Bioenergy Association of New Zealand

Occasional Paper 30

Stocktake of Sector Capability to Deliver Optimal Benefits from Bioenergy

Brian Cox

Bioenergy Association of New Zealand

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The Bioenergy Association of New Zealand publishes this series of Occasional Papers in order to encourage discussion on bioenergy topics amongst members. Members wishing to submit reports for possible publication within this series may contact the association Executive Officer – executive@bioenergy.org.nz .

The content of the document is the opinion of the author and not of the Bioenergy Association. The list of recommended actions is a collation of a number of discussions with active participants in the bioenergy and biofuels sector.

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Executive Summary

This report is a summary of information obtained from interviews with stakeholders on the actions which need to be taken to deliver the optimal benefits from bioenergy by 2050. The actions recommended throughout this report are collated in Appendix 1 to form the basis of a proposed capability development programme. If implemented together the sector would have the capability to deliver the optimal benefits from bioenergy by 2050. The recommended actions will be most efficiently implemented if there is a partnership between Government and the private sector.

The information in this report will provide the basis for development of prioritised action plans for each of the gaseous, solid and liquid biofuels sub sectors. The action plans should be split into short term actions (to 2030) and longer-term actions (to 2050). Identification of short term and long-term actions has not been attempted in this report as this should be done as the next step by stakeholder groups.

The specific actions listed in Appendix 1 can be grouped to fit the Bioenergy Association's vision for:

> *A sustainable and resilient Aotearoa New Zealand, where bioenergy from renewable natural resources powers regional economies, supports community wellbeing, and drives low-emission energy solutions for a thriving future.*

Grow sector visibility and credibility

- Demonstrating the role of biofuels in a robust energy market.
- Showcase real-world bioenergy use
- Promote biofuels in energy resilience
- Create a positive media landscape for bioenergy
- Promote the value proposition for each stakeholder
- Position BANZ as the trusted industry voice

Empowering feedstock providers

- Partnering with agribusiness and foresters to unlock new revenue opportunities
- Actively engaging and educating stakeholders across the value chain
- Regional mapping of present and future biomass and organics availability
- The value proposition of integrating trees on farms; increased domestic processing of wood into bio-products; optimising value from organic waste
- The value proposition to manufacturers of recycling processing residues as an energy fuel

Strengthen sector capability and standards

- Promote best practices, sustainability standards, and quality assurance
- Expand training, adviser networks, and professional development
- Providing best practice information to new entrants to the sector
    - Solid biofuels – expand the UseWoodFuelNZ portal
    - Gaseous Biofuels – expand the www.biogas.org.nz portal.
- Manage accreditation schemes for Solid Biofuel Supply, Biofertiliser production, Advisers
- Maintain a Register of Advisers who meet skills and knowledge criteria

Grow the market

- Work with Government agencies to collect actual data on regional biofuel use and prices
- Advocate for policy changes to support growth & acceleration
- Expand, connect & promote members
- Provide tools & case studies for the market
- Response to & trigger government consolation to drive action
- Encouraging awareness of regional economic potential

1. Introduction

New Zealand is rich in organic material, a valuable feedstock for the production of energy and co-products that can replace petroleum-based products and contribute to a more sustainable future.

The use of organic material such as wood for heat production is long-established, dating back to the country's first inhabitants. However, other forms of organic waste have been undervalued and typically disposed of in landfills or left to decompose on the forest floor.

Perceptions began to shift around 2010, particularly in the South Island, where solid biomass started gaining recognition as a resource. More recently, from around 2013, there has been growing interest across New Zealand in the value of organic waste for bioenergy for bioenergy production.

The bioenergy sector in New Zealand is still in the early stages of market development. It is only beginning to take on the characteristics of a formal market, with maturity emerging in some areas and among a limited number of participants.

This review considers the potential growth of New Zealand's bioenergy and biofuels market through to 2050, with a focus on the solid, gaseous and liquid biofuel sub-markets. While each sub-market is examined separately, it is acknowledged that there is considerable overlap in practice, with many participants active across multiple sub-markets. Unless otherwise noted, each sub-market is treated as a stand-alone market for the purposes of this review.

Unlike other energy sources such as solar, wind and geothermal – which typically involve fewer participants and minimal interaction with communities and the environment – the bioenergy market is deeply interconnected with local communities, land management and environmental impacts. To properly evaluate the sector's capability to deliver beneficial outcomes the review must consider these broader social, environmental and land-use considerations, both for domestic applications and potential export opportunities.

2. Background

The drivers, skills and experience of participants are generally specific to each bioenergy sub-market. However, all sub-markets operate within the broader energy landscape, contributing to the supply of heat, electricity and transport fuels.

2.1 Energy market

Bioenergy remains under-recognised within New Zealand's overall energy market, despite accounting for 8%[1] of total energy production in 2023. Analysis by the Bioenergy Association

[1] https://www.mbie.govt.nz/building-and-energy/energy-and-natural-resources/energy-statistics-and-modelling/energy-publications-and-technical-papers/energy-in-new-zealand

suggests that by 2050, approximately 27%[2] of New Zealand's energy could be derived from biomass and organic material.

The under-recognition is largely due to the absence of major energy companies actively promoting biofuels. In contrast, the electricity, coal, petroleum and gas sectors benefit from well-resourced corporate backing and marketing. Historically, in the early 1800's, wood was the primary fuel for heat, but its distribution did not rely on large supply networks – users sourced fuel locally. As electricity and fossil fuels became more widespread, their dependence on large infrastructure and distribution networks helped entrench their dominance, which continues today.

The electricity supply crisis of 2023-24, during which winter electricity prices spiked significantly, highlighted the vulnerability of New Zealand's energy system. Several large, long-standing industrial users – particularly in the pulp and paper sector – were forced to close, resulting in substantial job losses. Despite this, the energy conversation has remained heavily focused on electricity, with the potential contribution of biofuels largely overlooked by both Government and industry.

The Bioenergy Association has repeatedly emphasised the strategic risk of over-reliance on a single energy source – electricity – and the need to diversity through greater integration of bioenergy. (Refer to Sections 3.11 and 4.12).

2.2 Energy Strategy

The lack of a New Zealand Energy Strategy results in energy sector fragmentation and no coordination of opportunities so that the best energy solution is available for specific applications. The market planning is based on who has the deepest pockets and can shout the loudest.

The last update from MBIE was on 6 Sep 2024 saying that it was in progress and due to be published end of 2024, but nothing has occurred since. The NZ Energy Strategy is critical to show the role that bioenergy can/will play so we can get past the debate on 'is there enough?'. It should include high-quality scenario modelling on several potential energy pathways and show how dedicated short-rotation bioenergy forestry can be used to bridge the gap between future bioenergy demand vs. supply and put those hectares in perspective with other land uses in NZ. It should also incorporate outcomes from a Waste Strategy such as was proposed by the previous Government.

2.3 Bioenergy Data

There is a general lack of comprehensive and accessible data on the bioenergy sector in New Zealand. Much of the available data – such as that in the Energy Data Files[3] – is based on

[2] https://www.liquidbiofuels.org.nz/documents/resource/Information-Sheets/IS44-GHG-emissions-from-bioenergy-by-2050-190131.pdf
[3] https://www.mbie.govt.nz/building-and-energy/energy-and-natural-resources/energy-statistics-and-modelling/energy-publications-and-technical-papers/energy-in-new-zealand/energy-in-new-zealand-2024

estimates, particularly, due to the absence of surveys on wood fuel use. Some data collected by government agencies is classified as confidential and not made publicly available.

A notable example is the Heat Plant Database, originally developed and published by the Bioenergy Association. This resource was widely used by the sector participants to identify opportunities for bioenergy heat production and was especially valuable for wood fuel suppliers to planning for long term fuel supply. However, after ECCA assumed responsibility for the database, it ceased to be publicly available, limiting its usefulness to the sector.

More recently, EECA's Regional Energy Transition Accelerator (RETA) studies have provided regional insights into opportunities to convert fossil fuels heat plants to electricity or biomass. While this data is useful for business considering such transitions, the studies largely overlook the potential for gaseous biofuels and assume forestry residues as the sole biomass source. The studies do not explore broader, future sources of biomass or opportunities for biofuel diversification.

Existing bioenergy data is fragmented across multiple reports and agencies, making it difficult to locate and use. The Bioenergy Association's *Bioenergy Facts Information Sheet*[4] is a valuable starting point, but it should be expanded and more widely disseminated to support sector growth and planning.

Bioenergy Association could do a lot more telling of the bioenergy story. People don't know what bioenergy is and how it is already a significant contributor to providing a secure energy supply system. Data and case studies are necessary for story telling and the use of informetrics can get complex information to wide audiences. The Bioenergy Association should have a story telling department and this should be monitored by the Board

Action:

1) ***Review current data collection and publications for the bioenergy sector to ensure they are regionally specific and based on actual survey data.***
2) ***Compile and consolidate bioenergy data to update Information Sheet 35 'Bioenergy Facts and Figures', making the information more accessible and easier to locate.***
3) ***Bioenergy Association to establish story telling about bioenergy as a major activity and reported on at each Board meeting.***

2.4 Bioenergy policy development

Government energy policy documents frequently overlook or exclude data and discussion on gaseous, solid and liquid biofuels, with a predominant focus on electricity. Bioenergy, in any of its forms, is often grouped under a broad "renewable energy" label rather than being recognised as a distinct energy category. This electricity bias extends into key areas of energy planning such as the TIMES-NZ modelling, where bioenergy is frequently under-represented – largely due to a lack of dedicated advocates beyond Scion. In many cases, the Bioenergy Association has been the sole voice for the sector, in contrast to other energy sectors that benefit from multiple experienced analytical advisers.

[4] IS35 Bioenergy Facts and Figures https://www.usewoodfuel.org.nz/resource/is35-bioenergy-facts-and-figures

Having an Executive Officer with a government policy or corporate background strengthens Bioenergy Association's ability to engage in policy consultations. However, the absence of a presence in Wellington limits opportunities for face-to-face engagement, and the lack of in-depth, in-house analytical capability sometimes affects the depth and rigour of Bioenergy Association submissions to Government.

During policy development, the Government typically invites consultation, but submissions from the bioenergy sector are limited due to the small number of entities with dedicated policy advisers. Larger organisations that do make submissions often do so independently, without coordination with other stakeholders. The Bioenergy Association strives to involve its members in submission development, but participation is often minimal and limited resources mean that joint drafting efforts and attendance at consultation meetings can lack the necessary depth. This is an important role of a sector association so should be given priority amongst the many other association activities.

As a sector association, contributing to policy development is a critical function and should be prioritised among other activities. However, the broader challenge is compounded by the lack of bioenergy-focused policy research from universities and research institutions, which limits the evidence base needed to contribute to Government policy decisions and development.

The lack of policy discuss in the sector can be addressed by the Interest Group undertaking specific investigations and publishing short discussion papers for circulation to relevant stakeholders.

Action:

1) ***Secure funding to enable the Bioenergy Association to undertake in-depth policy analysis.***
2) ***Bioenergy Association to establish a presence in Wellington to facilitate face-to-face advocacy and engagement with policymakers.***
3) ***Encourage broader participation from bioenergy sector stakeholders in government consultations and policy development processes.***
4) ***Promote the development of bioenergy-related analytical expertise within universities and research institutions.***

2.5 Limited resources for sector growth

The Bioenergy Association estimates that by 2050, upto 27% of New Zealand's energy needs could be met from biomass and organic material. However, despite this significant potential, the sector remains under-resourced and under-represented.

As the industry body, the Bioenergy Association plays a central role in supporting and advocating for the sector. Yet, with few active participants able to justify membership, the Association's income is limited – primarily derived from membership fees and occasional project-specific contracts. This financial constraint restricts the Association's ability to undertake advocacy, policy development or industry support and activities at the level required to stimulate sector growth.

The lack of core funding also means that research is only undertaken when externally funded by agencies such as EECA or the Waste Minimisation Fund.

The Bioenergy Association's work is structured around three biofuel streams - solid, liquid and gaseous – each represented by an Interest Group. These groups guide activities, publications, reports and best practice development within their respective areas.

- The Solid and Gaseous Biofuels Interest Groups are active and engaged.
- The Liquid Biofuels Interest Group is relatively dormant due to limited sector activity

Interest Groups establish Working Groups for specific initiatives, such as:

- Use of treated wood as an energy fuel
- Digestate Biofertiliser Producers Forum
- Agricultural feedstocks
- Promotion of wood fuels benefits
- Standardising regional consenting rules for heat plant

The Bioenergy Association operates with four part-time contractors and has an annual operational budget of $130,000, with approximately $100,000 in externally funded project work.

2.6 A trusted source of information

The Bioenergy Association's website[5] hosts the Bioenergy Knowledge Centre[6] a searchable repository of reports, presentations and publications. Some content is member-only, but much is publicly accessible. An interactive Directory of Bioenergy Facilities[7] showcases bioenergy operations across New Zealand; it serves to reassure new investors that others are active in the field. However, this directory requires substantial updating.

The Bioenergy Association also offers a Free Advisory Service – used by approximately six individuals weekly (two non-members, four members) – providing early-stage guidance without the pressure of commercial engagement.

Each Interest Group manages a dedicated information portal:

www.biogas.org.nz www.usewoodfuel.org.nz www.liquidbiofuels.org.nz

These portals provide access to:

- Best Practice Technical Guides
- Technical Notes providing detailed information
- Information Sheets
- Occasional Papers (reports published by the Bioenergy Association)
- Lists of Experts. Accredited Solid Biofuel Suppliers, Accredited Biofertiliser Producers, Registered Advisers
- Equipment Catalogues

[5] www.bioenergy.org.nz

[6] https://www.bioenergy.org.nz/bioenergy-knowledge-centre

[7] https://www.bioenergyfacilities.org/

New material is added regularly as it becomes available.

The Bioenergy Association also runs a Professional Development Scheme and distributes a monthly Bioflash newsletter to ~2400 recipients (members and followers). The monthly webinars Education Programme is open to members and non-members, with EECA support enabling free access.

Despite the wealth of high-quality resources, the Association lacks the funds to actively promote its tools and services. As a result, many new entrants to the sector are unaware of easily accessible, often free, information held by the Association. Improving the visibility of portals, the Knowledge Centre and expert directories would help reduce the 'lack of information' barrier for newcomers and encourage membership.

