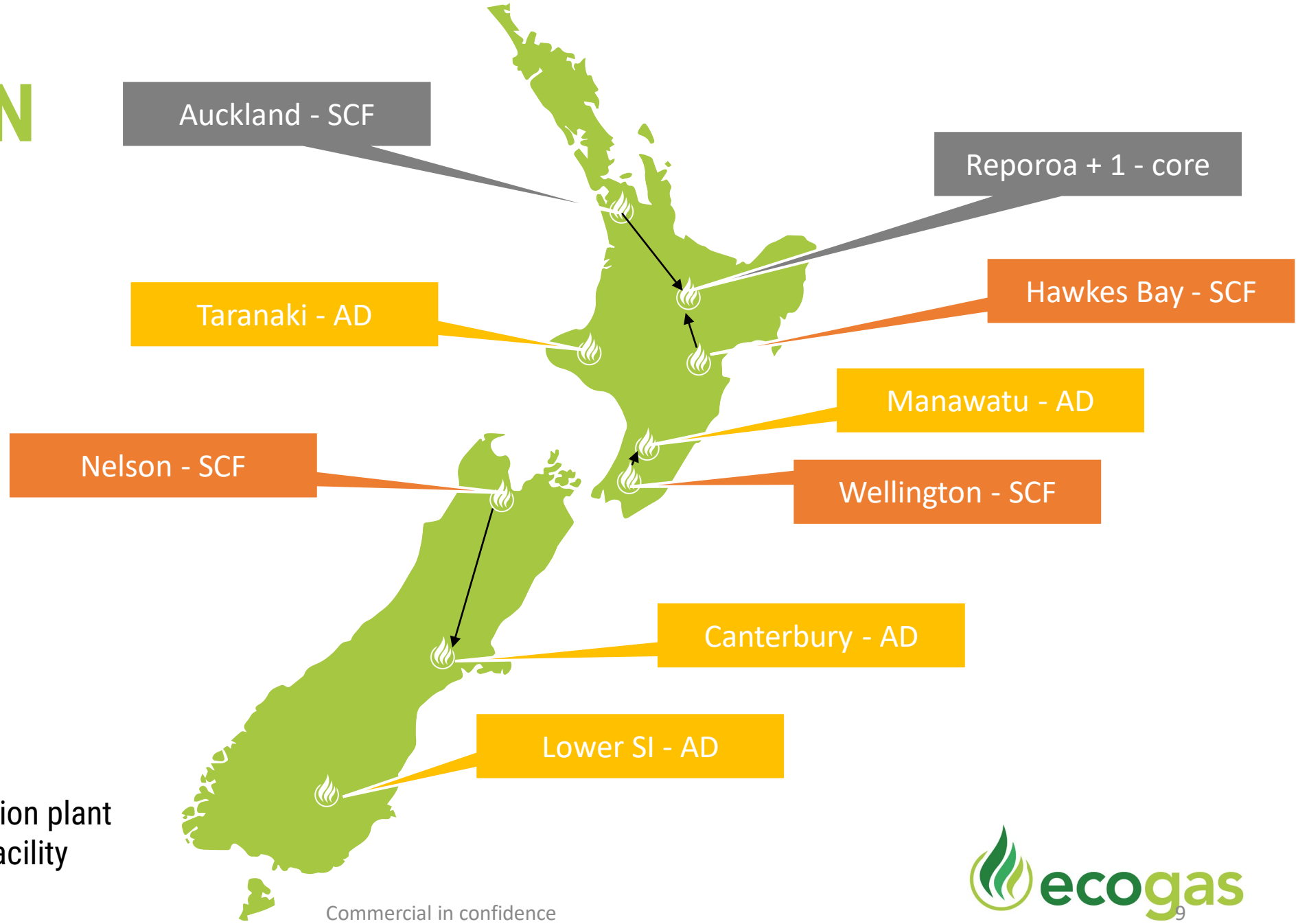


Biofert spreading
Owner: CTL



Farms
Owner: Various
BAU: Mineral
fertiliser

OUR PLAN



AD – Anaerobic digestion plant
SCF – Consolidation facility

CRITIAL SUCCESS FACTORS FOR AD PROJECTS

- ❑ Security of feedstock – ideally underpinned by long-term supply contracts
- ❑ Security of end-market for products - quality, cost, relevance that drives demand
- ❑ Minimum viable scale - economies of scale
- ❑ Funding – risk drives return expectations
- ❑ Resource Consent – long process with uncertain outcome due to lack of local reference plants

GOVERNMENT STRATEGY AND POLICIES

ECOGAS SUSTAINABLE COMMERCIAL MODEL

Flexibility in funding structure

Pricing structure to reflect risk and return relationship

Diverse waste streams for best results

Optimising Value Streams

Maximising innovation and technology

Balancing capital investment with returns

These are the attributes that have enabled and are the key to the successful start and future growth of Ecogas business.

WHY?

