

Bioenergy Association of New Zealand



NZ Bioenergy Strategy

A Technology and Capability Gap Analysis and Action Plan for Implementation (Summary Report)

Research Paper 4

30 August 2011

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Executive summary

This report was undertaken to identify technology and capability gaps and misalignments affecting implementation of the NZ Bioenergy Strategy. An Implementation Plan is then presented.

The Bioenergy Strategy sets out targets and priorities for action over three decades to 2040. The Strategy timeline is split into three phases: Foundation building, Development, and Expansion of the sector. In simple terms these can be considered as the present and the future (with phases 2 and 3 being in the future). The gaps analysis and implementation plan have been developed along these lines for each of the three bioenergy groupings (biogas, solid biofuel, and liquid biofuel)¹ as there are different drivers and participants related to each of the present sector activities and future ones.

The gaps analysis identifies that while conventional technologies for producing or using biogas and solid biofuels are well proven the technologies for the production of advanced liquid biofuels are in the early stages of development internationally and New Zealand should position itself as an adopter of appropriate technologies as they progress to commercialisation.

Generally and across the three bioenergy groupings economics is seen as the primary barrier to implementation of the Strategy. In addition there are five principle capability areas that require focus:

- Feedstock and biofuel quality and supply
- Developing markets for bioenergy (gas, liquid and solid)
- Understanding the economics
- Demonstration of the technologies
- Provision of information and knowledge

The necessary actions to address these gaps can be separated into the requirements for the present markets and potential future markets:

The present:

- Preparing and making available detailed techno-economic data on representative bioenergy investment options so that investors have good information for decision making.

¹ **Biogas** is produced from decomposition of biomass and can be used for heat or transport

Solid biofuels may be wood chip, or pellets from wood or herbaceous biomass used for heat or as a feedstock for production of biogas or liquid biofuel

Liquid biofuel may be produced using conventional technology using vegetable or animal sugars and oils as feedstock, or produced using advanced technologies using lignocellulosic biomass as feedstock

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- Development of feedstock and solid biofuels markets;
 - Where feedstock owners obtain maximum revenue
 - Wood fuel and wood pellets are promoted as mainstream fuels
- Production of quality feedstocks and biomass derived fuels such as pellets or gas that ensure that buyers have confidence in what they are buying;
 - Establish bioenergy (pellets, wood fuel, liquid biofuels) producers and product quality accreditation
 - Provision of data and information to give engine users confidence in using liquid and gas biofuels
- Establishing representative demonstration projects that show the ‘world of possibilities’ for bioenergy applications
- Provide funding to engineers, technologists and investors to participate in activities that assist with the transfer of international experience and knowledge.
- Develop and implement a use **woodfuel** newzealand promotion campaign
- Demonstrating how bioenergy can assist in achieving New Zealand’s climate change, sustainability and fuel security objectives whilst improving trade balance.
- Preparing and disseminating technical, economic and regulatory information to ensure that lack of information is not a barrier to investment:
 - Improving the dissemination of information from international collaborations and participation with IEA Bioenergy Task Groups.
 - Researching and providing information on how bioenergy initiatives can improve environmental outcomes including emissions to air
- Promoting the use of bioenergy:
 - Encouraging the use of biodiesel, biogas and bioethanol in vehicles
 - Working with local government to demonstrate how the use of bioenergy can improve air quality
 - Demonstrating that bioenergy (pellets, biogas and wood fuel) for heat can substitute for coal and gas fuel cost effectively.
 - Demonstration how municipal, food processing and farming waste can be utilized as a feedstock for the production of energy in commercial heat or vehicle fuel applications
 - Working with the rural sector to demonstrate how bioenergy applications can reduce effluent discharge to land and waterways.