EECA provides minimal bioenergy information on its website and does not reference the Bioenergy Association's extensive resources - the Bioenergy Knowledge Centre and bioenergy portals – missing a key opportunity to guide users to comprehensive sector knowledge.

Bioenergy Association collaborates with associate organisations that offer limited bioenergy information tailored to their members' interests. When approached, these organisations recognised the value of linking to bioenergy content hosted on the Bioenergy Association's portals rather than attempting to develop and maintain their own material. This cross-referencing approach helps ensure the information their members access is accurate, up-to-date and not duplicated. In the same way, EECA could enhance its website by providing direct links to the bioenergy portals for more detailed and comprehensive information

Action:

1) ***Promote awareness of best practice resources and guidance available to new sector entrants***
2) ***Update and publicise the Directory of Bioenergy Facilities***
3) ***Actively promote the Free Advisory Service as a first point of contact***
4) ***Where organisations wish to share bioenergy information with their members, they are encouraged to provide cross-referencing links to the bioenergy portals, rather than creating their own content. This ensures their members access trusted, accurate and up-to-date information from an authorised source***

2.7 Drivers for growth

Since 2020, New Zealand's bioenergy sector has gained significant momentum, driven by new economic, environmental and energy security imperatives. This has led to an influx of new participants, creating an urgent need for targeted education across government, private industry, landowners, investors, regulators and policymakers.

Despite this growth, accurate, audience-specific information remains scarce. Misinformation – particularly based on overseas experiences that don't reflect New Zealand's context – is common and unhelpful.

Key drivers for the increased uptake of biogas and biomethane include:

- Declining natural gas reserves resulting in reduced availability and rising costs. Fossil gas retailers and distributors are seeking biomethane to augment network viability

and avoid stranded assets. This blending capability means that biomethane injected into the natural gas distribution network can be delivered anywhere else on the network.

- Continued importance of gas for applications where alternatives of transitioning from gas to an alternative energy source would be very expensive or less suitable – e.g., commercial kitchens using gas for cooking.
- Biomethane as a drop-in fuel, produced to the same standard as natural gas, requires no costly equipment changes or infrastructure upgrades.
- On-site biogas use by food processors, who can recycle organic residues to fuel their own boilers and reduce energy costs.
- Sustainability pressures from international customers are prompting food processors to transition from fossil to renewable fuels. Switching to biofuels also generates NZ ETS revenue through emissions reductions.
- Energy price hedging of future energy costs through biofuel adoption is improving operational resilience for many manufacturers facing volatile gas and electricity prices.
- Electricity system stability is at risk of low hydro lake supply and is increasingly reliant on firm, controllable backup generation as more intermittent sources like wind and solar come online. Biomass is needed for dry year firming at Huntly Power Station, while stored biomethane can stabilise grid fluctuations.
- Liquid and gaseous biofuels are suitable for dry-year firming and quick-start backup generation, particularly at sites like Huntly Power Station. Liquid biofuels like biodiesel and biomethanol may also be used in open-cycle gas turbines for peaking generation.

Action:

1) ***Develop and disseminate information to counter misinformation about bioenergy sustainability.***
2) ***Promote the benefits of gaseous, solid and liquid biofuels to food processors.***
3) ***Develop a roadmap for increasing biofuel availability, aligned with emerging drivers.***

2.8 Contributing to a Circular Bioeconomy

As New Zealand moves to reduce fossil fuel dependence, there is growing public and government support for transitioning to a circular bioeconomy – a concept in which bioenergy and biofuels play a foundational role.

The Government signalled the advantages of this shift, for New Zealand, in the first Emissions Reduction Plan and has formalised its commitment through the creation of the New Zealand Institute for Bioeconomy Science, merging three Crown Research institutes[8]. This aligns closely with the bioenergy sector, which intersects forestry, agriculture research and land management

[8] AgResearch, Manaaki Whenua Landcare Research, Plant & Food Research, and Scion

The Bioenergy Association has long championed the circular bioeconomy concept and with government now taking the lead, can shift from advocacy to active participation alongside other emerging stakeholders.

There is a lack of New Zealand relevant information on what a bioeconomy is and what the benefits are. It is often based around a cascading use of biomass with the residues from one biomass use being used as a feedstock for another use. Bioenergy is often a co-product of a primary application for the biomass. Adaptation ands technology transfer from Europe, US and Asia would be a major win for the future NZ bioeconomy

Action:

Provide clear information on how bioenergy supports the development of a New Zealand bioeconomy and engage in related initiatives to aid the transition.

2.9 Sustainability

New Zealand's food exporters are increasingly required to meet stringent international sustainability standards, particularly regarding energy sources. Renewable energy certification is often a requirement. However, some certification criteria – developed overseas – are not well-suited to New Zealand's unique land use and environmental practices but are still required to be met.

To address this, the bioenergy sector has been working with others (e.g., forestry) to seek exemptions or develop alternative certification approaches more suited to New Zealand.

New Zealand has several comparative sustainability advantages:

- Widespread sustainable land management practices and robust environmental legislation
- Most biofuels are produced from biomass residues or materials otherwise destined for landfill
- Sufficient biomass for energy from residues exists to meet growing demand, with energy crops only likely needed as a supplementary source in the medium term.

Despite this, misconceptions about the sustainability credentials of New Zealand-produced biofuels remain a barrier to sector growth. This includes concerns around land use, where conflicts between agriculture and forestry are sometimes overstated. Bioenergy Association advocates for integrated land use, recognising that 6-9% of farmland is typically underutilised – e.g., erosion-prone slopes, gullies or grade 7&8 farmland – that could be better managed for bioenergy production.

To support better understanding and sector credibility, the Bioenergy Association is developing a Sustainability Policy.

Action:

1) ***Bioenergy Association to finalise and publish a Sustainability Policy for the bioenergy sector.***
2) ***Collaborate with other sectors to ensure that bioenergy is incorporated into sustainability criteria negotiated for the export of New Zealand products.***

2.10 Training capabilities

Anecdotal evidence indicates that consultancy work in the bioenergy sector is often of a substandard quality due to limited understanding of bioenergy markets and technologies. This knowledge gap is particularly apparent when compared to traditional energy sources like coal or electricity, with which many consultants are more familiar.

For example, owners of small boilers – such as those used in schools - often delegate supervision to support staff, like caretakers, who may be responsible for ordering fuel, operating the boiler and ensuring safe performance. Under New Zealand's Occupational Safety and Health legislation, asset owners are legally responsible for ensuring that these supervisory staff are adequately trained. While the Bioenergy Association previously offered boiler operator training in 2010, it has not done so in recent years. There is a strong case for reestablishing this capability, though the initial course development and funding remain barriers.

Action:

Re-establish training capability for small boiler operators.

Suppliers of small boilers typically offer appropriate on-going maintenance services, which asset owners can leverage. However, formal training in bioenergy remains virtually non-existent in Australasia. As a result, advisers often rely on outdated or irrelevant training – mostly commonly in coal or electricity technologies – which leads to inappropriate or suboptimal equipment choices for bioenergy applications.

To support sector learning, the Bioenergy Association provides a range of professional development tools, including:

- A monthly Bioflash newsletter that showcases international biofuel project investment and developments relevant to New Zealand
- An interactive Directory of Bioenergy Facilities to show investors and advisers where similar projects to theirs have been built
- A free monthly webinar programme, open to all sector participants
- A library of Best Practice Technical Guides available through the Bioenergy Knowledge Centre

Despite these resources, consultant engagement remains low. Many professionals prioritise fee-earning work and do not make use of these development tools. Inquiries suggest that a lack of immediate financial return is the primary barrier to participation.

Some training offered by the Carbon and Engineering Professionals (CEP) is relevant to bioenergy but tends to focus on electricity as if it were the only energy option. Biofuels are rarely covered due to a lack of expertise among course facilitators. Discussions are ongoing to explore whether CEP courses can be expanded to include bioenergy-specific content.

The Association's experience suggests that online training is the most effective format. It allows participants to fit learning around their workloads, eliminates travel requirements and enables flexible, self-paced learning. The Association already hosts a rich archive of webinars

and presentations in the Bioenergy Knowledge Centre, offering a strong foundation for building online courses without the need for extensive new content development.

Previous in-person training courses run in 2010 were poorly attended by the target audience (consultants), with attendees often joining simply to monitor competitors or market their services, rather than to gain knowledge. Survey feedback has shown that online training, particularly when linked to a Professional Development Scheme, would attract more participants.

To encourage uptake, the Association has established an Adviser Registration Scheme[9]. Staff of member organisations can be registered in specific areas of competence by earning Professional Development points through participation in recognised training activities. This system incentivises training and offers a practical benchmark for consultant selection. If employers consistently prioritise the use of registered advisers, registration will become a valued – and eventually essential – credential.

Action:

1) ***Promote the importance of Professional Development by advocating the importance of using registered advisers and encourage employers to adopt this as a selection standard.***
2) ***Collaborate with CEP to identify opportunities for joint training initiatives and shared resources.***
3) ***Develop and launch a comprehensive online training programme, supported by existing materials and linked to the Professional Development Scheme.***

2.11 Government policy and information bias

While government energy policy development is frequently framed as encompassing the entire energy system, consultation documents often focus almost exclusively on electricity. When this omission is raised with policy authors, they frequently acknowledge the oversight – but note that it was not intentional. In many cases, the bias originates in the initial Cabinet decision-making where directives outlined in Cabinet Minutes narrowly define the scope of work, limiting the inclusion of bioenergy.

EECA, as central government agency responsible for promoting energy efficiency and renewable energy, is the primary public source of information on bioenergy. However, its programmes and online content often do not present bioenergy as a mainstream, viable energy option. Despite EECA's stated commitment to covering all energy sources, bioenergy is frequently underrepresented or omitted entirely.

A notable example is the Regional Energy Transition Accelerator (RETA) studies in Taranaki and the Waikato. These regions already produce gaseous biofuels, yet RETA reports make no reference to biofuels as an energy solution. This omission reinforces the perception that bioenergy is not part of New Zealand's future energy mix and contributes to a continued lack of awareness among decision-makers and the public.

[9] https://www.usewoodfuel.org.nz/registered-wood-energy-advisors

Action:

1) ***Provide Ministers, Members of Parliament and officials with clear, targeted briefing materials outlining what bioenergy is, its benefits and its role as a mainstream energy option.***
2) ***Develop and distribute tailored information for both central and local government officials to ensure they are well informed about bioenergy and its potential contribution to New Zealand's energy system.***

2.12 Research and Development

The bioenergy sector in New Zealand has benefitted from research contributions by Scion, which has maintained a small but dedicated focus on bioenergy. However, insufficient research funding has limited Scion's ability to employ the breadth of expertise required to support a sector of this size and complexity.

Compounding this issue is a tendency among government agencies to overlook Scion as a resource, instead awarding bioenergy-related contracts to private entities with limited sector knowledge. This approach has hindered the development of a robust science capability in bioenergy – placing New Zealand behind other forestry – and land-rich countries such as Canada, where coordinated investment in bioenergy research has delivered stronger outcomes.

Outside of Scion, bioenergy research engagement from universities and other Crown Research Institutes has been minimal. While occasional work has been undertaken by the School of Forestry and the University of Waikato's Energy Research Group, overall interest from institutions such as AgResearch and Plant & Food Research has been limited. One notable exception is the Wood Technology Research Centre at the University of Canterbury, which has shown consistent engagement.

The Government's recent decision to merge AgResearch, Manaaki Whenua Landcare Research, Plant & Food Research and Scion into the proposed New Zealand Institute for Bioeconomy Science offers an opportunity to unify and strengthen bioenergy research across land, forestry and energy domains. However, this integration will only succeed if accompanied by increased investment in bioenergy R&D.

To support knowledge exchange, the Bioenergy Association regularly draws on resources from IEA Bioenergy Task Groups, which provide access to the latest international insights on bioenergy technologies and markets. Scion participates in:

- Task 43 – Biomass Supply
- Task 34 – Biomass Pyrolysis

EECA is a member of:

- Task 32 – Biomass Combustion

Scion has also recently chaired the overarching IEA Bioenergy Technology Programme.

It is understood that MBIE holds membership in several international renewable energy organisation. However, there is currently no structured mechanism to share insights from

these memberships with the domestic bioenergy sector – limiting the potential return on this international engagement.

The Bioenergy Association addresses this gap by sourcing and publishing relevant reports in the Bioenergy Knowledge Centre and promoting updates and event invitations through its Bioflash newsletter. Broader dissemination of international insights would significantly improve sector knowledge and innovation.

Action:

1) ***Encourage government agencies (e.g., EECA, MBIE, Scion) participating in international bioenergy organisations, like IEA Bioenergy, to actively disseminate relevant insights and information to New Zealand's bioenergy sector.***
2) ***Promote wider use of the Bioflash newsletter and Bioenergy Knowledge Centre as central platforms for sharing international and domestic bioenergy research.***

2.13 Collegial approach

A significant barrier to the growth of bioenergy projects in New Zealand is the often narrow scope of prefeasibility investigations. Unlike conventional energy projects, bioenergy initiatives typically involve complex value chains and multiple stakeholders, including feedstock suppliers, energy users, logistics providers and investors. As a result, successful project development requires broad thinking and a collaborative cross-party approach.

Too often, prefeasibility studies are confined to a single organisation's internal operations – limiting their effectiveness. This narrow perspective is typically dictated by the scope set by project funders or clients, which excludes broader collaborations as being 'out of scope'.

Examples of where a collegial approach is essential include:

- A food processor may have insufficient feedstock on their own, but by collaborating with neighbouring businesses or farms, a viable project could be created.
- Individual farmers with seasonal or low-volume feedstocks could collectively supply enough biomass to justify investment in a local bioenergy facility.

These examples highlight the need for a networked, win-win model, where cooperation across parties can unlock opportunities that would otherwise be unfeasible.

Action:

Promote case studies that illustrate successful collaborative bioenergy projects, demonstrating how a collegial approach can lead to viable, scalable investments.

2.14 Professional standards

The bioenergy sector supplies biofuels to the NZ energy market in a similar manner as other fuels. As with those traditional fuels, users of bioenergy – such as manufacturers, hospitals and schools – are dependent on the heat or other product the fuel is used to produce and so expect a consistent, high-quality product that performs reliably and safely.