SPOTLIGHT ON ANAEROBIC DIGESTION

132,000 small, medium or large-scale digesters operating

EU: **€83 billion investment** to build **5,000 new plants** by 2030

Potential to reduce **10-13%** of global GHG emissions

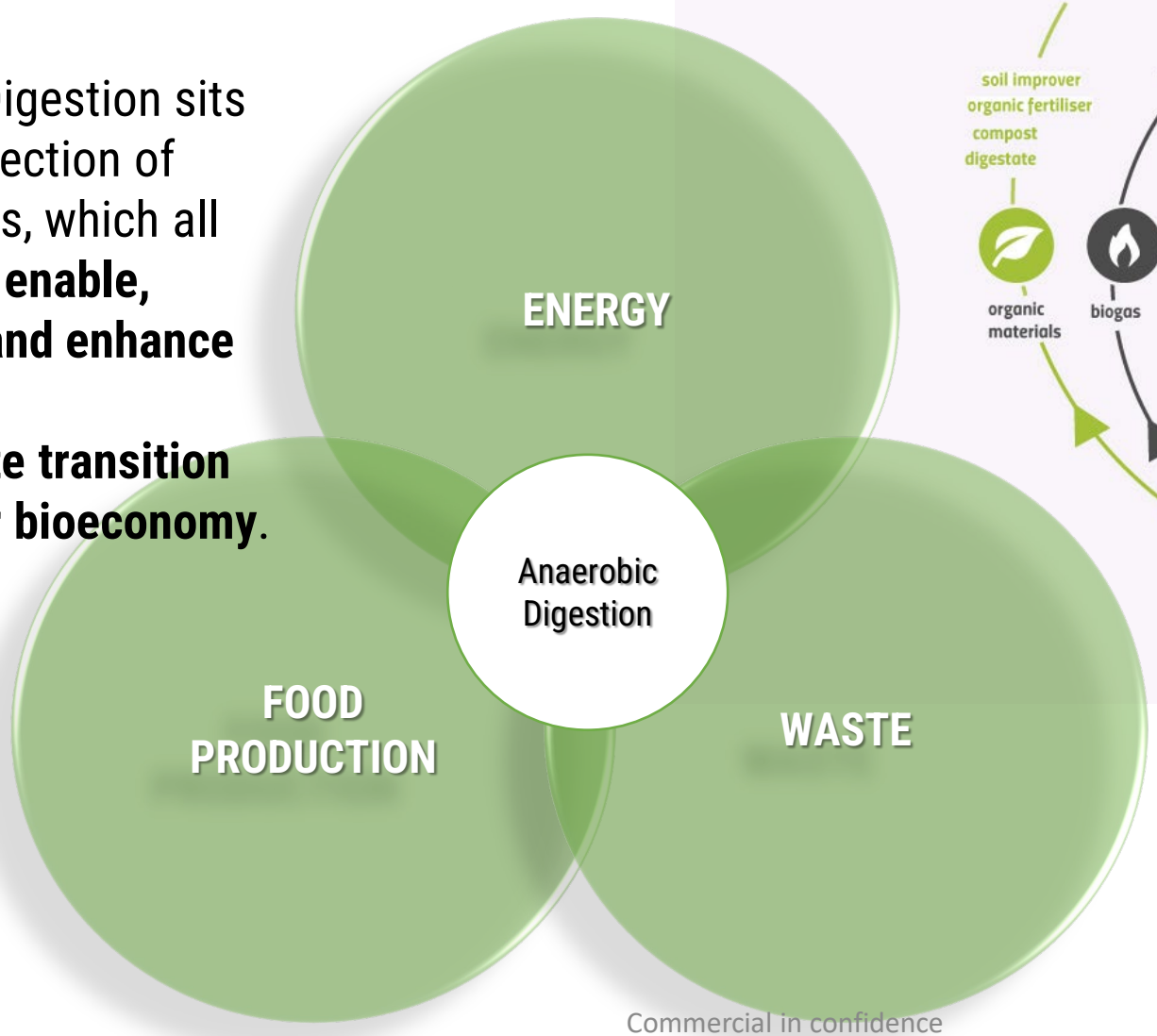
Potential to produce **26 PJ of biogas energy** in NZ from organic residues and break-crops

Potential to **replace 100% of** NZ's **residual gas demand in 2050**

Ref: WBA (2021) Global Potential of Biogas, BECA (2020): Biogas and Biomethane in New Zealand; European Biogas Association; EY (2022) Regulatory options for New Zealand's gas transmission system

WHERE DOES IT BELONG?

Anaerobic Digestion sits at the intersection of three sectors, which all **collectively enable, contribute and enhance its viability** and **facilitate transition to a circular bioeconomy**.



