

NEW ZEALAND BIOENERGY STRATEGY

SEPTEMBER 2010





The Bioenergy Association of New Zealand (BANZ) has been established to promote and coordinate the development of a bioenergy industry in New Zealand. The Association provides a central focus point for liaison with Government agencies, the dissemination of information amongst the industry and long-term positioning of bioenergy into New Zealand's energy system.

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The New Zealand Forest Owners Association (FOA) represents the owners of New Zealand's commercial plantation forests. It was set up in 1926 and is now one of the country's most influential primary sector organisations. Its members own or manage more than 80 per cent of the country's 1.76 million hectares of plantation forests. With export earnings of \$3.7 billion in 2008/09, plantation forestry is New Zealand's third largest export earner.

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The New Zealand Farm Forestry Association (NZFFA) was formed in 1957. Membership is spread over 29 Branches throughout NZ, and there are 5 special interest groups. We estimate our members own or manage up to 100,000Ha of forest, and influence the management of a similar area. These forests consist of radiata pine, cypresses, eucalypts, Douglas fir, blackwoods, poplars, other hardwoods, sequoia and NZ indigenous species.

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The New Zealand Institute of Forestry founded in 1927 is a professional body whose members are involved in all aspects of forests (both production and non-production) and forestry including forest ownership, management, processing, research, education and government. NZIF runs a registration scheme for its members, produces standards such as the widely used forest valuation standard and makes submissions on a wide range of issues.

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NZBIO is the national peak body representing the bioscience based industries of New Zealand. In 2008, a deliberate move towards the emerging international dialogue on referring to a bioeconomy was adopted, with NZBIO now operating under the tagline "Creating a Sustainable Bioeconomy in New Zealand".

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In 2002 the Forest Industry Contractors Association (FICA) was formed to give a common voice on relevant issues and to foster development and improvement in the forestry contracting industry. Since then, FICA has grown to represent and advocate for the interests of contractors who collectively harvest 45 – 55% of the national annual roundwood production. FICA has also become the provider of choice for business improvement information, practical workshops and new techniques and technologies to improve the health, safety and productivity of forestry contractors in New Zealand.

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Future Forests Research Ltd (FFR) was formed in 2007 to fund, contract and disseminate forestry research for the benefit of the wider forest growing sector in New Zealand. FFR's aspirations are to help enhance the performance of the sector through delivery of relevant and well targeted research. FFR provides the opportunity for sector stakeholders to engage with research in setting the direction and in the uptake of outcomes.

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SECTION ONE
NEW ZEALAND
BIOENERGY STRATEGY

VISION

Economic growth and employment built on New Zealand's capability and expertise in forestry, wood processing and bioenergy production - leading to new business opportunities which by 2040 supply more than 25% of the country's energy needs, including 30% of the country's transport fuels.

Aim of this strategy

This strategy aims to achieve economic growth and employment and realise greater value from New Zealand's existing forestry resource and new energy crops by providing impetus to the growing bio-economy.

It aims to lift the national growth in bioenergy use by 2040 to 25% of consumer energy - substantially above its current 8.5% - with attendant economic, social and environmental benefits¹.

This growth is driven by an increasing domestic and international demand for heat from proven wood fuel and biogas technologies, and for transport fuels in the form of biogas, biodiesel or bioethanol. This includes a 60% increase in New Zealand's use of biomass for heat. In energy terms, the largest demand by 2040 is for transport fuels, with the most strategically important being diesel (for farming, transport, construction and fishing) and jet fuel.

Economic benefits

This strategy will achieve multiple national economic benefits – both through extracting additional value from existing harvest residues, organic wastes, and diversified land use; and through economic growth generated by new energy crops.

Economic benefits are:

- improved extraction of wealth from NZ's natural resources
- improved national balance of trade through generating value-added export revenue and reducing import fuel costs
- increased employment and regional prosperity
- future-proofing New Zealand's energy supply and cost through reducing reliance on imported fuels
- strengthening New Zealand's international green trading advantage
- added value and greater business resilience for land owners, forest owners and wood processors through diversified revenue streams
- help for New Zealand in transitioning to a lower carbon economy
- reduced environmental impacts to air, soil and water
- economic benefits linked to waste reduction.

¹ In comparison, a 'business as usual' approach would achieve only around 9.5% of New Zealand's total energy needs by 2040, including very little transport fuel.

THE STRATEGY - A THREE-PHASE APPROACH

Foundation building phase (2010 – 2015)

This phase is the primary focus of this strategy. Activities here are critical to success in subsequent phases:

- Prepare for bioenergy industry growth based on existing resources, processes and markets; consolidate expertise
- Create a basis for broader acceptance and use of mature bioenergy technology and products (e.g. wood fuel for heat energy; biogas from municipal waste)
- Secure Government and investor support
- Increase understanding of market drivers for wood-based energy, wood fibre, and other products through practical experience
- Develop wood fuel market via forward contracts for quality feedstock for heat; commence wood pellet export (including torrefied wood pellets)
- Position wood fuel market for later expansion as feedstock for production of transport biofuels and biochemicals extraction
- Develop supply-chain infrastructure
- Confirm technical and economic platform for growth in subsequent phases
- Undertake commercially-focused research into fuel crop growing, processing technologies and trial plantings to underpin decisions on crops, processes and feedstock production
- Establish applied technology transfer programmes based on principle of being fast followers and adaptors of international research
- Establish regulatory environment and gain experience of production within this
- Develop suitable standards and controls to ensure new crops can be shown to be sustainable and not bio-security threats.