To support this, the Bioenergy Association has:

- Developed Best Practice Technical Guides outlining fuel production and operational standards. These are available online. Additional Technical Guides are produced as required.
- Established accredited schemes for fuel suppliers and advisers
- Participated as an observer on relevant ISO and Joint NZ/Australian standards committees.

Where applicable, Canadian bioenergy standards have also been referenced, as they are often highly relevant to New Zealand's conditions. The Association supports the use of ISO standards as the preferred benchmark, given that they are developed by international experts – expertise that is not always available locally.

The Sustainable Biomass Program (SBP) sets international standards which would assist with growth in export markets. SBP has been recognised by the Japanese Govt. as meeting the requirements lifecycle GHG accounting as well as legality and sustainability verification for Japan's power producers under their feed in tariff scheme. While perhaps more relevant for export markets but SBP certification might also be useful domestically to establish the credibility of the sector.

Unfortunately, compared to the gas and electricity sectors, New Zealand has few formal bioenergy standards. Moreover, because Standards NZ now requires sector participants to pay the full cost ($10,000-20,000 per standard) to initiate or revise formal standards, the Bioenergy Association can no longer afford to participate in such processes. As a result, it will continue to rely on its own industry-developed Technical Guides, even though standards relating to public safety should be considered a public good.

The focus of guidance to date has been on providing information on the value proposition. The focus now needs to change to providing operational guidance for maintenance, operation and health and safety. Technical Guides are required for safe operation and maintenance of bioenergy plant as the guidance currently available is often for other fuels or relevant to other countries.

There is a need for more support to equipment operators and maintainers. It has been suggested that Bioenergy Association should establish operator Forums for both solid and gaseous biofuels plant.

Action:

1) ***Promote ISO standards as the appropriate reference for New Zealand's bioenergy sector, ensuring alignment with international best practice.***
2) ***Prepare Technical Guides for operation, maintenance and health and safety of bioenergy plant.***
3) ***Establish operator/maintainer Forums to support the safe operation of bioenergy equipment.***

Of equal importance is the need to improve the professional standards of advisers, designers and contractors working in a sector. To address this, the Bioenergy Association has established a Register of Advisers (refer section 2.9) for individuals who can demonstrate relevant knowledge, qualifications and experience. This initiative, along with the existing

accreditation schemes, provides a trusted benchmark for advisers or when purchasing biofuels.

As the sector grows, the Bioenergy Association is positioning itself as a recognised, professional standards body - similar to organisations like Certified Builders or Certified Plumbers – to enhance quality assurance and protect end users.

Action:

Promote the Bioenergy Association as a professional body through wider recognition of its Advisers Register and accreditation schemes, and encourage stakeholders to use these as standard selection criteria

2.15 Consenting

The current lack of consistency in Regional and District Plan Rules presents a barrier to investment in bioenergy and biofuels infrastructure. Standardisation of consenting rules would:

- Reduce project development costs
- Encourage wider uptake of compliant, proven equipment and technologies
- Support the development of regulatory expertise
- Provide greater certainty to investors

The current Government has proposed reforms to the consenting regime and has signalled interest in standardising regional/district planning rules. In alignment with this direction, the Bioenergy Association's Solid Biofuels Steering Committee is exploring options for standardising regional rules for heat plant.

The perceived consenting risk is holding back best practice design of facilities where there will be discharges to air. This is particularly in regions with polluted/constrained airsheds and/or in commercial zones. There's often an assumption that particulate emissions from biomass combustion will make it impossible to obtain consent. It would be helpful to have case studies of actual installations that have successfully gained consent in strict airsheds. In addition, modelling hypothetical installations to demonstrate what would be required to obtain consent would be helpful. That kind of analysis could help build confidence among councils and operators.

Action:

Establish a Working Group to review and prepare model consenting rules for heat plant installations, to be proposed for regional and district planning consistency.

2.16 Advocacy

The Bioenergy Association is a member-driven organisation representing a wide spectrum of commercial interests across the bioenergy and biofuels value chain. Advocacy on behalf of sector – particularly to central and local government – is a core activity and a key value the Association delivers to its members.

The Association's policy submissions are:

- Professional and fact-based
- Constructive and practical for policymakers
- Informed by the Executive Officer's experience in both corporate business and public sector governance

Government officials regularly seek input from the Association because of this reputation. However, a key limitation is that the Executive Officer is not Wellington-based, reducing opportunities for vital face-to-face engagement with Ministers and officials.

Additionally, there has been limited direct engagement by the Association's Board with Ministers, which could be increased to raise the sector's visibility in decision-making circles. Another constraint is the lack of analytical capacity within the Association to support submissions with data and robust modelling – this is compounded by the broader lack of bioenergy sector data.

Action:

1) ***Improve collection and availability of bioenergy sector data to support evidence-based advocacy***
2) ***Strengthen the Association's Wellington presence, enabling more frequent in-person engagement with government decision-makers***

The Executive Officer proactively engages with the media, producing commentaries and statements and responding to requests for expert opinion. However, potential conflicts of interest limit the ability of the Association Board members to act as public spokespeople, though Interest Group Convenors occasionally participate. The Executive Officer has no potential conflicts.

The Association's media reach is constrained by:

- A lack of funding for communications to promote bioenergy and biofuels
- Limited capacity to generate article content
- No in-house communications adviser or dedicated promotional budget – a journalist is engaged on a case-by-case basis to assist with writing and proof-reading media statements and articles

Action:

1) ***Broaden the pool of authorised spokespersons to represent the Association in the media and at public events***
2) ***Expand communications funding to:***
    a) ***Engage professional article writers***
    b) ***Place advertorial content in relevant media***
    c) ***Secure ongoing communications support and media engagement capability***

2.17 Investor confidence

Access to project funding is a barrier demonstrated by the success of the GIDI scheme. This showed the level of assistance necessary to give private investors confidence to proceed with

projects. Accelerated depreciation will assist address the high upfront costs but other non-financial tools can give investors confidence. Case studies and demonstration projects are a low-cost method for providing confidence.

A lot of commercial uncertainty is caused because of the lack of experience in the market. Businesses often don't know where to source biofuels, what kind of contracts are typical, or even what type of biomass they should go for. The wholesale and retail markets for electricity are very mature and businesses know how to buy electricity. The website portals should be promoted as centralised biofuels marketplace notice boards giving buyers and sellers visibility into suppliers, pricing, contract models, biofuel types, quality, etc., the go-to place for biofuel procurement.

Action:

Develop case studies and demonstration projects to provide investor confidence.

3. Solid biofuels

3.1 Thumbnail of the market

The formal trading of wood fuel in New Zealand began in 2010, with the first sale and purchase agreements between wood fuel suppliers and customers outside the wood processing sector – such as rest homes, schools and hospitals. Prior to this, wood fuel was informally exchanged within the wood processing industry itself. The entry of customers unfamiliar with wood fuel procurement prompted the Bioenergy Association to develop a suite of best practice Technical Guides and establish the Wood Fuel Supplier Accreditation Scheme to support reliable and transparent trade. These early initiatives laid a strong foundation for the sector's steady growth in sale and purchase of wood fuel.

The wood fuel market expanded significantly in the South Island following the introduction of the Government Investment in Decarbonising Industry (GIDI) Fund. However, a downside of the rapid shift from coal to wood fuel was the influx of consultants, to assist applicants for funding, many of whom lacked sufficient expertise in bioenergy. Even after the closure of the GIDI fund, a large number of these consultants remain active in the sector. Their limited understanding of bioenergy, compared to their knowledge of electricity-based solutions, often leads to biased advice for investors considering heat plant technologies. This trend is also evident in some of EECA's activities and energy policy development.

Unlike many other resource-based markets, the wood fuel supply sector has grown slowly, mainly due to limited engagement from resource owners. Growth has instead been driven by equipment suppliers and a handful of consultants seeking business opportunities. Forest owners and landholders have shown little urgency to maximise returns from the biomass resources they could harness. In contrast, other industries typically seek value from all outputs, including residues that might otherwise be wasted - sent to landfill, or, in forestry's case, left on the forest floor.

In 2023, the New Zealand Forest Service (Te Uru Rākau), in collaboration with sector associations, developed a transition plan to maximise the value from wood. For the first time, this brought all parts of the forestry and wood sector together to work collaboratively. A central focus of the plan was the use of wood residues for energy fuel production and sale. Unfortunately, with a change in government, this work was halted. However, momentum has continued as the wood sector associations persist in promoting the recovery and use of residues as energy fuel. These associations have formed a pan sector group, the Forest & Wood Forum, to carry forward many of the initiatives previously outlined in the Industry Transformation Plan.

Recognising the importance of expanding biomass supply, the Government – through the Second Emissions Reduction Plan – has established a Ministerial Biomass Supply Task Force, serviced by MBIE.

Table 1 (overleaf) outlines a base-case scenario for potential demand for bioenergy and biofuels by 2050[10].

Table 1: Base scenario – Where the demand for bioenergy and biofuels could come from in 2050

Application areas	Energy from bioenergy or biofuels (PJ)	
Solid biofuels		
Residential/commercial[1]	7	
Wood processing (existing)[2]	43	
Stationary heat (fuel switching)[3]	24	
Electricity firming[4]	15	
		89
Liquid biofuels		
Domestic aviation[5]	4	
Domestic marine[6]	2	
International aviation[7]	6	
International marine[8]	6	
Heavy land transport[9]	10	
Rail[10]	1	
Off road land transport[11]	15	
Stationary heat (fuel switching)[12]	1	
		45
Gaseous biofuels		
Electricity[13]	3	
Heat users (Circular own use)[14]	5	
Transport[15]	1	
rLPG[16]	1	
Biomethane to gas network[17]	6	
		16
		150

[10] https://www.bioenergy.org.nz/resource/is61-sourcing-biomass-to-meet-the-demand-for-biofuels

3.1.1 Current solid biofuels market

Reliable data on the current solid biofuels market in New Zealand is limited, as much of it is derived through estimation rather than direct measurement. According to MBIE's Energy Statistics, solid biofuels accounted for 44.37 petajoules (PJ) of energy in 2023.

Biomass resources for solid biofuels include both woody and herbaceous plant matter. However, in practice, all solid biofuels currently used are derived from woody biomass. As a result, the terms *solid biofuel* and *wood fuel* are often used interchangeably. These wood fuels - produced from forest harvest and processing residues - take the form of chips, pellets, hogged fuel, briquettes, and firelogs.

The majority of wood fuel is used for heat production, with only a small portion used to generate electricity. The wood fuel supply market as a coal replacement is well-established in the South Island. In contrast, the North Island is significantly behind – by approximately 14 years – in its transition to biomass for heat, due largely to the historic reliance on natural gas for industrial heating. As natural gas contracts expire and supply constraints emerge, North Island heat users are increasingly transitioning to electricity, biomethane or wood fuel.

The use of biomass to generate electricity on a commercial scale is unlikely to be economic in New Zealand, given the lower costs of generation from solar, wind, and geothermal energy. However, biomass will have a niche role to play as a dry-year reserve or in freeing up electricity in specific base-load applications. In some cases, where a heat plant has excess thermal capacity, co-generation of electricity and heat may be economically feasible - but generally, the marginal additional cost of cogeneration exceeds the value of the electricity produced.

The Bioenergy Association has assessed various future scenarios for biomass availability. One base scenario (Table 2 overleaf) projects supplying 150 PJ of energy from biomass by 2050[11] - a threefold increase over current biomass supply levels for energy.

[11] https://www.usewoodfuel.org.nz/documents/resource/The-demand-for-biofuels-is-changing-the-value-of-treesv_BCox.pdf

Table 2: Base scenario for sourcing biomass to supply 150PJ of bioenergy

		2050		
		Energy PJ		Quantity
Biomass				
Municipal				
	Municipal wood wastes	2.4		266,000 tpa
	Arborist	0		158,000 tpa
Agriculture and horticulture				
	Horticulture	0.9		126,000 tpa
	Agriculture crop residues	6.2		351,000 tpa
	Shelterbelt	0.6		82,000 m^3pa
	New farm forestry	16.9		
Wood processing				
	Existing wood processing	43		
	Port bark	1.8		262,000 tpa
	Pulp log	5.6		817,000 m^3pa
	New wood processing residues	13.1		
Forestry				
	Harvested carbon forest	2		
	Production thinnings	1.6		232,000 m^3pa
	Waste thinnings	3.6		192,000 odt pa
	Pruning residues	0.5		25,000 odt pa
	Inforest landing residues	11.3		1,643,000 m^3pa
	Cutover – ground based	8		1,164,000 m^3pa
	Cutover – hauler/cable	1		145,000 m^3pa
	Wilding forest	0.2		
	New plantation forestry residues	10		
Non-residual sources				
	Sawmill chip	11.6		
	Diversion from export K grade logs	31.4		
	Douglas Fir production thinnings	0.9		
	Energy crops	0	172.6	
Organic				
Waste				
	Municipal WWTP	0.6		
	Municipal organics	1.5		
	Food processing residues	1.8		
	Pulp and paper effluent	0.6		
	Dairy effluents	6.8		
	Pig and poultry organics	1.7		
	Crop residues and supplementary crops	1.4		
	Gas capture at landfill	3		
Non residual sources				
	Energy crops	0		
			17.4	
			190.0	

Future biomass supply is expected to come from a range of sources, including:

- Diversion of low-grade logs from export into domestic energy use
- Increased biomass from farm-grown trees, including shelterbelts and new plantings lower productivity land (Land Use Capability Classes 7 and 8)
- Greater volumes of residues generated through increased domestic processing of wood for bio-product manufacturing.

3.2 Programme to meet demand

The Solid Biofuel Interest Group has set a vision for ***Bio-Heat to supply 25% of New Zealand's energy needs by 2050.***

Objectives:

a) Ensure Bio-Heat is properly considered in every commercial scale thermal energy project
b) Provide tools to support consultants and decision makers
c) Address concerns around biomass availability
d) Stimulate economic onshore demand for lower-value export logs, ensuring that only high-value logs are exported from New Zealand.