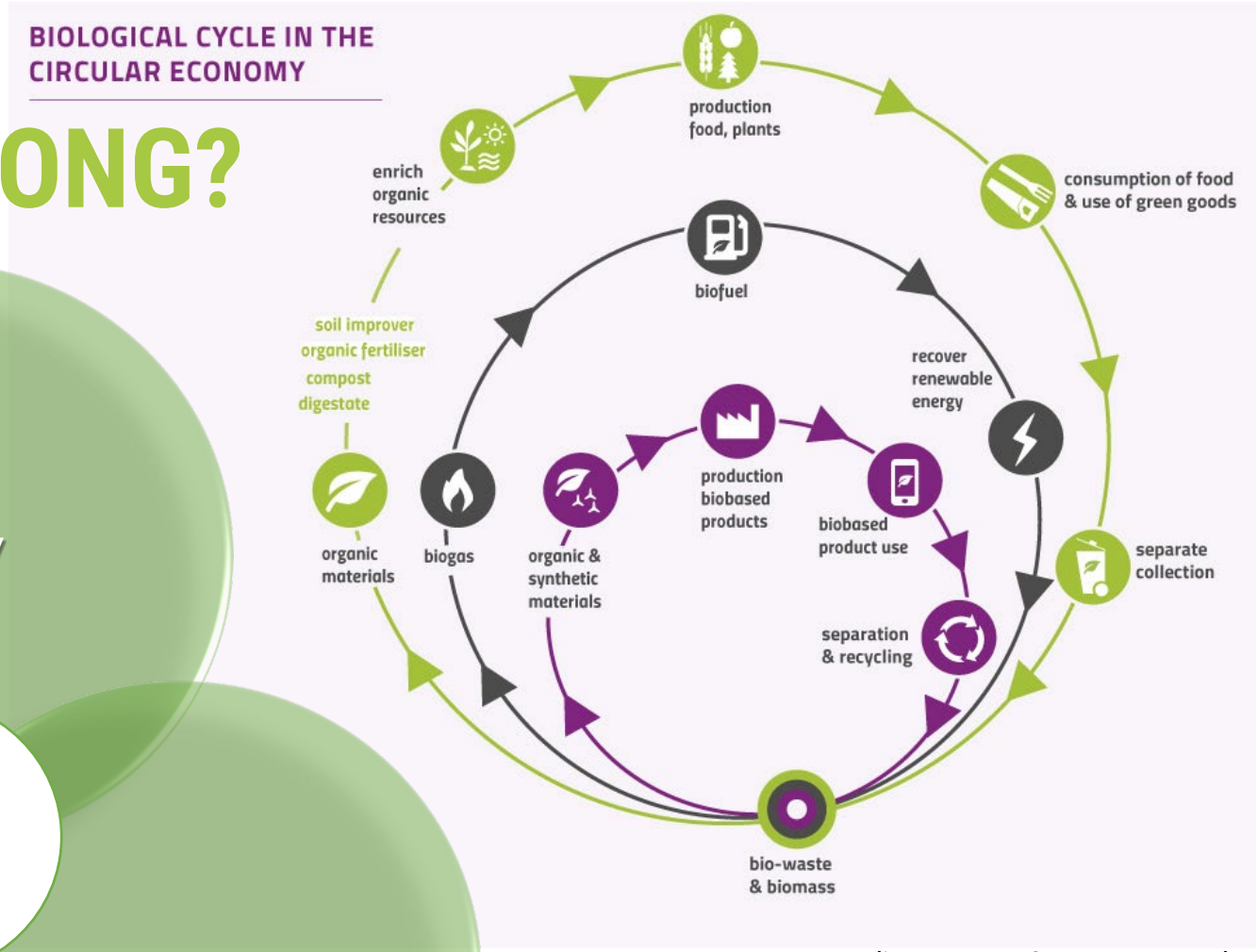


Image credit: European Compost Network

EMISSIONS REDUCTION POTENTIAL

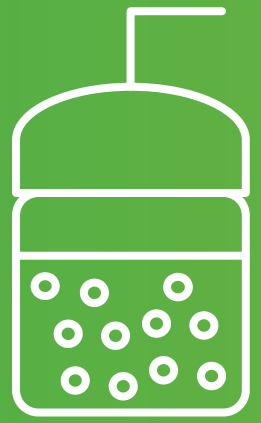
ecogas

Environment

Diversion from landfill

CO_2

233 t CO2e avoided



Food waste
1000 tonnes

130 tonnes

Energy

CHOOSE ONE PATHWAY

Transport

115,000 L petrol

CO_2

281 t CO2e avoided

Electricity

400 MWh

CO_2

39 t CO2e avoided

Process Heat

3,500 GJ

CO_2

186 (NG) – 398 (coal) t CO2e avoided

Primary Sector

Renewable CO_2

Digestate

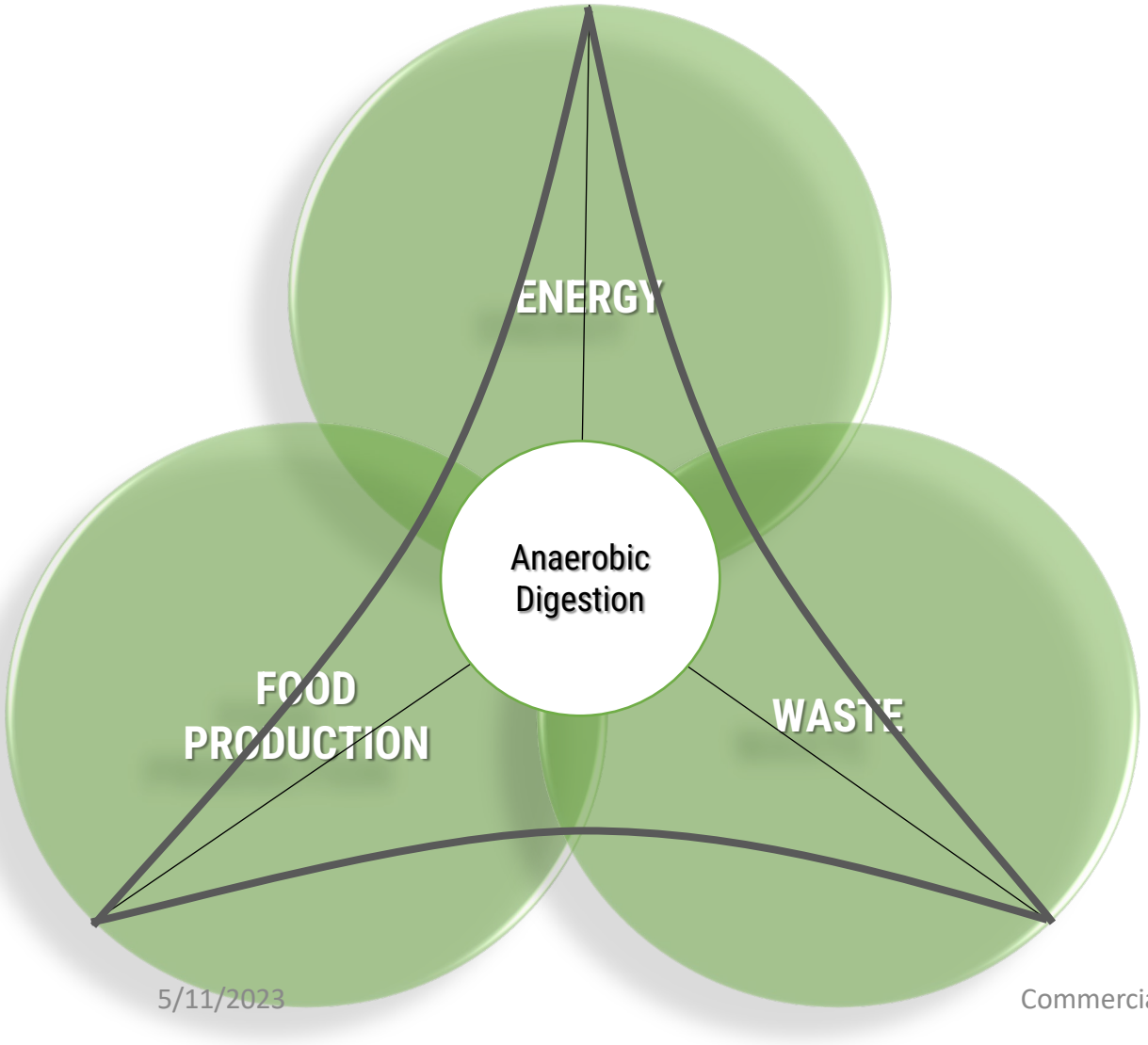
10 tonnes of fertiliser replaced

CO_2

16 t CO2e avoided

HOW?

THE "ENABLED" MODEL



Each sector contributes and supports equally via government policies and market-based tools.

AD is recognised as a process of choice for inedible putrescible organic residues.

Biogas/biomethane are recognised for their value as a renewable substitute of fossil fuels in process heat, electricity production and transport.

Digestate is promoted as a safe sustainable fertiliser with fertilising and soil conditioning properties unmatched by synthetic fertilisers.
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BENEFITS:

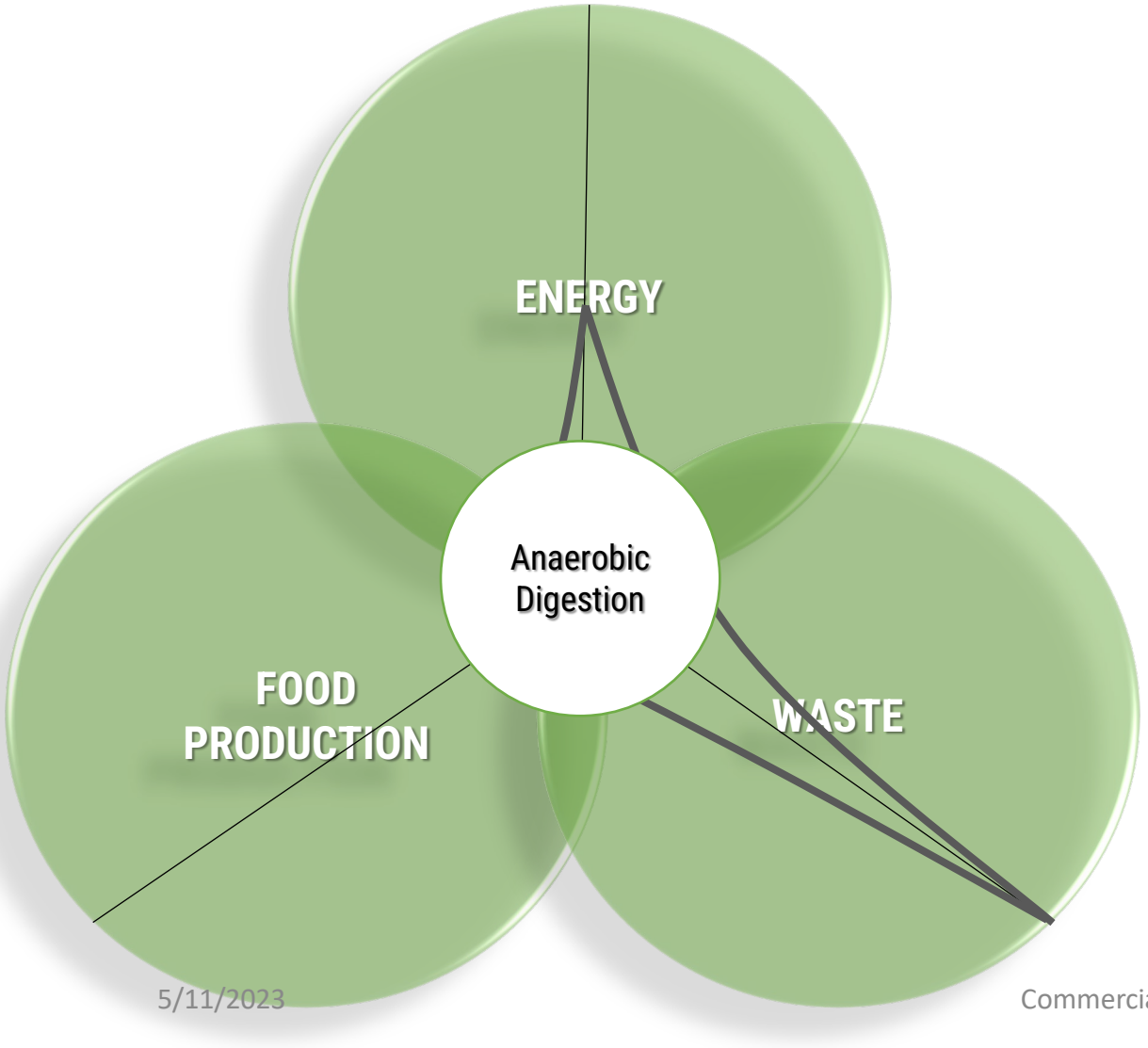
- continuous growth of the sector and outputs through stability > self- reinforcing cycle
- reduction in minimum viable scale to micro-scale projects

THE "ENABLED" MODEL

Each sector contributes and supports equally via government policies and incentives and market-based tools.

SECTOR	GOVERNMENT	MARKET
Waste	National targets for diversion of organics from landfills Landfill levy that drives diversion	Provision of processing services at scale Private co-investment into facilities Long-term contracts Partnerships
Energy	Renewable gas blending obligations Feed-in-tariffs	Renewable gas certificates Renewable gas standards for injection to grid and for use in transport vehicles Harvesting of bioCO2 for market supply
Food production	Restricted application of synthetic nitrogen and phosphorous on fields Statutory order for use of organic fertilisers Limiting use of energy crops for biogas production Animal-byproducts regulation that minimises risk	Certification scheme for fertilizer from organic residue Acceptance across various sectors Long-term offtake contracts
All sectors	Support for R&D Streamlined consenting process Investment into workforce upskilling	Standards for AD plant design Collaboration

THE NEW ZEALAND MODEL



- The New Zealand model currently heavily relies on collection of gate fees.
- Gate fees are competing against low value landfill fees, landfill levy $60/t compared to $150/t in NSW or $200/t in the UK
- Minimum viable scale of a project is 25,000 tpa (e.g. Tauranga + Hamilton + Rotorua) > requires consolidation of multiple waste streams
- Absence of renewable gas certificates > biomethane valued against natural gas by majority of the market
- Absence of organic fertiliser acceptance rules
- “Headwinds” from the food export market for use of biofertiliser

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OUTCOME:

- High risk business model
- Investment uncertainly

IMPACT OF STRATEGY

- Cross-sectoral support will:
  - ➢ Reduce the minimum gate fee
    - ➢ Open access to a wider feedstock market
      - ➢ Produce more energy and fertiliser
      - ➢ Create an opportunity for supplementary feedstock via farm diversification
        - ➢ Enhance the emissions reduction outcome for all
  - ➢ Reduce the minimum viable size for AD project
    - ➢ Increase access to benefits to wider stakeholder group
    - ➢ Increase regional energy security
  - ➢ Increase market confidence
  - ➢ Reduce the impact of carbon price on households and value

WHAT?

Nā tō rourou, nā taku rourou ka ora ai te iwi

The New Zealand market will adopt Anaerobic Digestion as a key tool for transition to a low-carbon bioeconomy with global recognition of its export products.