The future;

- Work with international gasification and advanced liquid biofuel technology developers to establish commercial scale liquid biofuel plant in New Zealand.
- Prepare and make available technical and economic information to assist potential investors:
 - Develop financial and economic information that shows land owners and potential investors the value of investment in gasification and advanced liquid biofuels
 - Establish a database of information on respective technologies and their application
 - Participate in international IEA Bioenergy Task Groups to ensure that information on emerging technologies is effectively and efficiently brought to NZ
 - Establishing networking to encourage communication between interested parties, in particular between researchers and investors.
- Promote future gasification and liquid biofuel opportunities to potential New Zealand and international investors
- Encourage Government to include bioenergy within its Economic Growth Agenda.

Appendix: Summary of Bioenergy Sector Priorities for Action

The following is a summary of actions that are recommended to be pursued so that the vision of **25% of consumer energy from bioenergy by 2040** can be achieved. The actions are not in a priority order as they are the responsibility of different parties. The list has been collated under technology groupings (solid biofuel, biogas, liquid biofuel) with a general grouping for topics covering more than one technology.

1. Understanding the Resource Potential and how to use it – current and future

Actions are focused on unleashing the vast amount of under utilized or wasted biomass for producing additional value from existing business activities eg forestry and land use, or economic growth from new business activities.

Tech Grouping		Task	Who	Priority
General	1.	Develop a programme of work to improve the knowledge of territorial councils on the opportunities for collecting and using organic municipal refuse for the production of energy	BANZ/EECA	**
General	2.	Obtain, and provide to forest and landowners, information on the value of diversification into new and alternative sources of biomass as feedstocks for the production of both fuel and bio chemicals/materials.	BANZ/NZBIO/ NZFOA	**
Solid biofuel	3.	Implement a market development programme that promotes biomass feedstocks/fuel as a quality product similar to gas or coal	WFIG/WPIG	***
Solid biofuel	4.	Undertake research and provide training workshops so as to reduce forest harvest collection and processing costs.	WFIG/FICA	**
Solid biofuel	5.	Undertake R&D into the wide range of emerging short and medium rotation energy crops eg Miscanthus and Eucalyptus species, available as a biomass fuel	WFIG	**
Solid biofuel	6.	Address the limitations of some short rotation energy crops eg Miscanthus, from being included within the climate change mitigation policies.	WFIG	*

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Solid Biofuel	7.	Establish a means of providing market information on the cost of feedstocks so that buyers and sellers can operate efficiently.	WFIG	*
Biogas	8.	Prepare technical guides for the design, sourcing and construction of equipment for using biogas for electricity and heat production, and as a transport fuel.	BIG	***
Biogas	9.	Establish/co-ordinate programmes to achieve maximum energy output from municipal solid waste, farming waste and food processing waste.	BIG	*
Biogas	10.	Work with government and the waste minimization sector to encourage inclusion of biogas production when new municipal liquid waste processing plant is built	BIG/ WasteMINZ	***

2. Research

Research actions are largely based on scientists and technologists following international R&D work and adopting it for New Zealand conditions along with technology development based on specific feedstocks and end-user market conditions.

Tech Grouping		Task	Who	Priority
General	1.	Establish a pan sector Bioenergy Research Action Plan (currently being developed by Advanced Biofuels Research Network) so as to achieve the goals set out in the Bioenergy Strategy and other strategies of relevance	Advanced Biofuels Research Network /industry*	***
General	2.	Research entities to identify how appropriate public good outputs of government funded projects can best be provided to assist smaller players in the sector.	Industry/ research entities	***
General	3.	Hold an annual industry /researchers forum to review progress on meeting the bioenergy R&D needs and prepare an annual Bioenergy R&D research wish list which explicitly identifies sector needs and can be used to drive public good funding.	Industry/ CRI/ Universities Industry	***
General	4.	Establish a mechanism which encourages the easy access and dissemination of NZ and international published material to transfer experience and knowledge to the sector.	Advanced Biofuels Research Network	**

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General	5.	Establish a coordinated, funded and effective involvement by New Zealand in IEA Bioenergy Task Groups.	MSI	**
Liquid Biofuel	6.	Analyse conversion options to determine optimum routes in NZ context	Scion UoC NIWA CRL Energy	***
Liquid Biofuel	7.	Establish a mechanism for providing assistance for small technology developers to obtain funding for taking research to commercialisation.	MSI	**

*Industry means individual companies and relevant industry associations

3. Economics and markets

Actions to facilitate bioenergy market development needs to put more focus on the market and less on the availability of resources and the technologies.