Core messages:

- NZ does not face an energy shortage.
- There is potentially sufficient sources of biomass available to meet future demand
- Bio-Heat is 30-50% more cost-effective than electric-boiler heat
- Bioenergy provides a range of non-energy co-benefits for New Zealand
- Bioenergy is complementary to the 'Electrify NZ' initiative

Communication Strategy:

The *UseWoodfuelNZ* campaign needs to be refreshed and used as a platform to engage with:

- Forest growers
- Energy users
- Government, as part of its broader energy strategy

Action:

1) ***Develop and publish a fuel comparison calculator to support fuel selection by heat plant advisers***
2) ***Build a database of electricity prices relevant to energy users***
3) ***Refresh and relaunch the UseWoodFuelNZ campaign***
4) ***Recover fuel comparison calculators previously hosted on the EECA website and make them available through the UseWoodFuelNZ portal***

3.3 Ensuring supply of biomass

Investors in bioenergy solutions need confidence that sufficient biofuel will be available for the economic life of their operations. A key strength of New Zealand's bioenergy potential lies in its favourable growing conditions - trees here grow approximately three times faster than in countries like Scandinavia, which already have established bioenergy markets. Unlike these counties, however, New Zealand has not fully embraced forestry as a strategic economic foundation.

As petroleum products become more expensive or geopolitically uncertain, sustainable forestry in New Zealand will become increasingly valued. Much of the country's Land Use Capability Class 7&8 land has limited farming value but strong potential for productive forestry. Anticipated growth in demand for biomass is expected to stimulate new planting on this underutilised land.

Providing investors with confidence in availability of biomass is critical to all opportunities as without fuel there is no bioenergy operation. Alongside this is the desire to understand biofuel prices. The latter is more challenging, as each source of biofuel feedstock differs in terms of location, as well as the cost of recovery and processing into a fuel. The best can be regional price indicators but even these are difficult because sourcing and supply are so different truckload by truckload. Export log price metrics are useful regarding wood as a commodity but currently this data is too course and should be produced regionally and on a monthly basis if it is to be of use for the bioenergy market.

Biomass is available in every region but because there is little trading in some regions the supply market in those regions is underdeveloped.

Bioenergy Association is advocating for regional biomass mapping such as in the EECA RETA project be extended to include possible future biomass availability.

3.3.1 Trees on farms

The potential to source biofuel feedstock from farms is substantial. Early analysis suggests that up to 25% of biomass suitable for biofuels could come from agriculture and horticulture sources. It has been assessed that 6-9% of a hill country farm is not highly productive and is often made up of erosion-prone slopes, gullies, shelterbelts or riparian planting – ideal for integrating trees into agricultural or horticultural farm operations, an ideal tool for land management. Many of the trees on farms can be easily harvested as the farm already has access tracks necessary for biomass removal.

Many farms already have woodlots and forestry experience, along with infrastructure such as access tracks that support biomass harvesting. However, most farm foresters lack the knowledge and experience on how to recover biomass for sale to fuel producers. Current expertise is drawn from large-scale commercial forestry, which is not always applicable to small-scale farm forestry.

Action:

Develop a tailored suite of tools and case studies for farm forestry, including:

1) ***Model contracts for purchase of biomass from landowners***
2) ***Best Practice Guide***
3) ***Demonstration biomass recovery***
4) ***Market information***
5) ***Examples of collective recovery and sale of biomass***

3.3.2 Herbaceous biofuels

Currently, solid biofuels are sourced almost exclusively from woody biomass. While some herbaceous crops such as Miscanthus are grown, their use as a biofuel has not yet been realised. Miscanthus, which must be harvested annually and if in large round bales can be stored without shelter, offers significant potential as a strategic fuel source – particularly for heat plant owners.

As demand for solid biofuels increases, herbaceous biomass (which is often burnt or discarded) could be better utilised as a biofuel in boilers. Accelerating this transition requires targeted guidance to the recovery and use of the herbaceous biofuels.

Action:

1) ***Provide guidance to farmers and landowners on growing, recovering and using herbaceous biomass for energy***
2) ***Provide technical advice to heat plant designers and installers on combustion of herbaceous biofuels in existing and new boilers.***

3.3.3 Treated timber as an energy fuel

The use of treated timber in boilers is currently restricted in many regions, though some consenting authorities permit certain types (e.g. boron-treated timber) under specific conditions. *Bioenergy Association Technical Guide 9* provides advice, to consenting authorities and applicants, on acceptable blending of treated and untreated wood as a boiler fuel.

While contaminated timber must generally be disposed of to landfill, understanding residues recovery techniques of treated used timber suitable for use as a biofuel, and the resulting grades of feedstock produced requires Guidelines to be developed and incorporated into training courses. Bioenergy Association is working with the New Zealand Demolition & Asbestos Association to develop guidelines and model recycling facilities and has been a member of the Workforce Development Working Group contributing to developing Resource Recovering Unit Standards training material.

Bioenergy Association has established a Working Group to investigate the use of treated timber as an energy fuel. Issues to be addressed include:

- Identify and learn from consenting authorities who are consenting the use of treated wood as an energy fuel
- Identify the criteria for consents
- Identify heat plant which are successfully using treated timber as an energy fuel
- Prepare and publish guidelines for use of treated timber as an energy fuel.
- Consider technology for the recovery of CCA chemicals from treated wood

Action:

1) ***Finalise guidelines and training materials, for recovery of treated timber for use as an energy fuel, in partnership with the New Zealand Demolition & Asbestos Association***
2) ***Undertake sampling/testing of typical sources of treated timber to determine practical grading systems during demolition***
3) ***Learn from consenting authorities currently approving treated timber use as in energy systems***
4) ***Identify consent criteria and successful heat plants already using treated timber as an energy fuel***
5) ***Develop and publish national guidelines for treated timber as an energy fuel.***

3.3.4 Wood processing residues

Wood processing residues are ideal feedstocks for wood fuel. Increasing domestic processing of logs will expand the availability of this high-quality biomass. Processors may either establish themselves as a wood fuel supplier based on their own residues or sell the residues to aggregators with customer networks. Work needs to be done to assist wood processors to see supply of residues to the energy market as a viable option for their business.

Wet sawdust is often a difficult residue for processors to deal with. Guidance on drying options or use as a high moisture resource should be undertaken.

Action:

1) ***Prepare case studies demonstrating the financial return from selling wood processing residues as a feedstock for wood fuel.***
2) ***Provide guidance on handling of wet biomass residues for production as a biofuel***

3.3.5 Diversion of low-grade export logs

In many regions of New Zealand, low-grade logs traditionally intended for export are now being diverted for use as wood fuel. Exporting these logs is effectively exporting potential energy – logs cut to export specifications often result in waste. By using logs for energy instead, nearly 100% of the tree can be recovered and used.

Action: Prepare case studies highlighting the increased financial returns from selling low-grade logs for energy compared to export.

3.3.6 Forest biomass recovery

The recovery of biomass residues at harvest is increasing, driven by new Environmental Standards for commercial forestry and growing market for the residues as a source of energy fuel. Some forest owners are now aiming for 100% biomass recovery from the trees they plant.

Work is required to assist forest owners to see slash as a co-product of their operation. They need to see that having uses of their slash, such as production of energy fuels, is a tool for ensuring compliance with their environmental standards. This will require them to collectively promote and assist the construction of bioenergy production facilities in each region. In many regions such as inland Taranaki and Tairawhiti the leadership for slash use must come from forest owners.

Action:

1) ***Develop case studies showing financial returns from 100% recovery of biomass from trees planted.***
2) ***Provide guidance and demonstration role models of how forest growers integrate use of slash to produce biofuels to meet their resource consent conditions.***

3.4 Solid biofuels data

Current data on bioenergy resources and usage in New Zealand is largely derived from what data is available rather than directly measured surveys. Where measured data does exist, it is often too coarse to be of practical use for decision-making. For example, MPI's published log price data is only available quarterly and at a national level – or, at best, separated into North and South Island figures. To be useful for investors ad market participants, data needs to be more granular – ideally published monthly and at a regional level.

Action:

1) ***Improve data collection methods for biomass resources and bioenergy use to ensure accurate, measured data is available and openly accessible***
2) ***Request that MPI expand its log price reporting to provide monthly, region-specific data.***

3.5 The participants

3.5.1 Resource supply

Woody biomass – primarily in the form of residues - is sourced from plantation forests, on-farms trees and wood processors. Over the past 15 years, as the wood fuels market has expanded, biomass supply has grown in parallel. The economics of recovery have improved with increased experience and better systems for residues recovery.

However, in many regions, a lack of demand has provided little incentive to recover residues. This was illustrated when storms washed forest debris onto low-productivity farmland and foreshores, underscoring the missed opportunity to recover biomass that might otherwise have had value.

In the South Island, rising demand for biomass – driven by the replacement of coal-fired heat plants – has led to the development of biomass supply chains in areas where residues recovery had not previously been considered.

A notable trend in some parts of the South Island is the diversion of low-grade export logs for domestic use as wood fuel. This shift not only reduces reliance on export markets but also improves recovery efficiency, as logs can now be processed without the constraints of export-length specifications – allowing for 100% utilisation of the tree into wood fuel.

As the value of woody biomass continues to grow – both for fuel and for use in bio-based products – it is anticipated that new plantation forests and on-farm tree plantings will increase. This will, in turn, result in higher volumes of available residues. However, as the bioeconomy expands and more residues are diverted to biochemicals and advanced bio-products, competition for this resource is also likely to increase.

Analysis suggests that New Zealand has sufficient biomass residues to meet demand for a number of years. Data is freely available from NEFD, WAFS, RETA and a projections report from Scion, to provide investors with good information on what biomass could be available from existing biomass sources. However, no comprehensive studies have been undertaken to quantify the future supply potential from woody biomass from new sources.

Action:

Undertake a national study to estimate the future potential supply of woody biomass from possible new plantings.

3.5.2 Solid Biofuel Suppliers

The sourcing and supply of biomass residues to aggregators – who produce specification compliant wood fuel – has largely evolved from agricultural contractors. These contractors often generate biomass when clearing woodlots, shelterbelts on farms, waterways and post-harvest forest areas. Similarly, wood processors seek efficient avenues for disposing of surplus wood processing residues.

Because woody biomass from forest harvesting and wood processing is rarely specification-ready, it typically requires further processing – such as sizing or drying – before it can be used by a wood fuel supplier. Wood Fuel Suppliers often act as aggregators, sourcing material from multiple contributors and processing it to meet quality standards.

Some forest growers, contractors or processors vertically integrate and supply wood fuel directly. While this is less common, it can enhance supply chain reliability.

To provide market confidence to the supply of solid biofuels, the Bioenergy Association established the Solid Biofuel Supplier Accreditation Scheme[12]. Since its launch in 2010, the scheme has improved fuel quality assurance and Accredited Suppliers accountability. Initial complaints about inconsistent fuel quality have significantly declined, with no complaints reported in recent years. A recent rise in applications for accreditation reflects growing recognition of the scheme's value.

However, greater awareness among wood fuel buyers of the scheme and requirement for accreditation as a criteria of wood fuel purchase would strengthen its impact.

Action:

1) ***Increase promotion of the message "Buy only from an Accredited Solid Biofuel Supplier"***
2) ***Support existing wood fuel suppliers in achieving accreditation***

3.5.3 Investor owners

Investors in heat plant and other bioenergy infrastructure who are customers for solid biofuels place strong emphasis on the long-term availability and cost of biofuels. Ensuring transparent information on future supply and pricing is essential for informed investment decisions.

[12] https://www.usewoodfuel.org.nz/resource/tnsb04-solid-biofuel-supplier-accreditation-scheme

Action:

1) ***Publish regular updates on projected regional pricing for all available fuel types.***
2) ***Produce and update regional maps and tables identifying likely sources of solid biofuels through to 2050.***

3.5.4 Advisers

As discussed in section 2.13 there are concerns that many advisers on solid biofuel projects lack necessary knowledge and expertise – often applying coal-based experience to biomass equipment, despite significant differences in combustion characteristics. Section 2.13 discusses skills development initiatives being managed by the Bioenergy Association including that of solid biofuels.

To support skills development, the Register of Solid Biofuel Advisers was created, allowing experienced advisers to distinguish themselves. While this should incentivise registration, greater awareness at the senior management level within consulting firms is needed, as these leaders typically drive business development priorities.

Action:

1) ***Review the Adviser Registration Scheme to ensure it remains fit for purpose***
2) ***Promote the benefits of registration to senior managers in consulting and engineering firms.***

EECA's GIDI and other funding programmes have generated a valuable database of successful and unsuccessful decarbonisation of heat projects and bioenergy applications. A formal review of this information pool could identify key learnings, especially from failed applications and inform future training needs.

Notably, in 2010, EECA commissioned an experienced external adviser to access feasibility studies, leading to the creation of a decade-long Bioenergy Education Programme. A similar review now would benefit the sector to understand what training or information is still required. The choice of reviewer is critical as when EECA undertook a similar review around 2012 they used a reviewer, who had no more knowledge and experience than those being reviewed, so missed many of the errors being made. The reviewer should be independent and highly experience.

Action:

Undertake a review of GIDI and other funded applications to identify key lessons and inform future skills development initiatives

3.5.5 Equipment and services supply

The solid biofuels sector is generally well supported with appropriate equipment and services. Suppliers offer a full range of spare parts and maintenance for their products. However, new entrants to the market often struggle to identify reputable suppliers or mistakenly purchase unsuitable equipment due to low upfront costs.

A concerning trend is the importation of equipment not previously used in New Zealand, which may be poorly matched to local conditions and lack adequate backup support. Suitability and after-sales service should be prioritised over price alone.

Action:

1) ***Expand the equipment and service provider catalogues on the Usewoodfuels website***
2) ***Encourage suppliers to offer webinars or educational sessions to inform owners and advisers about available equipment and services suitable for New Zealand conditions.***

3.6 Emissions reduction factors

The EECA GIDI Fund has supported numerous heat users in transitioning from coal to solid biofuels, primarily due to the significant greenhouse gas (GHG) emission reductions that can be achieved. These reductions are calculated using the emissions factors published by the Ministry for the Environment (MfE).

However, the most recent MfE Emission Factors (2024) show a substantial increase in the direct (Scope 1) emissions factor for biomass compared to 2023. This sharp rise is not supported by any identifiable change in fuel feedstock, processing and utilisation practices. As a result, the calculated emissions reductions from switching to solid biofuels are now considerably lower than previously reported.

This unexpected change has the potential to significantly undermine investment confidence and slow the momentum of New Zealand's heat sector decarbonisation efforts.

Action:

Conduct a review of the current MfE emissions factors used to calculate GHG reductions when transitioning from fossil fuels to solid biofuels, to ensure they are evidence-based and accurately reflect actual emissions performance.