The Government has a responsibility to minimise the impact of this transition on the cost of living and wellbeing and ensure this transition is just and equitable.

THE BAU MODEL

- By 2025 – the carbon price will equalise internationally driven by Carbon Border Adjustment Mechanism & equivalent policy with our trading partners > 100EUR/t CO2e
- The carbon price will increase the cost of synthetic fertilizer, waste, energy & primary industry inputs
- The price of natural gas will spike in the near-term potentially driving some industries relying on gas to cease operations in New Zealand.
- The natural gas grid transmission & distribution network may not be able to "right-size" and remain economic without government support.
- The gas demand will then decline over coming decades as natural gas demand transitions to electricity.
- Disintegrated policy approach drives a risk of misalignment and carbon cost becoming untenable in critical sectors of NZ economy and households.

THE JUST TRANSITION MODEL

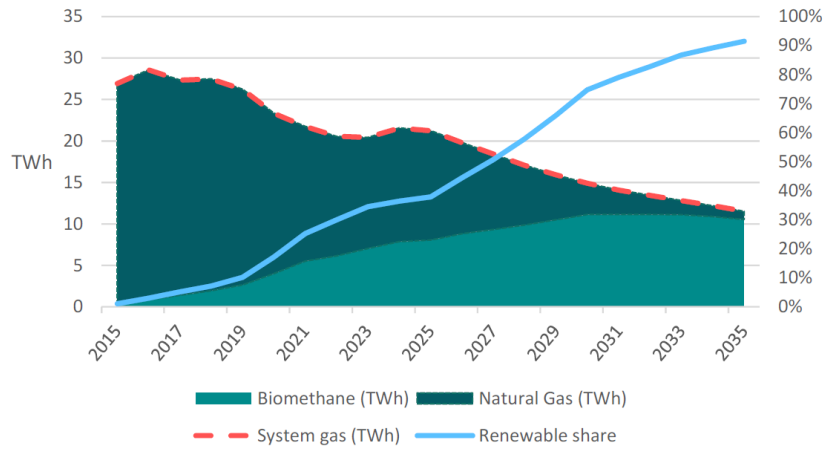
- A cross-sectoral policy approach will be adopted to minimise the cost of transition for households and the impact of decarbonization strategies and policies on key sectors of our economy
- Pricing trajectory for synthetic fertiliser, energy and production inputs will be committed by government in anticipation of international carbon price movement
- This will increase the value of digestate and biogas/biomethane, increasing investment into facilities
- Regional bio-hubs will then be established at the optimal economic distance between suppliers and product users, securing remote regions with heat, electricity and HGV fuel supply
- Captured liquified biogenicCO_2 which will become one of the lowest cost negative emissions pathways.
- The residual gas demand after 2050 for chemical feedstock and niche high temperature direct firing process will be supplied from biomethane or biogas

DENMARK'S KEY INGREDIENTS TO SUCCESS

- Political leadership is needed to recognise the socioeconomic value of biogas
- Broad agreements across political parties provides stability and de-risks investments
- Mix of Agri + Environmental + Energy policies
- Trust and collaboration between public and private stakeholders
- Societal centric decision-making process over economy-centric one

A 100% green gas grid by 2027?

