BIOENERGY
the renewable fuel

Actions to maximise reduction of methane emissions from waste and achieve net-zero carbon emissions by 2050

Without significant cost or effort, the upgrading of municipal and waste water treatment facilities and the co-treatment of trade waste to produce biogas can contribute an additional 3.0 PJ of energy and reduce greenhouse gas emissions of 515 kt CO2-e pa by 2050. If national zero organic waste to landfill policies are enacted and agriculture is required to treat farm wastes to avoid runoff of nutrients into waterways then significantly more greenhouse gas emission reductions can be achieved. Complete diversion of domestic, commercial and industrial food waste from landfill to newly build anaerobic digestion facilities has a potential to reduce greenhouse gas emissions by further 789 kt CO2-e pa by 2050, or 1,296 kt CO2-e if domestic green waste is included. [1]

Anaerobic digestion has the potential to eliminate 1,811 kt CO2-e pa by 2050. This all can be achieved using well-established technology and existing waste materials with many other associated environmental and socio-economic benefits. Biogas can be used to generate electricity, produce heat, used as a vehicle fuel, and be a feedstock for manufacture of bio-based materials, further offsetting greenhouse gas emissions by substituting carbon-intensive resources. This is 4.6PJ pa of energy.

To eliminate **1,811 kt CO_2-e pa by 2050 by** generating electricity, producing heat, treating to biomethane for use as a vehicle fuel, and use as a feedstock for manufacture of high value bio-based materials requires government and private sector parties to work together with an agreed plan of action. Because the economic drivers are weak but public good benefits are high the plan of action will require active Government leadership.

The target is realistically achievable because action is based on using **well-established technology** and **existing waste materials** with many other associated **environmental and socio-economic benefits in particular from that of the revenue cost offset able to be derived**.

With many regional Councils currently considering waste water treatment facility upgrades, mostly to land and without consideration of processing opportunities, there is a degree of urgency required to addressing this situation.

The following measures complementary to the NZ Emissions Trading Scheme will be necessary to encourage increased greenhouse gas emissions reduction from waste by use of waste-to-energy technologies to

[1] The analysis underpinning this document is available in Bioenergy Association Information Sheet 47, *The role of organic waste and biogas in the transition to low carbon economy in New Zealand*, November 2018

produce biogas and fertiliser products and assist with transformation towards a net-zero emissions economy. The list is a mix of what could best be done by a partnership of Government and business.

Recommended actions

1. Implement nation-wide zero organic waste to landfill policy

- Government to establish a National Policy Statement to require zero organic waste to landfills by 2040.
  - Identify a national implementation strategy and action plan including: target facilities; promotion; education and information programme; value proposition information; collection and dissemination of demonstration project information.
- Each region to establish monitoring, reporting and set a specific target for the reduction of methane from municipal, industrial and agricultural residual organic waste, and waste water treatment plants.
  - Regions to monitor GHG emission from residual organic municipal, industrial and agricultural waste and set targets for reduction by 2030, 2040 and 2050.
  - MfE to extend the existing mechanism for the collection of data from all landfill and WWTP and to provide an annual report on methane capture and emissions presented by region.
  - Collate information on existing regional policies regarding methane reduction. Review the information and report back to local government with information and guidance on best practice.
  - Improve regulatory matters at the time of any regional plan review.
- Each region to establish strategies and implementation plans to address barriers to reducing methane emissions from waste, similar to catchment plans required under the RMA.
  - Prepare and provide guidance to the respective organic waste sector suppliers on utilisation rather than disposal.
  - Host regional meetings and training courses to assist liquid and solid waste facility owners to be up-to date with methane reduction opportunities and practises.

2. Government introduces policies to encourage early investment in processing of waste to produce energy and other products

- Revise the NZ Waste Strategy so that it includes greater focus on processing organic waste rather than disposal to landfill.
- Waste Minimisation Fund to provide funding to implement the public good component of the national and regional methane reduction activities.
  - Use the fund to support the undertaking of feasibility studies into the utilisation of waste instead of disposal.
  - Support demonstration projects for a range of applications
  - Review the present use of the landfill Waste Disposal Levy and the criteria for grant allocations from the Waste Minimisation Fund, so as to more explicitly include methane emission reduction opportunities.