3.7 Project Funding

The electricity, petroleum and natural gas markets in New Zealand are subject to levies, which fund EECA's annual work programme, developed in consultation with stakeholders. Notably, coal is not subject to a levy, which is a significant anomaly given its high carbon intensity. EECA aggregates levy funding and determines actual allocation through the national Budget process.

Bioenergy Association maintains a Collaboration Agreement with EECA to fund mutually beneficial projects, with annual funding typically ranging from $60,000 to $80,000. This supports enables initiatives such as the Bioenergy Association's free Webinar Education Programme and other targeted activities.

Additional funding opportunities for bioenergy-related work exist:

- *Forest Growers Levy Trust* – this fund supports research for the benefit of forest growers and could be accessed for wood fuel-related studies. To date, the Bioenergy Association has not sought funding from this source.

- *Waste Minimisation Fund (WMF)* - Treated timber has been identified as a funding priority under this fund. The Bioenergy Association is currently engaging with MfE to explore potential projects.
- *MPI Funds* – Funding for forestry-related research is available through the Sustainable Food and Fibre Futures (SFF Futures) and Sustainable Land Management and Climate Change (SLMACC) programmes. These have not yet been accessed by the Association

Funding for research and innovation in forestry is available from the Ministry for Primary Industry through the and the Sustainable Land Management and Climate Change (SLMACC) Research Programme. No funding has been sought from these Funds.

While there is a range of funding sources theoretically available to support bioenergy sector growth, the Bioenergy Association's limited staffing and project management capability constrains its ability to fully pursue and manage funding projects. Strengthening internal capacity is a critical next step.

Action:

1) ***Advocate for the introduction of a coal levy, consistent with levies applied to other energy sources***
2) ***Submit an application to the Forest Growers Levy Trust for wood fuel-related research.***
3) ***Submit a proposal to the Waste Minimisation Fund for research on using treated timber as an energy fuel.***
4) ***Strengthen Bioenergy Association's capability to prepare funding applications and manage funded projects.***

3.8 Emerging technologies

Some investors are exploring emerging bioenergy technologies not yet operational in New Zealand. These technologies, which include thermal conversion methods, produce liquid or gaseous biofuels and have seen varying success overseas. However, they generally require large-scale feedstock inputs and are often considered too large for current New Zealand market conditions.

Technologies under consideration include:

- Hydrothermal liquefaction
- Pyrolysis
- Gasification.

The products – such as bio-oils and synthetic gases – have long-term potential for contributing to New Zealand's low-emissions energy future post-2050.

Hydrothermal liquefaction (HTL) technology is showing promise in treating high moisture content mixed feedstocks. HTL gives benefits such as:

- in the speed of the reaction (minutes rather than weeks, with greatly reduced footprint as a consequence
- significantly higher extraction of energy 2-3X AD and biocrude is higher energy density than biogas (30MJ/kg vs 20MJ/kg) and easier to handle and store,
- significant renewable CO2 production separated out (95% pure)

- much larger solid phase reduction 10% of solids biosolids by weight is produced as an inert hydrochar rich in P, compared with 40-50% by weight as digestate from AD.
- the high temp and pressure means the products are sterilised and the main contaminants are greatly reduced (microplastics, pharma, PFAS). It is a closed system so fewer issues with odour and the like.

While these technologies may eventually play a role in New Zealand's bioenergy market, they are not a current priority for sector development. An exception could be gasification of woody biomass for conversion to biomethane, though current market signals suggest this technology too is unlikely to be a priority before 2040. These technologies should therefore be maintained under a watching brief.

3.9 Sustainability

Current sustainability criteria being developed within the forestry sector are generally tailored to large commercial plantation forests, such as those certified under the Forest Stewardship Council (FSC) or similar schemes.

To ensure credibility and transparency in the use of such biomass for energy, a simple, practical sustainability declaration process is needed – especially for smaller-scale suppliers. It is anticipated that these requirements will be implemented by self-declaration by Accredited Wood Fuel Suppliers as part of the accreditation process.

Action:

Include sustainability declaration requirements in the criteria for Accreditation of Solid Biofuel Suppliers.

3.10 Heat plant

Ash is a coproduct of producing heat from combustion of biomass. The ash can be used for a number of applications which will be revenue positive for the heat plant owners. Use of the ash also avoids the alternative of disposal which is usually a cost. There is need for research and production of guidance of the viable uses of ash.

The limitations from consenting Rules are adding significant unnecessary costs to the installation of new heat plant. An example is some regional Rules relating to consenting flue height as set out in section 2.14. Review and standardisation of consenting Rules would go a long way to reducing capital and operating costs of heat plant in many regions.

Too many heat plant are bespoke designs. Adoption of off-the-shelf modular designs would reduce capital and operating costs.

Action:

1) ***Investigate the opportunities for use of ash as a product of boiler operation***
2) ***Consenting authorities to adopt consent criteria that is standard across all regions so that consent authorities learn from each other.***
3) ***Promote the use of modular off-the-shelf heat plant design.***

3.11 Export opportunities

New Zealand has potential to process and export value-added biofuels such as black or white wood pellets, particularly to high-demand markets in Southeast Asia. Developing export-capable biofuel production facilities that also serve the domestic market could create economies of scale that improve the overall financial viability of biofuel manufacturing in New Zealand. To achieve economies of scale for the financial viability of some new biofuel production plant will require a mix of sales to the domestic and export markets.

3.12 Energy market

New Zealand's electricity market is under growing pressure, with increasing demand necessitating the construction of new electricity generation power stations which is expected to drive up electricity prices. The shift toward variable renewable sources like wind and solar is also creating challenges for electricity supply smoothing.

Thermal generation equipment is not a good smoothing technology as it is better suited to base load generation, particularly for replacing coal in the Huntly Power Station. Unlike intermittent renewables, biomass can provide dispatchable and controllable energy, marking it suitable for both base load and dry-year backup capacity.

The key challenges in transitioning Huntly Power Station – or similar plants – to biomass fuel are:

- Securing long-term supply contracts for sufficient volumes of fuel
- Identifying and producing biomass in a form (e.g. black pellets) that matches the technical requirements of the existing boiler

Genesis Energy is actively investigating biomass options, including black pellets, as part of their decarbonisation strategy.

At the same time, prioritising the use of solid biofuels for heat should be supported by Government as that would alleviate pressure on the electricity grid. Using biofuels to produce heat – rather than electricity – ensures that valuable electricity capacity is reserved for applications where it is the most efficient or essential energy.

Action:

Encourage the use of biomass for heat production to reduce electricity demand for heat and strengthen overall the overall electricity system reliance.

4. Gaseous biofuels

4.1 Thumbnail of the market

4.1.1 Current market for gaseous biofuel

The gaseous biofuels market in New Zealand is emerging. Biogas is currently produced at a limited small number of facilities, primarily from:

- Landfills

- Municipal wastewater treatment plants (WWTPs)
- Onsite anaerobic digesters at food processing facilities

At some sites, biogas is used to generate electricity, at others, it is simply flared. All Class 1 municipal landfills are required to install landfill gas (LFG) capture systems by 31 December 2026, while other Class 1 and Class 2 landfills must meet conditions under the Resource Management Act 1991. There is increasing attention on ensuring the most effective use of biogas.

Some food producers or processors utilise anaerobic wastewater treatment facilities to produce gas or electricity for their own use. Others still flare the gas. The Ecogas facility at Reporoa is New Zealand's first commercial organics recycling plant and represents a new direction for the sector.

According to MBIE's Energy Data Files:

- 1.10 PJ per annum is estimated from wastewater treatment
- 2.74PJ per annum from landfill

However, these figures are derived from electricity generation data, not from direct gas measurement. In many cases, biogas is flared and actual gas production is unknown. To develop a meaningful database and inform future planning, it is essential to collect accurate, measured data on biogas production and digestate output from all existing facilities.

Action:

1) ***Confirm the actual quantity of biogas produced at each biogas facility.***
2) ***Establish a national database quantifying existing digestate production and use from WWTP and anaerobic digestion (AD) facilities***
3) ***Assess whether biogas is being used for maximum value and not unnecessarily flared.***

In order to increase biogas production, it is essential that actual production is measured and published. This also assists proposed work to be undertaken to identify how the biogas produced is most efficiently used, stopping gas from being unnecessarily flared. The biogas produced can then be reported in the Energy Data Files maintained by MBIE.

It is suggested that MBIE/MfE work with the sector to review possible methodologies for collection of actual quantities of gas production and published in the Energy Data File and Greenhouse Gas Inventory

Action:

Collaborate with MBIE and MfE to develop and implement methodologies for measuring and reporting actual biogas production, including publication in the Energy Data Files and the Greenhouse Gas Inventory.

4.1.2 Uses of biogas

Biogas can be used in several ways:

- Directly as a boiler fuel, transport fuel, on-site electricity generation or export from the site

- Upgraded to biomethane, which can be injected into the gas pipeline network for extraction and use by customers elsewhere.

Currently, biogas production in New Zealand is primarily a by-product of organic waste disposal, rather than a value-driven recycling approach. Maximising its energy and nutrient potential will require intentional collection and strategic application.

4.1.3 Biogas production technologies

Different biogas systems produce different co-products and require different feedstocks:

- Purpose-built anaerobic digesters process clean, separated feedstock such as residues of food growing or processing, or agricultural crop residues, yielding both biogas and biofertiliser.
- Food processing plant with wet organic residues typically use anaerobic wastewater treatment equipment (e.g. covered ponds or sealed tanks), producing gas and nutrient-rich effluent.
- Municipal wastewater treatment plants (WTTPs) produce biogas and biosolids, with land application governed by the Biosolids Guidelines.
- Landfills manage mixed, often contaminated organic waste material can be processed in a landfill where the biogas produced is collected.

Other organic treatment methods, such as composting, produce soil by-products but not biogas. Thermal treatment (covered in Solid Biofuels in Section 3.16) also does not yield biogas.

4.1.4 Synthetic Gas (Syngas)

Synthetic gas can be produced through gasification of organic material (woody or herbaceous biomass, and other organic material). While not yet commercially used in New Zealand, this technology may become viable post-2050. Bioenergy Association continues to monitor international developments in gasification, with a view to encouraging local adoption when appropriate.

Action:

Monitor international development in gasification technologies and prepare to support investment in biomethane production once commercially viable in New Zealand.

4.1.5 Potential market for gaseous biofuels

Recent studies, into the potential for biogas and biomethane production in New Zealand, have identified that up to about 60 PJ of biogas and biomethane could theoretically be produced annually in New Zealand. The Bioenergy Association has set more realistic production targets, aligned with current and future energy needs:

- 5 PJ of biogas being produced by 2027, equivalent to 70% of gas consumed by the residential market in 2023
- 12 PJ of biogas being produced by 2035, equivalent to 60% of gas used by the food and beverage industry in 2023

- 20 PJ of biogas being produced by 2050, equivalent to 100% of hard-to-abate industrial gas needs

The New Zealand biogas market is transitioning from being an output of waste disposal to being driven by a demand for renewable gases to augment declining natural gas reserves. Gas is a major contributor to the national energy market and some uses are highly dependent on specific attributes of gas as a form of energy supply. Biomethane, a drop-in replacement for natural gas, requires no new infrastructure and can be blended with natural gas or used as 100% replacement into the existing network.

While the energy characteristics of biogas are a primary driver for market development, the production of biofertiliser from the digestate solid portion, when the gas is produced, is likely to be an important contributor to the financial viability of using anaerobic digestion technology.

It is important to recognise that biogas and biomethane serve two distinct markets:

- Biogas will be used predominantly by food processors and small organic recycling facilities where biogas it can be used directly on-site for heat or electricity, especially in boilers. This avoids the additional cost of upgrading to biomethane.
- Biomethane production is likely where there is sufficient gas volume and proximity to the natural gas distribution network, enabling efficient sale to customers.

As New Zealand continues to face electricity supply constraints, large-scale production of biogas and biomethane will strengthen and support national energy supply:

- Smoothing fluctuating generation by providing firm generation to smooth intermittent supply from wind and solar in existing gas turbine generators,
- Quick start standby emergency generation capacity.
- Replacement of natural gas in existing manufacturers boilers and gas turbines, thereby freeing electricity for more appropriate or high-value applications.

Additionally, as the market expands, gaseous biofuels are expected to increasingly replace LPG and diesel for heating applications – particularly in areas where no gas distribution network is likely to occur as the biofuels market grows.

Action:

Identify and publish case studies showcasing the replacement of LPG with gaseous biofuels in heat applications

4.1.6 Feedstocks

Current biogas production is mainly from landfill where gas is collected, municipal and food processors wastewater treatment facilities, and from anaerobic digestion of food wastes. The feedstocks are waste and the objective is waste disposal. The biogas produced is incidental to the disposal of waste.

Only the Ecogas Recycling facility in Reporoa sources its organic material as a feedstock to produce energy and fertiliser products.

The future demand for biogas and biomethane will require large quantities of feedstocks. Initially the feedstocks will come from food wastes and food processing. To get greater quantities of feedstock will provide opportunities for farmers to produce feedstock either as a complementary agricultural crop or from crop residues. To achieve the necessary quantities there will need to be an extensive assistance provided to farmers on how to produce feedstock at a price appropriate for use in AD facilities.

Action:

1) ***Establish an education programme to assist farmers produce organic material from their agriculture activities.***
2) ***Undertake research to establish the value proposition for farmers to produce agricultural material suitable as a feedstock***.

4.1.7 Potential future market for feedstocks

With the commercial production of biogas and its upgrading to biomethane, the market is starting to see the organic material as a potential feedstock rather than as waste to be disposed of. This valorisation of organic waste is changing attitudes to organic waste collection and its recycling or disposal. What was previously considered as waste is now being considered as a feedstock.

For organic waste to be considered valuable it has to be treated as valuable. That is driving separation of organic material into “clean” and contaminated. It also leads to separation of wet food wastes from dry woody waste. Mixed and contaminated waste is difficult to recycle and so landfill is still its best place of disposal. Clean and separated organic material is ideal feedstock for composting or anaerobic digestion.

To get the optimal volumes of organic feedstocks requires improvements in waste collection and handling.

Agricultural crop growing and processing residues can be ideal as a feedstock because they are separated at source and recycling equipment can be tuned to handle the different feedstocks, thus improving the efficiency of recycling. To get the large volumes of feedstock required to meet future gaseous biofuel demand will require agricultural and horticultural sources of feedstock to be maximised.