Decline in use of gas, increase in biomethane production



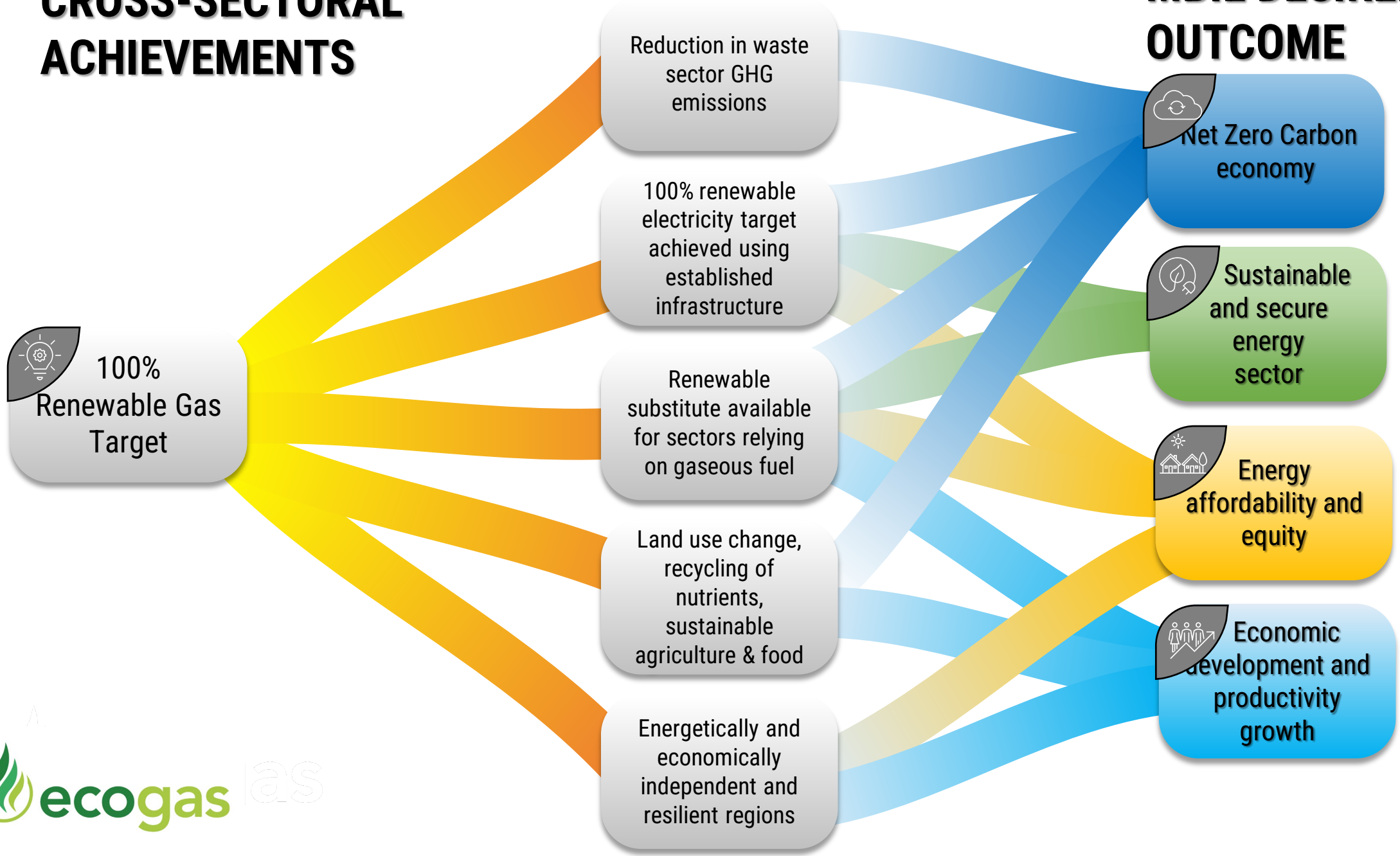
Source: Danish Energy Agency

CONSULTATION QUESTIONS

How can New Zealand transition to a smaller gas market over time?

- Recognition of the critical role of gas in the Net-zero future of NZ as a:
  - Fuel source for high temperature firing
  - Drop-in fuel to peaking gas turbine electricity generating
  - Input materials for manufacturing
- Policy commitment to transition of gas sector to renewable gas (mandate) beyond 2050
- Cross-sectoral collaboration to ensure the production of renewable gases is enabled and sustainable.
- Please refer to slides above.

CROSS-SECTORAL ACHIEVEMENTS



What is needed to ensure fossil gas availability over the transition period?

- Orderly transition and down-scale of the gas industry (26.1 PJ after 2050)
- Current gas reserves are sufficient to cover the gas transition to renewable alternatives
- Renewable gas/biomethane production is fully commercialised and well-proven technology
- NZ has a potential to produce 100% of residual gas demand from biomethane from organic residues and break crops
- Cross-government collaboration is required to support acceleration of build of biogas plants
- Parallel strategies and government support (EECA, rebate schemes) need to be made available to ensure just transition to low-carbon alternatives for sectors that can switch to other forms of fuels (household heating, low-temperature process heat, light vehicle transport)

What factors do you see driving decisions to invest or wind down fossil gas production?

- Evaluation of societal, environmental and economic impacts of retaining fossil gas production versus early cessation of the gas production and use
- Critical assessment of the carbon, cost, timelines and availability of the currently committed strategies (electrification, hydrogen production)
- Holistic assessment of benefits of gradual transition to renewable gas.

Does the Government have a role in enabling continued investment in the gas sector to meet energy security needs? If yes, what do you see this role being?

- Yes. The Government has a responsibility to minimise the impact of the transition to low carbon on the cost of living and wellbeing of people and ensure this transition is just and equitable.
- As seen in successful examples, the role is:
  - Political leadership needed to recognise the socioeconomic value of low-carbon alternatives
  - Secure broad agreements across political parties provides stability and de-risks investments
  - Develop a mix of Agriculture + Environmental + Energy policies that deliver a unified outcome
  - Build trust and collaboration between public and private stakeholders
  - Implement a societal-centric decision-making process over economy-centric one
- Following this, the government can implement supporting strategies that will facilitate an accelerated growth of the renewable gas production industry (refer to previous slides for examples)

Does the Government have a role in supporting vulnerable residential consumers as network fossil gas use declines? If yes, what do you see this role being?

- Establish the size and location of the vulnerable market (refer to Gas NZ submission)
- Focus on meaningful support to transition to non-gas (electricity) forms of heating/cooking as a rebate or tax incentive

What role do you see for gas in the electricity generation market going forward?