Tech Grouping		Task	Who	Priority
General	1.	Establish funding mechanisms, so that pursuit of regional economic growth from bioenergy in regions which are rich in biomass (eg Bay of Plenty) and have the infrastructure appropriate to assist development clusters, become a focus for investment in new initiatives.	EECA	***
General	2.	Establish an information Newsletter about the bioenergy market, the competitors, the customers price on carbon, waste avoidance costs and market trends	BANZ	**
Solid Biofuel	3.	Develop a wood pellet market expansion programme of action.	WPIG	***
Solid Biofuel	4.	Implement a <i>usewoodfuelNew Zealand Campaign</i> to promote the use of wood fuel throughout New Zealand.	WFIG/WPIG	***
Solid Biofuel	5.	Work with fuel suppliers to establish a market for wood fibre that is well informed and effective.	WFIG	***
Solid Biofuel	6.	Work with forest harvesters and other wood fuel producers to ensure that wood fuel is produced and delivered to a consistently high quality and lowest cost, while maximizing financial return.	WFIG/NZFOA	***

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Solid Biofuel	7.	Work with wood fuel suppliers with education workshops to assist ensure delivery of wood fuel that meets specified quality standards.	WFIG	**
Solid Biofuel	8.	Establish a programme of activities to promote recognition that wood harvest and process residue is a valuable coproduct of the sector, and is not waste.	WFIG	*
Solid Biofuel	9.	Provide landowners with good financial information on the financial benefits of alternative land use including the growing of short rotation energy crops on suitable land, and the growing of long rotation crops on steep land	WFIG	*
Liquid Biofuel	10.	Establish a scheme for accreditation of biodiesel and bioethanol suppliers.	LBIG	***
Liquid Biofuel	11.	Establish programmes to show vehicle users that biofuel use in engines is safe and efficient.	LBIG	***
Biogas	12.	Evaluate local and international experience and compare project economics of potential biogas applications to explain costs and benefits	BIG	*
Biogas	13.	Record and analyse existing and potential NZ biogas generating sites, both currently economic and non-economic	BIG	*

4. Information and Project Demonstration

Markets work most efficiently when all players have full information and there is common understanding of market drivers. It is important that small industry players are supported, alongside encouragement for existing corporate players.

Tech Grouping		Task	Who	Priority
General	1.	Establish a web based directory of NZ bioenergy demonstration projects.	BANZ	***
General	2.	Establish a contestable bioenergy projects fund similar to the previous EECA Wood Energy Programme	EECA	***
General	3.	Collate and disseminate information on the benefits of using bioenergy to overcome air emission concerns in specific localities	BANZ/EECA	***

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General	4.	Establish a programme of action to assist with the dissemination of bioenergy knowledge and experience	BANZ/EECA	***
General	5.	Improve dissemination of information from IEA Bioenergy Task Groups	Relevant research agency	**
General	6.	Establish a contestable fund to assist technical transfer of international knowledge and experience: <ul style="list-style-type: none"> • engineers and the technologists • potential investors. 	EECA	**
General	7.	Encourage collaborative work between industry parties to ensure funding of demonstration projects	BIG/WFIG	**
General	8.	Undertake regional analysis of energy supply, demand and drivers to determine local priority developments	Regional Councils	*
General	9.	Update and extend the independent centre of knowledge and expertise for advising investors on the range of bioenergy opportunities	EECA	*
Biogas	10.	Establish a programme of action to ensure that councils with opportunities for the production of biogas from solid and liquid municipal refuse are fully informed on the technologies and the costs.	BIG	**
Biogas	11.	Development of Case Studies with step by step guide to biogas collection and utilization and advice on how to make sites economic.	BIG	**

5. Leadership

There is a need for leadership to encourage investors and practitioners to have confidence in using bioenergy.