Agriculture and horticulture farmers can gain additional revenue from growing specific crops on their 6-9% of low productivity land and selling crop residues as supplementary feedstocks for biogas production. This can strengthen the resilience of their business by diversification of farm operations.

It can be expected that around 2050 that the demand for biomethane will incentivise forest owners to supply biomass residues to gasification plant where syngas will be produced as a precursor to the production of biomethane.

Action:

1) ***Educate business and communities to treat organic residues as of value and not just a waste to be disposed of.***

2) ***Educate the organic waste collection sector how to separate different types of organic material so that the highest value can be received when sold as a feedstock for recycling into energy and fertiliser***
3) ***Advocate for standardised organic waste collection and separation processes across all regions***
4) ***Provide information to the agriculture and horticulture sectors on how to gain revenue from growing of supplementary feedstocks on low productivity land.***
5) ***Investigate opportunities for the gasification of woody biomass to produce biomethane.***

4.2 Sustainability policy

Increasingly the international purchasers of food from New Zealand are wanting certification that the food is grown and processed to highest sustainability standards. Generally, exporters are being required to show that the energy used in growing and processing has a sustainability certificate. However, the specified criteria of sustainability may be inappropriate for NZ grown food because of New Zealand's existing high environmental standards. There is a need for agreement on the criteria to apply for energy used to grow and process food sourced from New Zealand so that the sustainability doesn't become a non-financial trade barrier.

Action:

Develop sustainability criteria for gaseous biofuels used in food production that meets food exporters requirements.

4.3 Gas levy

The Gas Safety, Monitoring and Energy Efficiency (GSMEE) Levy for 2025/26 is set at $1.962 million and is payable by sellers of piped gas to gas retailers. While EECA aims to allocate levy funding to initiatives that relate directly to the fuels being levied, in recent years the Electricity Levy and GSMEE Levy have been pooled. It is recommended that these funds should be tied to funding renewable gas projects.

Although there is no dedicated gas project funding, EECA's Industry Development Programme is intended to build capability and capacity within the energy sector to meet market demand for expertise. This includes the use of levy funds to support and develop relationships with industry partners and associations, such as the Bioenergy Association. Specific EECA support includes the development of technical information, guidance and specifications, as well as the delivery of training programmes, webinars, conferences and accreditation schemes.

As required by legislation, EECA consults with the energy sector on the intended use of levy funds. However, the Bioenergy Association has not historically used this consultation process to is an opportunity for recommending specific allocation of the levy funds to biogas and biomethane.

Action:

1) ***Amend the GSMEE levy framework so that it applies to all natural gas retailers, including those supplying gas for electricity generation.***

2) ***Bioenergy Association and GasNZ to jointly advocate, to EECA, for dedicated portion of GSMEE levy funds to be allocated directly to EECA gas-related projects, particularly those advancing gaseous biofuels.***

4.4 Resource Supply

Biogas is produced through the decomposition of organic matter and several studies have investigated the current and potential future availability of organic material from various sources as feedstock for gaseous biofuels. However, much of the existing data was originally collected for purposes other than recycling as an energy fuel and therefore may not be directly applicable for assessing regional opportunities for organic recycling into energy.

To support the development of the biogas sector, it is recommended that a project be undertaken to extract and reframe relevant data from Ministry for the Environment (MfE) datasets, with a focus on information that can inform regional-scale biogas production planning.

Action:

Compile and publish tables of regional sources of organic material suitable for energy recycling and make them accessible to the biogas production sector.

The cost-effectiveness and efficiency of recovering organic residues for energy use is highly dependent on the training and skills of collection and recovery staff. Contaminated organic residues cannot be recycled and are typically sent to landfill. To ensure high-quality feedstock and reduce waste, it is essential to develop and incorporate best practice guidelines into training programmes

The Bioenergy Association is actively engaged in this space through participation in:

- The Workforce Development Council working group on Resource Recovery Unit Standards, and
- The WasteMINZ Working Groups on resource recovery and application to land.

Action:

Collaborate with WasteMINZ on the development of Guidelines and training programmes for the recovery of organic resource suitable for bigas production

4.5 Gas market regulation

Gas Industry Co (GIC) is the industry body of New Zealand's gas sector, working in partnership with both government and industry. GIC is responsible for overseeing gas governance, facilitating efficient gas markets, and providing trusted advice to support the energy transition.

GasNZ is the industry organisation representing members with commercial interests in the upstream gas market activities, Bioenergy Association members are focussed on the production and use of biogas and biomethane.

The Bioenergy Association supports collaboration by:

- Providing GasNZ and GIC staff with free and open access to the Biogas Knowledge Centre
- Inviting representatives from both GasNZ and GIC to participate in the Gaseous Biofuels Steering C

This ongoing collaboration ensures alignment on market development, policy and best practice for the gaseous biofuels sector.

Action:

Maintain and strengthen Bioenergy Association's working relationship with GasNZ and GIC staff by continuing to provide open access to the Biogas Knowledge Centre and including staff in the Gaseous Biofuels Steering Committee.

4.6 Gas trading

With the growth of biomethane demand this opens up the capability of gas producers to trade gas to customers who are also connected to the gas distribution network. The recent revision by Standards New Zealand of the gas quality standard (NZS5442) to allow for the injection of biomethane into the existing gas pipeline network opens the market up for gas trading.

Because biomethane availability is new to many gas users there is a lot of education to do in order to get gas users comfortable in purchasing biomethane.

A methodology for calculating the carbon intensity of biogas and biomethane has recently been agreed and now requires dissemination to the sector. In establishing the calculation methodology, it became clear that there is a need for guidance on how to calculate emissions reduction when using biogas or biomethane to replace fossil fuels.

Renewable Energy Certificates associated with traded gas will allow valorisation of traded gas.

Action:

1) ***Produce a Guide for gas users on biogas and biomethane trading.***
2) ***Produce a Technical Guide showing worked examples of the Carbon Intensity methodology***
3) ***Disseminate the methodology for calculating the carbon intensity of biogas and biomethane***
4) ***Extension of the current Carbon Intensity methodology report to cover feedstocks from agricultural crops and energy crops***
5) ***Produce a guide for calculating emissions reduction when gaseous biofuels replace fossil fuels.***
6) ***Assist with the establishment of renewable Gas Certificates for traded gaseous biofuels.***
7) ***To improve the financial viability of biogas production by developing the economic and environmental opportunity of using digestate from source-separated organic residues to replace synthetic fertilisers.***

4.7 The participants

4.7.1 Resource recovery and supply

Recyclers of organic material require source separation wherever possible. The cleaner the organic waste, the greater the proportion that can be successfully recycled into bioenergy or compost. Conversely, contaminated material must be sent to landfill.

Contracts for the collection and supply of organic waste typically include conditions that limit contamination. Any load found to be contaminated upon delivery may be rejected and returned to the supplier, with disposal at landfill required at the supplier's expense.

Action:

Prepare a Guide to organic material collection and recovery.

4.7.2 Investor owners

Landfills in New Zealand are owned by a mix of private and public investors. Public ownership is typically by district or regional councils, where landfills are integrated into the local community's waste management infrastructure. More recently, private operators own and manage many landfills, with councils contracting them for the collection and disposal of municipal organic waste.

Councils usually own wastewater treatment facilities (WWTPs) as part of their broader municipal wastewater collection and disposal activities. Food processors often integrate wastewater treatment into their food processing infrastructure. Currently there is only one commercial organic recycling facility in New Zealand, which is privately owned.

Future organic recycling facilities are likely to be privately built, with councils issuing licenses for the collection of separated municipal organic material. This organic material may then be diverted to privately owned landfills, composting operations, worm farms, thermal treatment facilities or anaerobic digestion (AD) facilities. Only landfills and anaerobic digestion facilities produce biogas.

A number of well-known project proposals have failed due to investors engaging advisers lacking relevant experience. Many councils and companies rely on "preferred" advisers who may not be best suited or most qualified for bioenergy project development. Investors are more likely to succeed when they engage specialists with direct experience in biogas and biomethane (see next section 4.7.5 for recommended actions).

Action:

1) ***Expand access to information for investors and operators:***
   a) ***Bioenergy Association to extend the information on biogas and biomethane available at www.biogas.org.nz to match the standard of the solid biofuels website.***
   b) ***Improve navigation and accessibility of information on the Biogas website www.biogas.org.nz and the Biogas Knowledge Centre www.biogas.org.nz/biogas-knowledge-centre portal.***
2) ***Add resources held on production of renewable CO_2 production from AD facilities.***
3) ***Update technical content on biogas production from WWTPs.***
4) ***Collaborate with NZTE to develop a prospectus for potential gas infrastructure investors. (how to make it easy for them)***

5) ***Add an addendum to each RETA regional report identifying opportunities for gaseous biofuels to support fossil fuel decarbonisation.***

4.7.3 Advisers

The wastewater and landfill sectors benefit from well-established base of experienced engineering and environmental advisers, often supported by WaterNZ, an industry organisation which provides good support to those consultants and equipment suppliers involved with wastewater treatment. University engineering schools have a significant focus on wastewater engineering but less on the design and use of anaerobic digestion technologies.

The number of operational anaerobic digestion organic recycling facilities in New Zealand has declined since the 1980s, resulting in a significant shortage of experienced AD advisers. Recent technical assistance has often had to be sourced from Australia and overseas. This gap in knowledge and experience is especially evident at the prefeasibility stage of project planning.

New Zealand-based advisers are often overlooked in favour of overseas based consultants, reducing opportunities for capability to grow. Raising the profile of qualified New Zealand-based advisers will help improve the overall capability of local advisors and sector expertise and project success.

The weakness of those working on landfills and wastewater treatment is that the objective has been to least cost waste disposal and not optimisation of extraction of value from waste. The consequence is that opportunities for production of biogas from solid and liquid waste is not pursued, generally because of capital expenditure constraints of the asset owner. The objective of council as asset owner is also generally related to least cost, and not investment optimisation.

There is limited information on how well New Zealand universities train students in organic waste recycling technologies, including AD. A sector-wide review is needed.

Action:

1) ***Encourage consultants to register experienced staff on the Register of Biogas Advisers.***
2) ***Promote the message "Engage a Registered Biogas Adviser".***
3) ***Write to asset owners recommending they engage only registered advisers.***
4) ***Request that third-party funders use of registered advisers as part of funding criteria.***
5) ***Review university curricula for training in organic recycling and anaerobic digestion technologies to produce gaseous biofuels.***

4.7.4 Equipment and services supply

The limited number of anaerobic digestion (AD) facilities developed in New Zealand in recent years has resulted in a weak supply chain for specialised equipment and services. This shortage affects both small and large-scale projects and contributes to challenges in commissioning, maintaining and operating AD facilities. A mature biogas industry typically has

a robust network of local equipment suppliers and service-providers – but this depth is currently lacking in New Zealand.

While equipment and expertise can be sourced from Australia, the market there is relatively shallow. Several potential equipment suppliers and service providers have joined the Bioenergy Association in anticipation of sector growth but have since withdrawn due to a lack of sustained project activity – an issue exacerbated by New Zealand's low population and limited market size.

A key issue is the low visibility equipment and service suppliers have in the market, which has created a perception among potential investors and project developers that the necessary expertise and equipment are unavailable locally. Raising the profile of these providers will help correct this misconception and support broader sector development. The Bioenergy Association's Biogas website and Bioflash monthly newsletter (with a circulation of over 2,450 subscribers) offer valuable platforms to do this.

Action:

1) ***Enhance the visibility of equipment and service suppliers by encouraging greater use of the Biogas Equipment and Services Catalogue on the Biogas portal.***
2) ***Promote suppliers and service providers through increased advertising and exposure in the monthly Bioflash newsletter to raise awareness of their availability and expertise.***

4.7.5 Quality assurance and testing

The commercial success of biogas and biofertiliser products relies on having credible quality assurance systems in place to ensure products meet the relevant standards.

Currently, there are three laboratories in New Zealand capable of testing solid biofuels. However, there is a significant gap in chemical testing for anaerobic digestion facilities. This shortfall poses a barrier to establishing market confidence in the quality of biogas and digestate-derived biofertiliser products.

Action:

Support the development of testing capability by assisting at least three existing chemical laboratories to acquire and install the necessary equipment for testing biogas and biofertiliser producers.

4.8 Policy support for gaseous biofuels

Until recently, the EECA-Bioenergy Association Collaboration Agreement (see Section 3.5) focussed primarily on solid biofuels projects. However, EECA has now expanded its scope of interest to include gaseous biofuels. As a result, a strategic planning meeting was held to identify potential joint projects and areas of collaboration.

A key outcome of the meeting was the desire by EECA to gain confidence in promoting gaseous biofuels as a viable renewable energy source – alongside with other options - for business and communities transitioning from use of fossil fuels.

Bioenergy Association works closely with GasNZ, whose members represent New Zealand's gas market and have a vested interest in the distribution and use of gaseous biofuels. GasNZ assists Bioenergy Association identifying barriers and proposing practical solutions to support increased gaseous biofuels production.

Action:

1) ***Prepare a White Paper promoting the use of organic feedstocks for biogas and biomethane production.***
2) ***Update EECA's website to ensure gaseous biofuels are treated equally with other fuel opportunities. This should include:***
    a) ***Comprehensive and up-to-date information on gaseous biofuels is available to potential investors and operators.***
    b) ***Direct links to relevant guidance and resources hosted on the GasNZ website and the Biogas Portal*** *www.biogas.org.nz*
    c) ***Link to the Biogas Knowledge Centre*** *www.biogas.org.nz/biogas-knowledge-centre*
        (i) ***Expansion of the RETA database to include regional biogas data.***
        (ii) ***Interactive mapping of:***
        (iii) ***Existing and potential feedstock sources (e.g. food waste, agricultural by-prodcts)***
        (iv) ***Existing biogas facilities (landfill, anaerobic digestion, wastewater treatment) including location, output and usage***
        (v) ***Proximity of facilities to the gas distribution network***
3) ***Advocate for a renewable gas mandate that includes a minimum percentage of renewable gas within the gas supply***
4) ***Develop national consenting guidelines for anaerobic digestion (AD) facilities, with standardised rules for siting, consenting and construction across regional councils to reduce compliance complexity***
5) ***Recommend government incentives for the aggregation of organic waste and the construction of supporting infrastructure (e.g. transfer stations, AD facilities)***
6) ***Provide guidance on gas pipeline pricing, including:***
    a) ***Transport, posted pricing structures***
    b) ***A model business case demonstrating the value of using biogas and biomethane to augment availability of fossil gas for industrial processes, to provide an element of certainty to investors***

4.9 Best Practice

As the gaseous biofuels sector is transitioning into a mainstream energy supplier, customers are increasingly seeking assurance that gaseous biofuels are produced and delivered to best practice standards. These fuels are used in critical applications where reliability is non-negotiable – gas must be supplied as contracted and to the required specified quality specifications.