- Higher peak demand is projected due to an increased reliance on electricity as an energy source
- With high proportion of renewable electricity and phasing out of fossil-fuels, there is a need for dispatchable gas-fired power generation can be used to complement renewables
- The use of existing gas infrastructure, supplemented with a commitment to transition to 100% renewable gas network provides an opportunity to meet the 100% renewable electricity target without extensive capital and carbon commitment required to build other energy storage alternatives

What would need to be in place to allow gas to play this role in the electricity market?

- Government commitment and support for development of renewable gas industry
- Refer to the “Enabled” model on previous slides for details

Do you think gas can play a role in providing security of supply and/or price stability in the electricity market? Why / Why not?

- The current natural gas infrastructure - based primarily on long-term, take-or-pay contracts between pipeline operators and customers that pay a reservation charge (or tariff) for capacity.
- With transition to electricity and biomass in some sectors, the current infrastructure may have sufficient storage capacity to deliver on peak-demand days when renewables cannot generate at full capacity
- This switch in revenue model will require some regulatory and market mechanisms and collaboration across the entire value chain
- Some mechanisms to smoothen the impact on price can be found in https://www.mckinsey.com/industries/electric-power-and-natural-gas/our-insights/the-role-of-natural-gas-in-the-move-to-cleaner-more-reliable-power

Do you see alternative technology options offering credible options to replace gas in electricity generation over time? Why / Why not?

- The baseload electricity should be generated from renewable sources (solar, wind, hydro, biomass).
- Gas should only be used for peak firming.

On a scale of one to five, how important do you think biogas is for reducing emissions from fossil gas? Why did you give it this rating?

- 5
- Why?
  - Readily available fully commercialized technology
  - Drop-in fuel for existing fossil-gas
  - Sufficient feedstock available to enable transition and meet residual gas demand post 2050
  - Cross-sectoral benefits (emissions reduction, transition to circular bioeconomy, ensuring relevance of our export product for global markets)
  - Highest employment generating renewable energy technology

Do you see biogas being used as a substitute for fossil gas? If so, how?

- Yes.
- Biogas is a versatile fuel source and can be used as:
  - Direct substitute to gas
  - Co-fired with other liquid or solid fuels
  - Electricity generation
  - Transport fuel (CNG, LPG)
  - Harvesting of CO2 for storage or use

What else can be done to accelerate the replacement of fossil gas with low-emissions alternative gases?

- Refer to the “Enabled” model and “Denmark’s key ingredients to success” slides before

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On a scale of one to five how important is a renewable gas trading to supporting the uptake of renewable gases? Why have you given it this rating?

- 5
- Renewable gas trading is a globally proven tool to fund new AD infrastructure, reducing the sector's reliance on other forms of government support — and drive biogas growth to its full potential
- Many of the industries purchasing biomethane certificates are unable to electrify their operations due to cost and a lack of suitable alternatives for renewable heat.
- Renewable gas certificates provide price signals for suppliers to incentivise investment
- With effective eligibility criteria, renewable gas trading will recognise the full value of biomethane in reduction and avoidance of carbon emissions. Higher value obtained for the biomethane then reduces the pressure on securing gate fees for feedstock, which consequently increases the potential market for feedstock. Please refer to "Impact of Strategy" slide for more details.

What role do you see for the government in supporting such a scheme?

- The Government should oversee the development and implementation of such scheme to ensure its alignment with key strategies and policies
- The scheme can be owned and operated by the private sector.
- The Government's role resides mostly in enabling and clearing the pathways for committed long-term supply in feedstock and applicability and market acceptance of the products.

On a scale of one to five how important do you think CCUS is for reducing emissions from fossil gas use? Why did you give it this rating?

- CCUS from fossil gas should be perceived as a transitional strategy, with clear indication of the Government's commitment to cease the use of fossil gas in the future. This may reduce the viability of CCUS projects.
- Where available, early transition to renewable gasses should be supported over CCUS from fossil fuels (e.g. onsite biogas generation and use in industries).

What role do you see for gas storage as we transition to a low-emissions economy?

- With high reliance on renewable energy generation from hydro, wind and solar, gas storage provides a readily available source for peak generation using peaking gas turbines at power stations.
- When combined and a 100% renewable gas target, there is an opportunity to achieve 100% renewable electricity without using existing infrastructure.

On a scale of one to five, how important do you think increasing gas storage capacity is for supporting the transition? Why did you give it this rating?

- The data and information available to us suggests that there is no need for increasing gas storage capacity. With substantial decrease in gas use in low-temperature sectors, the gas demand is expected to decrease from 192 PJ to 26 PJ. The unused capacity may be sufficient to provide peak electricity firming.
- Further analysis will need to be carried out on the peak electricity demand.

What should the role for government be in the gas storage market?

- The government's role is to:
  - Provide certainty of direction to enable investment
  - Facilitate robust private-public collaboration
  - Invest adequately into RD&D

What risks do you anticipate if New Zealand gas markets were tethered to the international price of gas?

- Refer to the BAU model slide for the analysis and predictions.

Prepared by: Alzbeta Bouskova Houghton
Email: alzbeta.bouskova@ecogas.co.nz
Phone: 021 223 9536

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