Tech Grouping		Task	Who	Priority
General	1.	Encourage Government to include bioenergy within their Economic Growth Agenda	BANZ	***
General	2.	Encourage Government to have procurement policies to encourage the use of bioenergy in government facilities,	BANZ	***

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General	3.	Work with councils to develop best practice guidelines for procurement at the local government level to boost uptake of bio opportunities	BANZ	***
General	4.	Provide information at both the local and national government level that improves the understanding of the potential opportunities that bioenergy presents.	BANZ/EECA	**
General	5.	Assist Maori landowners to diversify their land use via biomass feedstock production	BANZ/Te Puni Kokori	**

6. Policy and Regulation

Appropriate policies by government and industry can encourage uptake of bioenergy.

Tech Grouping		Task	Who	Priority
General	1.	Provide information to Government on the wider economic benefits likely to be achieved from bioenergy so that appropriate government policies can be implemented	BANZ	***
General	2.	Encourage Government to allow accelerated depreciation for renewable energy projects to assist overcome the capital cost barrier.	Renewable energy organisations	**
General	3.	Work with Government to ensure that the Bioenergy Strategy is integrated into the Waste Minimization, Forestry and other sector strategies.	BANZ/ WasteMINZ	**
General	4.	Work with government to develop information, policies and national targets to address issues such as air pollution, water pollution etc—using bioenergy resources as the delivery mechanism	BANZ	**
Biogas	5.	Establish a programme to encourage the collection and processing of organic waste for the production of biogas instead of putting in landfills.	BIG	***

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7. Business and Commercialisation Capacity

Building the capacity to make it happen.

Tech Grouping		Task	Who	Priority
General	1.	Establish a database on the website of current business commercialisation support programmes	BANZ/NZTE	***
General	2.	Improve visibility of existing players so that investors see that there is growing confidence in the bioenergy product	BANZ	***
General	3.	Identify opportunities to facilitate possible partnerships to advance ideas to market or to ensure several small players can benefit from a collaborative approach.	NZTE	**
General	4.	Encourage the establishment of bioenergy development clusters (eg Kawerau, Waipa, Murupara) to reinforce synergies between businesses and provide economies of scale for mutual support, shared engineering, and market perception	BOP Governance Group	**

8. Knowledge and skill development

Markets depend on having good knowledge and commercializing an ideal requires skill and experience.

Tech Grouping		Task	Who	Priority
General	1.	Work with universities and polytechnics to establish bioenergy focused courses aligned with existing biotechnology R&D entities so as to increase the number and breadth of researchers involved in the sector.	BANZ	*
Solid Biofuel	2.	Promote the use of the wood Fuel Classification Guidelines to wood fuel producers.	WFIG	***
Solid Biofuel	3.	Establish classification grades for short rotation energy crops eg miscanthus similar to that in the Wood Fuel Classification Guidelines	WFIG	***
Solid Biofuel	4.	Promote the use of quality wood fuel so as to lift the perception of wood fuel as a mainstream energy source.	WFIG	***
Solid Biofuel	5.	Establish a scheme for accreditation of wood fuel suppliers.	WFIG	**

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Solid Biofuel	6.	Work with FICA to hold wood fuel workshops aimed at improving the quality, price and value of wood fuel from forest residues	FICA	**
Solid Biofuel	7.	Develop a programme of R&D on short rotation energy crops	WFIG	**
Solid Biofuel	8.	Get involved with the new IEA Bioenergy Task 43 – Biomass feedstocks for energy markets.	WFIG	*
Solid Biofuel	9.	Promote new harvest contract regimes that improve the value of wood residue for forest owners.	WFIG/ NZFOA	*
Solid Biofuel	10.	Work with NZFOA to develop a wider wood fuel supply sector	BANZ/NZFOA	*
Biogas	11.	Monitor progress on, and contribute where necessary to the biogas standard ISO/TC 255 Bio	BIG	**