To meet these expectations, the Bioenergy Association has established a suite of quality assurance mechanisms including:

- Register of Gaseous Biofuels Advisers – to differentiate experienced practitioners

- Accreditation of Digestate Biofertiliser Producers – to ensure quality and consistency
- Directory of Experts – for investor and operator reference
- Catalogue of products and services – listing vetted suppliers and technologies
- Code of Conduct for Members – setting professional and technical standards
- Complaints Process – for accountability and performance improvement

Additional quality assurance schemes will be established as further needs arise.

Action:

1) ***Review existing quality assurance mechanisms to ensure they remain fit for purpose as the sector expands***
2) ***Promote these sector quality assurance mechanisms to ensure confidence among end users, regulators and the public that the sector operates to best practice and standards.***

4.10 Skills development

The current gaseous biofuels workforce is smaller and less experienced participants than it was during the 1980's, when New Zealand had a greater number of operational anaerobic digestion (AD) facilities. While some experienced practitioners from that era remain active, their expertise is not yet widely passed on to newer entrants.

Most current consultants are relatively new to the sector and often lack opportunities to gain hands-on experience due to the limited number of active projects. With few digesters being built the consultants also miss the opportunities for gaining hands-on experience and building on their specialist knowledge and skills.

There is currently no formal training programme for gaseous biofuels in Australasia and with limited project activity, there is also little commercial incentive for practitioners to undertake formal specialised training.

As outlined in Section 2.7, the Bioenergy Association is working on skills development initiatives across the gaseous, liquid and solid biofuels work streams. It is also collaborating with the Workforce Development Council to develop unit standards for resource recovery, focusing on collection, separation and handling of organic materials.

Action:

Continue to support the development and implementation of unit standards and explore ways to formalise training pathways for consultants and operators in the gaseous biofuels sector.

4.11 Encouraging investment

There is a lack of experience in designing and constructing AD facilities in New Zealand. There were more AD facilities in operation in the 1980's than today. The knowledge and experience of the 1980's has been lost. Essentially the sector is in its infancy so assistance is necessary to reduce costs and improve adoption of best practice in design , construction and operation. Regulators also have very limited experience and so tend to be overly precautionary when consenting.

There are few suppliers of equipment and consultants often do not have experience and may under or over design. To improve the investment risk the Bioenergy Association is promoting:

- International equipment suppliers to establish agencies in New Zealand,
- Adoption of off-the-shelf modular designs rather than each installation be bespoke.
- Consenting authorities to adopt consent criteria that is standard across all regions so that consent authorities learn from each other.
- That consent conditions be relevant to the location and different facilities. For example the rural farm facilities may have more simple consent conditions than industrial facilities which will generally be much larger and recycle greater quantities of feedstock.

Action:

1) ***Encourage modular off-the-shelf equipment design***
2) ***Consenting authorities to adopt consent criteria that is standard across all regions so that consent authorities learn from each other***

5 Liquid biofuels

5.1 Thumbnail of the market

5.1.1 Current market

In the New Zealand transport context, liquid biofuels are best suited for heavy transport sectors such as rail, marine, aviation and large land transport vehicles. The most likely domestic feedstock for liquid biofuels domestic production is woody biomass.

International marine and aviation regulations are increasingly influencing New Zealand transport operators, with global standards being adopted across the sector. New Zealand cannot afford to remain passive with regard to international transport fuels – failure to act would have dire consequences for export markets. To maintain access to international transport decarbonisation decision-making markets, New Zealand must act collegially with other countries.

While New Zealand is unlikely to become a major producer of liquid biofuels, strategic investments as new technologies become available could help manage long-term transportation costs. For example, importing drop-in transport biofuels such as renewable diesel offers a practical decarbonisation pathway of heavy transport with avoidance of any unnecessary capital expenditure. It is assessed that the trade-off of increased fuel costs vs avoided capital expenditure by replacement of existing equipment is strongly in favour of transitioning to liquid biofuels as soon as possible.

Anchor Ethanol is a key supplier of ethanol for biofuel blends, such as those offered by Gull Petroleum in New Zealand. Anchor Ethanol specializes in producing ethanol from whey, a byproduct of the dairy industry. It has plants in Tirau, Reporoa and Edgecumbe, using batch and continuous fermentation processes to create various grades of ethanol, including those for fuel. Anchor Ethanol is a subsidiary of Fonterra.

NZ Biofuels operates the only HSNO certified Biofuel Production Facility operating in NZ. They also produce other grades of Biofuel available for process heat (boilers) and for use in industrial applications. Their Biodiesel and Biofuel options are made from Used Cooking Oil (UCO) - predominantly Canola Oil, which is available from within the Canterbury region. Their production facility currently produces 1.5 million litres B100 production annually, expandable to 4 million litres annually, with increase in shifts and additional tank capacity. They supply bulk Biodiesel and Biofuel from North Canterbury to Southland. They will supply the North Island on a B100 basis (freighted) only.

5.1.2 Potential liquid biofuels market

Scion has been undertaking research into SAF for many years and has been involved with recent investigations being undertaken by a number of private sector organisations. Scion provides a role as a common and valuable repository of information which investors can draw upon. Scion's links to international research into liquid biofuels is a good avenue for the transfer of international knowledge to New Zealand.

Scion has developed a Bioenergy Value Chain Model which can provide information to policy makers on the entire value chain from where to grow a wide range of feedstock options, processing technologies, where to site them, and fuel mix.

Scion researched and developed a Roadmap for NZ to develop a liquid biofuels business using domestic sourced organic feedstocks. Key aspects from the roadmap are:

- A biofueled future is unlikely to happen by itself. Leadership at a national level is needed – there has to be national commitment to do things right.
- The investment needed is large and stakeholder industries will need a degree of certainty when committing to feedstock and processing options, as well as taking ownership of delivering their parts of the value chain.
- With the right will, Scion's study and the Biofuel Value Chain Model, New Zealand has the capability to explore different options and plan the way forward to a sustainable future.
- The roadmap sets out pathways for a number of substitution scenarios up to the relatively high level of 30% by 2050 using any combination of feedstocks, technologies and final product mix.

Even though costs have changed the Road Map is still applicable today.

While theoretically all fossil liquid fuels could be replaced by drop-in renewable diesel, bioethanol, SAF or blends suitable as boiler fuels the amount actually used in decarbonisation is likely to be much lower, because of perceived price and supply constraints. The technologies are emerging in maturity as demand for liquid biofuels increases.

The International Maritime Organisation (IMO) has established emissions reduction targets for shipping, aiming for at least a 20% reduction in GHG emissions by 2030 and at least 70% reduction by 2040, both compared to 2008 levels. The ultimate goal is to achieve net-zero

emissions by or around 2050. These targets provide a strong incentive for adoption of emission reduction solutions such as the transition to low emission biofuels

5.1.3 Potential investment investigations

The potential for liquid biofuels in New Zealand is extremely large if there is a will for it to occur. However other than from Air New Zealand for Sustainable Aviation Fuel (SAF), and investigations into the reuse of the Marsden Point refinery site, there is no interest except occasionally from heavy road transport operators who realise the benefits of transitioning to a drop-in vehicle fuel such as renewable diesel. The marine sector is starting to investigate options.

Air NZ has been undertaking research in partnership with MBIE into the possibility of developing a New Zealand based SAF manufacturing facility. The information from the research is not public so we have learnt nothing from the project which would assist others to investigate opportunities.

Channel Infrastructure NZ who owns the land and assets at the closed Marsden Point Refinery have a vision for the site as an Energy Precinct, which could accommodate a range of energy projects. Channel Infrastructure has a conditional agreement with Seadra Energy and a consortium of partners including Qantas, Renova Inc, Kent Plc and ANZ, to develop a biorefinery at the site. Channel also have a memorandum of understanding with Fortescue for a potential SAF manufacturing plant on the site

Scion continues to offer support to stakeholders looking to develop SAF production in New Zealand. Scion contributed its expertise around woody biomass availability and sustainability into the recent feasibility study conducted by Lanzajet and funded by Air New Zealand and the New Zealand Government. Additionally, since 2021 Scion have been a member of Sustainable Aviation Aotearoa (SAA) – a public-private cross-agency governance body for achieving aviation decarbonisation. The SAA was developed:

a) To position Aotearoa/New Zealand as a leader in aviation decarbonisation.
b) To accelerate the establishment of SAF production facilities in Aotearoa/New Zealand and the delivery of SAF to the market, including through the development of the right mix of policy settings and capital investment.
c) To facilitate the adoption of zero emissions aircraft, including through ensuring existing infrastructure is fit for purpose and/or the identification and development of new infrastructure.
d) To provide combined political and industry leadership on efforts to deliver Aotearoa's/New Zealand's capabilities for aviation decarbonisation.

Scion have also been developing new technology to help decarbonise the Maritime sector, by producing a drop-in biofuel, made from wood, for blending with heavy fuel oils.

5.2 The participants

Unlike the NZ solid and gaseous biofuels sectors there have been few participants in the liquid biofuels sector.

5.2.1 Resource supply

Unlike other countries developing liquid biofuel markets New Zealand does not have an abundance of high sugar/high starch/oil feedstocks and is mainly dependent on lignocellulosic biomass which is a poor feedstock for manufacturing liquid biofuels. The technologies for producing liquid biofuels in New Zealand are emerging and work by Scion is showing that these technologies are viable. New Zealand has a comparative advantage in that the feedstocks available are highly sustainable and there are significant quantities.

The Te Uru Rakau (NZ Forest Service) has undertaken a Wood Fibres Future study[13] into the availability of woody biomass as a feedstock for production of export products including liquid biofuels.

There has been some concern that the European Sustainability criteria if applied to New Zealand would constrain liquid biofuel production. However, the constricting European criteria are not applicable in New Zealand so getting agreement on the sustainability criteria to apply will remove this barrier.

Action:

Gain agreement to the sustainability criteria to apply to production of Biofuels in New Zealand. [i]

5.2.2 Investor owners

The lack of Government assistance to potential international investors for liquid biofuel production compared to what is available in other countries is a major barrier to investment.

5.2.3 Advisers

The large NZ based consultancies have been able drawn on their international staff and where necessary international consultants have been engaged. Domestic based consultancies have provided the NZ knowledge, particularly with regard to feedstock supply, for adaptation from the international experience.

5.3 Capability development

The main barrier to production of liquid biofuels in New Zealand is the lack of interest across government agencies on investigating the liquid biofuels opportunities for reducing GHG emissions. Because liquid biofuels can often be a full drop-in replacement fuel for fossil fuels the economic advantage compared to other renewable fuels is the avoidance of capital expenditure required.

Marine and aviation transport have strong incentives for transitioning to a biofuel and are leading investigations. However, heavy land transport and rail could have similar incentives

[13] https://www.usewoodfuel.org.nz/resource/wood-fibre-futures-report-stage-one

but the vision hasn't caught hold in New Zealand. Until NZ heavy land transport operators can see the benefits of liquid biofuels nothing will change from the current situation.

With the lack of participants wanting liquid biofuels the Bioenergy Association has lacked members making this a priority. The Association has to focus on the priorities of its members and so without members and their membership fees the Association has no funds to undertake advocacy work for liquid biofuels. Despite the lack direct instruction from members there is a general expectation that the Association will advocate for liquid biofuels.

Government led "Roadmaps" have been prepared for development of large NZ Inc investment opportunities such as hydrogen, electricity security of supply (Onslow), and Electrify NZ Action Plan. Such a Plan for liquid biofuels would provide a vision which can be presented to possible stakeholders. This could be easily achieved by updating the Road Map previously prepared by Scion.

Action:

Based on previous work undertaken by Scion prepare a Liquid Biofuels Roadmap to set out a vision for development of a liquid biofuels sector in NZ and promote it to possible stakeholders.

5.4 Emerging technologies

Internationally there is significant development of new technologies for the production of sustainable fuels. Many of these technologies build on old proven technologies such as gasification, Fischer-Tropsch, pyrolysis, fermentation etc. They produce syngas, bioethanol, biomethanol and methane all of which are key ingredients for future biofuels.

A key barrier to many of the opportunities is the lack of supply of feedstocks. If feedstock owners wanted to maximise financial return from use of the feedstocks then liquid biofuels would be more financially viable.

Many of the emerging technologies could be applicable to New Zealand but the small scale of the New Zealand market, and the lack of interest from feedstock owners, is likely to make investment difficult. It is therefore recommended that New Zealand should keep an eye on the emerging technologies and be open for any that look promising, in particular for marine, aviation, rail and heavy land transport.

Action:

Monitor international research into emerging technologies and be open to options for heavy land, marine and air transport.

6 The framework for action

The gaps and barriers which should be addressed in order to achieve the targets for bioenergy and biofuels by 2050 can be grouped as follows.

Grow sector visibility and credibility

- Demonstrating the role of biofuels in a robust energy market.
- Showcase real-world bioenergy use

- Promote biofuels in energy resilience
- Create a positive media landscape for bioenergy
- Promote the value proposition for each stakeholder
- Position BANZ as the trusted industry voice

Empowering feedstock providers

- Partnering with agribusiness and foresters to unlock new revenue opportunities
- Actively engaging and educating stakeholders across the value chain
- Regional mapping of present and future biomass and organics availability
- The value proposition of integrating trees on farms; increased domestic processing of wood into bio-products; optimising value from organic waste
- The value proposition to manufacturers of recycling processing residues as an energy fuel

Strengthen sector capability and standards

- Promote best practices, sustainability standards, and quality assurance
- Expand training, adviser networks, and professional development
- Providing best practice information to new entrants to the sector
    - Solid biofuels – expand the UseWoodFuelNZ portal
    - Gaseous Biofuels – expand the www.biogas.org.nz portal.
- Manage accreditation schemes for Solid Biofuel Supply, Biofertiliser production, Advisers
- Maintain a Register of Advisers who meet skills and knowledge criteria

Grow the market

- Work with Government agencies to collect actual data on regional biofuel use and prices
- Advocate for policy changes to support growth & acceleration
- Expand, connect & promote members
- Provide tools & case studies for the market
- Response to & trigger government consolation to drive action
- Encouraging awareness of regional economic potential

To address the issues identified in this scan of the capabilities of the sector into action will require them to be prioritised. There are also actions for the short term and those longer-term actions often involving a number of stakeholders. These have not been addressed in this report which is simply a long list of issues requiring action.