- Allow for accelerated depreciation of renewable energy, waste to energy and energy efficiency capital investments to recognise that renewable energy and energy efficiency equipment is more capital intensive but often has lower on-going operating costs than alternatives.
- Central Government to introduce procurement policies so that:
    - utilisation of waste and renewable energy options must be considered as a priority when making capital investment decisions on waste,
    - all costs and benefits are included in a full life cycle analysis of options, and
    - if investment recommendations do not lead to a renewable energy solution that the reasons for not adopting such a solution are explicit.
- Government's project appraisal model uses a CO_2-eq emission cost profile assumption published by MfE from time to time. This profile takes account of assumed movement over time as a result of the ETS (This approach/modelling will also demonstrate that the Government is taking clear long-term decisions that reflect the likely real price of carbon over the life of the methane-fuelled plant i.e. 20 years plus).
- Local councils be required to introduce life-cycle based procurement policies similar to those adopted by central Government.
- Extend the period of Crown Loans for biogas facilities beyond the current 5 years to better reflect the economic lifecycle costs and benefits of a waste processing facility.
- Use the proposed Green Fund to assist territorial councils invest in projects that wouldn't otherwise get done because of competition for capital.
    - Encourage use of anaerobic rather than high operating cost aerobic WWTP
    - Encourage waste treatment solutions which integrate multi-waste streams from municipal, industrial and agricultural sources.

3. Provide guidance, demonstration and assistance to business and territorial authorities for the planning, assessment and implementation of single or multi-stream treatment of food and organic liquid and solid waste to produce energy and other products.

- Ensure that there are adequate anaerobic digestion demonstration facilities for a range of applications
    - Integrated municipal and industrial waste streams.
    - Horticultural and industrial facilities treating food production and processing residues to provide on-site electricity, heat and high value fertiliser.
- Establish a working group including all relevant organisations and government entities (along the lines of the Land and Water Forum) to facilitate the use or treatment of residual organic waste after separation, reuse and recovery activities.
- Provide a national programme to assist local government and business have the best information possible for investment in facilities which will reduce discharge of methane from waste as a GHG emission.
    - Collate and publishing useful information from operational demonstration facilities
    - Identify, obtain and disseminate best practice information to assist reduction of GHG emissions from residual organic waste:

- Methods and evaluation of options for methane collection and processing at WWTP.
- Methods and evaluation of options for use of digestate as a fertiliser and biosolids disposal to land.
- Guides to the use of biogas for electricity generation and process heat production.
- Guide to using biogas as a vehicle fuel
- Guide to the combustion of biosolids as a fuel supplement for process heat
- Guide to commercialisation of investment ready waste-to-energy facilities
- Guide to developing shared equity projects for integrating waste suppliers and facility operators.
- Guide for investors in waste-to-energy projects.

4. Provide guidance, demonstration and assistance to territorial authorities for upgrading and optimising WWTP for beneficial treatment of trade wastes providing reduction of emissions and operating costs.

- Ensure that there are adequate demonstration facilities for a range of applications
  - Collate and publish useful information from demonstration facilities that can be used to assist other often smaller authorities.
- Assist local government undertake feasibility studies of waste treatment improvement options similar to the energy efficiency programmes run by EECA
  - Criteria for local government investment in waste facilities to be based on economic lifecycle costs and benefits of a waste processing facility and not just capital cost.

5. Assistance to agricultural organic waste producers to reduce methane emissions

- Establish programmes for reducing methane emissions from industrial and agricultural organic residues.
- Develop the following Technical Guides:
  - Methods and evaluation of biogas technology options for methane collection and processing at industrial waste water treatment facilities.
  - Methods and evaluation of biogas technology options for processing agricultural residues.
  - Guide to use of anaerobic digestion to reduce farm emissions and waste and improve farm resilience.

6. R&D into the high value uses of biogas such as a vehicle fuel and as a feedstock for the manufacture of bio-based materials

- Validation of the use of anaerobic digestion digestate as a fertiliser and WWTP biosolids as a combustion fuel.
- Options for use of biosolids to avoid disposal to landfill
- Feasibility and value exchange of farms offsetting biological emissions from livestock by processing of organic waste and effluent.
- Utilising waste and derived products as contributors to the circular economy.