The prioritisation and development of Action Plans is the next step building on the information in this report.

Appendix 1: List of Recommendations

Table 4: Recommended Capability Development Programme

	Actions	Page
Grow sector visibility and credibility		
Policy	Provide Ministers, MPs and officials with material so that they are well briefed on what bioenergy is, its benefits and its inclusion as a main-stream energy option	10
Policy	Provide local and central government officials with material so that they are well informed on bioenergy and its benefits as a main-stream energy option	10
Advocacy	Strengthen the presence of the Bioenergy Association in Wellington and face-to-face interaction with government officials and Ministers	14
Advocacy	Bioenergy Association needs to find funds in order to undertake in-depth policy analysis.	4
Advocacy	Encourage bioenergy sector participants to make submissions and participate in policy development.	14
Advocacy	The Bioenergy Association broaden its representation to the media	13
Advocacy	Bioenergy Association to extend its communications funding to: a) Engage article writers b) Place advertorial c) Engage communications assistance	13
Advocacy	Encourage greater development of bioenergy analytical expertise from universities and research entities.	3
Growing the market		
Data	Review data collection and publication on the bioenergy sector so that it is based on actual survey and is regional	2
Data	Collate bioenergy data and update Information Sheet 35 so that the data from the sector is easier to find.	2
Data	Collect data on the bioenergy sector that can support advocacy	13
Investor confidence	Develop case studies and demonstration projects to provide investor confidence.	18
Information dissemination	Update and promote the Directory of Bioenergy Facilities	5
Information dissemination	Promote the Free Advisory Service	5
Information dissemination	Where organisations wish to provide bioenergy information to their members, rather than provide information themselves they should link to the bioenergy portals as trusted sources of information.	5
Information dissemination	Develop and disseminate information to counter misinformation on bioenergy sustainability wherever it arises	6
Information dissemination	Promote the benefits of gaseous, solid and liquid biofuels to food processors.	6
Sector planning	Develop a roadmap for growth in the availability of biofuels to meet the specific drivers for energy	6
Sector planning	Provide information on how bioenergy is a significant contributor to development of a New Zealand bioeconomy and participate wherever involvement may assist to transition.	7
Strengthening sector capability and standards		
Sustainability	Bioenergy Association to prepare and publish a Sustainability Policy for the bioenergy sector.	7

Sustainability	Work with other sectors to ensure that bioenergy fits with the sustainability criteria they are negotiating with other countries for export of New Zealand sourced products	7
Information	Encourage government entities who are members of IEA Bioenergy or any other relevant international organisation to disseminate bioenergy information from those organisations to the participants in the bioenergy sector	11
Information	Encourage the Bioflash and Bioenergy Knowledge Centre to be used to share appropriate information with the bioenergy sector	11
Information	Presentation of case studies can show by example how a collegial approach to bioenergy projects is necessary for many opportunities to become viable	12
Information	Bioenergy Association to establish story telling about bioenergy as a major activity and reported on at each Board meeting.	4
Standards	That ISO standards be promoted as the relevant standards for the NZ bioenergy sector.	12
Standards	Establish a Working Group to review and prepare model Rules for the consenting of heat plant.	12
Professional development	Bioenergy Association promote itself as a professional body with registration of advisers and management of biofuels accreditation schemes	12
Information dissemination	Undertake promotion of where best practice information can be obtained by new entrants to the sector	5
Operational support	Prepare Technical Guides for operation, maintenance and health and safety of bioenergy plant.	14
Operational support	Establish operator/maintainer Forums to support the safe operation of bioenergy equipment	14
Training	Work with sector advisers to encourage Professional Development by advocating that anyone seeking advice 'employ only registered advisers"	9
Training	Seek economies of scale by working with CEP to evaluate common training services.	9
Training	Develop on-line training packages	9
Solid biofuels market development		
Training	Re-establish training capability for small boiler operators	8
Data	Develop and publish a fuel comparison calculator for heat plant advisers to compare different fuels for heat production	17
Data	Build a database of electricity costs for energy users	17
Tools	Recover the calculators previously on the EECA website and host them on the UseWoodFuelNZ portal.	18
Advocacy	Refresh and relaunch the UseWoodFuelNZ Campaign	17
Trees on farms	Develop a suite of tools and demonstration case studies applicable to the scale of farm forestry including: • Model contracts for purchase of biomass from landowners • Best Practice Guide • Demonstration biomass recovery • Market information • Examples of collective recovery and sale of biomass	18
Guidance	Provide guidance to farmers and other landowners on the growing of herbaceous biomass and its recovery and use as a biofuel.	19
Guidance	Provide guidance and demonstration role models of how forest growers integrate use of slash to produce biofuels to meet their resource consent conditions.	27
Guidance	Provide guidance to heat plant designers and installers on the combustion of herbaceous biofuels in existing and new boilers.	19
Treated timber	Work with New Zealand Demolition & Asbestos Association on development of Guidelines and training for recovery of treated timber for use as an energy fuel	19

Treated timber	Undertake sampling and testing of typical sources of treated timber to identify possible gradings that can be applied during structure demolition.	19
Treated timber	Identify consenting authorities who are consenting to the use of treated wood as an energy fuel	20
Treated timber	Identify the criteria for consents for use of treated timber as an energy fuel	20
Treated timber	Identify heat plant which are successfully using treated timber as an energy fuel	20
Guidance	Investigate the opportunities for use of ash as a product of boiler operation	33
Guidance	Consenting authorities to adopt consent criteria that is standard across all regions so that consent authorities learn from each other.	33
Guidance	Promote the use of modular off-the-shelf heat plant design	33
Treated timber	Prepare and publish guidelines for the use of treated timber as an energy fuel.	20
Treated timber	Prepare case studies showing the increased financial return from selling low grade logs for energy compared to sale as an export log.	20
Value proposition	Prepare case studies showing the financial return from selling process residues as a feedstock for wood fuel.	20
Value proposition	Prepare case studies showing the financial returns from 100% recovery of biomass from trees planted	20
Value proposition	Improve biomass resource and bioenergy use data collection methods so that actual data is available and published in open source.	21
Data	MPI to expand its log price data collection so that regional monthly data is available	21
Quantity of biomass	Undertake a study on the potential amount of woody biomass which may be available in the future from new plantings.	21
Guidance	Provide guidance on handling wet biomass residues for production as a biofuel	26
Quality assurance	Expand promotion of “buy only from an Accredited Solid Biofuel Supplier”	22
Quality Assurance	Work with existing wood fuel suppliers to assist them gain accreditation	22
Data	Publish regular updates on the possible future prices of the full range of fuels available regionally	22
Quantity of biomass	Regularly publish regional maps and tables of likely sources of solid biofuels out to 2050.	22
Quality Assurance	Review the Scheme for Registering Advisers to confirm that it is fit for purpose	23
Quality assurance	Promote the benefits of registration to senior managers in consulting firms.	23
Professional development	Undertake a review of the GIDI applications to identify lessons learnt.	23
Promotion	Expand the equipment and service provider catalogues on the UsewoodfuelsNZ website	24
Professional development	Encourage equipment and service suppliers to provide webinars on their products so that owners and their advisers are well informed on what equipment and services are available in New Zealand	24
Emissions reduction	Review the emissions factors set by MfE for calculating emissions reduction when transitioning from fossil fuels to solid biofuels	24
Funding	Advocate for coal to be levied	25
Funding	Make application to the Forest Growers Levy Trust for research funding	25
Funding	Make application to the Waste Minimisation Fund for research into the use of treated timber as an energy fuel.	25
Funding	Strengthen the Bioenergy Association’s capability to make application for funding and project manage delivery of project outcomes	25
Quality assurance	Include requirements for declaration of sustainability to be included within the criteria for Accreditation of Solid Biofuel Suppliers	25
Information	Encourage use of biomass for heat production so that electricity is freed up for applications where electricity is a more suitable fuel.	27

Gaseous biofuels market development		
Data	Confirm the amount of biogas produced at each current biogas production facility	26
Data	Establish database and quantify existing digestate production and use from WWTP and AD facilities	26
Value proposition	Investigate that biogas being produced is used to maximise value	26
Data	Work with MBIE and MfE on methodologies for actual biogas production data and its publication in the Energy Data Files.	27
Emerging technologies	Monitor the international development of gasification technology so that it is encouraged for production of biomethane as soon as it is commercially viable for investment in NZ.	27
Feedstocks	Educate businesses and communities to treat organic residues as of value and not just a waste to be disposed of.	28
Feedstocks	Educate the organic waste collection sector how to separate different types of organic material so that the highest value can be received when sold as a feedstock for recycling into energy and fertiliser	28
Feedstock.	Establish an education programme to assist farmers produce organic material from their agriculture activities.	32
Feedstock	Undertake research to establish the value proposition for farmers to produce agricultural material suitable as a feedstock	32
Feedstocks	Advocate for standardised organic waste collection and separation processes across all regions	28
Feedstocks	Provide information to the agriculture and horticulture sectors on how to gain revenue from growing supplementary feedstock on low productivity land.	28
Emerging Technologies	Identify case studies where gaseous biofuels can be used to replace LPG.	28
Sustainability	Develop sustainability criteria for gaseous biofuels used in food production that meets food exporters requirements	29
Funding	Modify the GSMEE levy so that it is paid by all natural gas retailers including for the generation of electricity.	30
Funding	That Bioenergy Association and GasNZ advocate to EECA for direct use of the GSMEE levy funds to be spent on gas projects including gaseous biofuels	30
Feedstocks	Prepare tables of regional sources of organic material and make available to the biogas production sector	30
Feedstocks	Work with WasteMINZ on development of Guidelines and training for organic resource recovery	30
Advocacy	Bioenergy Association maintains a close working relationship with GasNZ and GIC staff by providing free and open access to the Biogas Knowledge Centre and the Gaseous Biofuels Steering Committee.	31
Gas trading	Produce a Guide for gas users on biogas and biomethane trading.	31
Gas trading	Produce a Technical Guide showing worked examples of the Carbon Intensity methodology	31
Gas trading	Extension of the current Carbon Intensity methodology report to cover feedstocks from agricultural crops and energy crops.	31
Gas trading	Disseminate the methodology for calculating the carbon intensity of biogas and biomethane	31
Emissions reduction	Produce a guide for calculating emissions reduction when gaseous biofuels replace fossil fuels	31
Gas trading	Assist with the establishment of renewable Gas Certificates for traded gaseous biofuels.	31
Biofertiliser	To improve the financial viability of biogas production by developing the economic and environmental opportunity of using digestate from source-separated organic residues to replace synthetic fertilisers	32

Feedstocks	Prepare a Guide to organic material collection and recovery	32
Investors	Update and expand information available to potential investors and operators: a) Bioenergy Association to extend the information on biogas and biomethane held on the www.biogas.org.nz to the level that has already been done for solid biofuels website. b) Review the ease of accessing information on the www.biogas.org.nz and Bioenergy Knowledge Centre https://www.biogas.org.nz/biogas-knowledge-centre websites. c) Expand information held on the production of renewable CO_2 by AD facilities d) Update information held on the production of biogas from WWTP	32
Investors	Work with NZTE to produce a prospectus for potential gas infrastructure investors. (how to make it easy for them)	33
Information	Update EECA website to ensure gaseous biofuels is treated equal to other fuel opportunities to ensure EECA remain fuel agnostic.	35
Data	Review methodology for MBIE/MfE collection of actual quantities of gas production for Energy Data File and Greenhouse Gas Inventory (belief is that it is derived data and not actual data).	35
Value proposition	Preparation of a White Paper encouraging use of organics to produce biogas and biomethane.	35
Professional Development	Encourage consultants to get their experienced staff onto the Register of Biogas Advisers.	33
Professional Development	Advertise “Ëngage a Registered Biogas Adviser”.	33
Professional Development	Write to asset owners and to encourage them to engage only registered advisers.	33
Professional Development	Where a feasibility investigation is being third party funded write to funders and encourage them to include within their funding criteria that the funded should engage only Registered Advisers	33
Professional Development	Undertake a review of university training of the technologies for recycling of organic material to produce gaseous biofuels.	33
Profiling	Assist equipment and service suppliers gain greater profile by greater use of the equipment and service catalogues on the Biogas portal.	34
Profiling	Encourage greater advertising of equipment and services on the Bioflash newsletter	34
Service providers	Assist at least three existing chemical testing laboratories install required testing equipment for biogas and biofertiliser producers.	34
Quality assurance	Review the sector quality assurance mechanisms and ensure that they are fit for purpose.	35
Quality Assurance	Promote the sector quality assurance mechanisms so that the public, gas users and regulators are confident that the sector is performing at best practice	35
Investors	Update EECA website to ensure gaseous biofuels is treated equal to other fuel opportunities and ensures EECA remains fuel agnostic. a) Update and expand information on gaseous biofuels available to potential investors and operators b) Include links to available information and guidance already published on the GasNZ website and Biogas Portal www.biogas.org.nz c) Include link to the Biogas Knowledge Centre www.biogas.org.nz/biogas-knowledge-centre d) Expand the RETA database to include regional biogas information e) Link to map of current and potential feedstock sources (including potential agricultural by-products	35

	f) Existing biogas production and use, (who, where, how much, use of the biogas) from landfill, AD, and WWTP facilities g) Map current biogas production facilities proximity to gas pipeline distribution network	
Incentive	Promote mandate for gas to include for percentage renewable gas	35
Standards	Preparation of standardised rules for the location, consenting and construction of AD plant across regions. (currently every region has its own rules and they all differ from neighbours)	37
Incentives	Government to provide incentives for aggregation of organic waste collection and construction of infrastructure	37
Incentives	Provide guidelines on the pipeline pricing structure – posted prices. This would include a work model business case for the use of biogas and biomethane to augment the availability of fossil gases for use in manufacturing. To provide an element of certainty to potential investors	37
Liquid biofuels market development		
	Update Liquid Biofuels Roadmap	39

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Brian Cox

Bioenergy Association of New Zealand

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