Development Phase (2015 – 2020)

- Investment programme commences, estimated at \$6 billion - covering a range of initiatives including technologies for processing wood fibre into transport fuel
- Demonstration plantings of energy forests and transport fuel crops are carried out in selected regions
- Expanding heat energy market continues to maximise opportunities for growth
- Wood processing sector infrastructure builds, based on growth in wood fuel demand and export of chips and pellets
- Burgeoning wood fuel and export markets provide economies of scale which supports development of planting and harvesting technologies
- Technological advances allow more economical harvesting of forest residues
- Energy crops become a co-product with other land uses, giving greater value to landowners
- New market for low grade (chip) logs adds further value for existing forest owners.



Expansion Phase (2020 – 2040 and beyond)

- Investment in bio-refineries for the production of transport fuel and other bio-materials
- Expansion of fuel crops and energy forest plantations on marginal land
- On-going research and development.

Developing the sector

This strategy would see a wide range of products developed in response to growing market demand - based on wood fuel, biodiesel, bioethanol, biogas and bio-oil.

This builds on proven technologies using natural feedstocks and organic waste:

- wood fuel for heat from forest harvest and processing residues
- biogas from municipal, agriculture waste and food processing residues
- liquid biofuels:
 - biodiesel from used cooking oil, animal fats, canola, forest residues and forest harvest; and
 - bioethanol from whey, black liquor, forest harvest and residues.

The strategy then leads into a wider range of biochemical products from wood.

Technology transfer programmes will tap overseas research into biofuel production, while New Zealand research and trials are focused on establishing energy crops which will position us best for the growth phases. Increasing capability to assess wood-to-energy conversion technologies should also be a key focus.

During the Foundation Building Phase, existing wood energy, biogas, and transport biofuel activities can be expanded by pursuing 'low hanging fruit' to develop industry role models and gain sector experience.

Key participants

To succeed, this strategy requires a common vision and collaboration across industry, as well as aspirational leadership from Government.

Existing and new forests, and farm-based energy crops, will be utilised to establish regional supply chains - building on the expertise and infrastructure of larger players in the energy, forestry and wood processing sectors.

Collaboration with the forestry sector will be key to reduce growing, collection and processing costs, and to ensure delivery to specified quality standards.

Industry needs to work with Government to establish mechanisms to support investment and overcome market barriers, particularly through clustering of market participants. It is important that small industry players are supported, alongside encouragement for existing corporate players.

Cross-government support and action will be pivotal, and would ideally entail:

- policy (including ETS) and procurement directives
- support for strategic research on biomass resources and conversion technologies
- demonstrated commitment - for example, wood fuel used to heat public buildings; production of biogas from municipal waste; use of biofuels in government vehicles.

The integration of forestry, land use and bioenergy policies would help both traditional and emerging bio-based operations to boost performance and enjoy higher economic returns.

Wider strategic context

This strategy needs to be linked to an overarching forestry strategy, covering diversified products (logs, chip, pellets, biochemicals, biofuel), more efficient byproduct recovery and incentives to optimise use of harvest and processing residues.

This strategy contributes to a policy of waste reduction by utilising biomass feedstocks from forestry and wood processing residues, agricultural residues, and municipal and industrial wastes. There are clear links to waste minimisation and improved environmental outcomes – for example, producing biofuels from dairy effluent or algae in water ways.

Longer term, this should sit alongside a biomaterials strategy. Ideally, bioenergy initiatives should be co-ordinated with those relating to the production of biochemicals and bio-based products from organic feedstocks.

SECTION TWO
NEW ZEALAND
BIOENERGY STRATEGY -
BACKGROUND

1 Context

Over the next 30 years the world is expected to face substantial increases in oil and gas prices and a reduction in availability of fossil fuels. World demand for biofuels is expected to rise.

This *New Zealand Bioenergy Strategy* covers the development of a nationally significant bioenergy business sector and prepares New Zealand for a time when transport fuels need to come from non-hydrocarbon sources. The strategy builds on the opportunity for land and forest owners to improve business resilience through diversification.

This strategy has been prepared by the Bioenergy Association of New Zealand (BANZ) and the Forest Owners Association (NZFOA), with input from many other stakeholders, to provide a common direction and establish priorities for action.

It is a working document, to be subject to regular review, and intended to secure the mix of resources and policy required to achieve the strategic objectives and growth. It will provide guidance and direction to sector participants, building confidence that there is a viable and long-term future for an integrated bioenergy sector in New Zealand.

Background to this strategy is contained in the companion document *A Picture of Bioenergy Opportunities for New Zealand*. That document contains detailed information on biomass, bioenergy, and associated conversion processes and products as the basis for this strategy.

New Zealand has the opportunity to establish a large, wealth-earning bio-economy based on significant underutilised biomass resources already and potentially available. Bioenergy is currently the leader into the bio-economy through the proven technologies and established infrastructure of the forestry and wood processing sectors. Bioenergy can provide the 'pull' to the production of biochemical and bio-based products that will form a significant part of the wider bio-economy.



2 Biomass resources and products

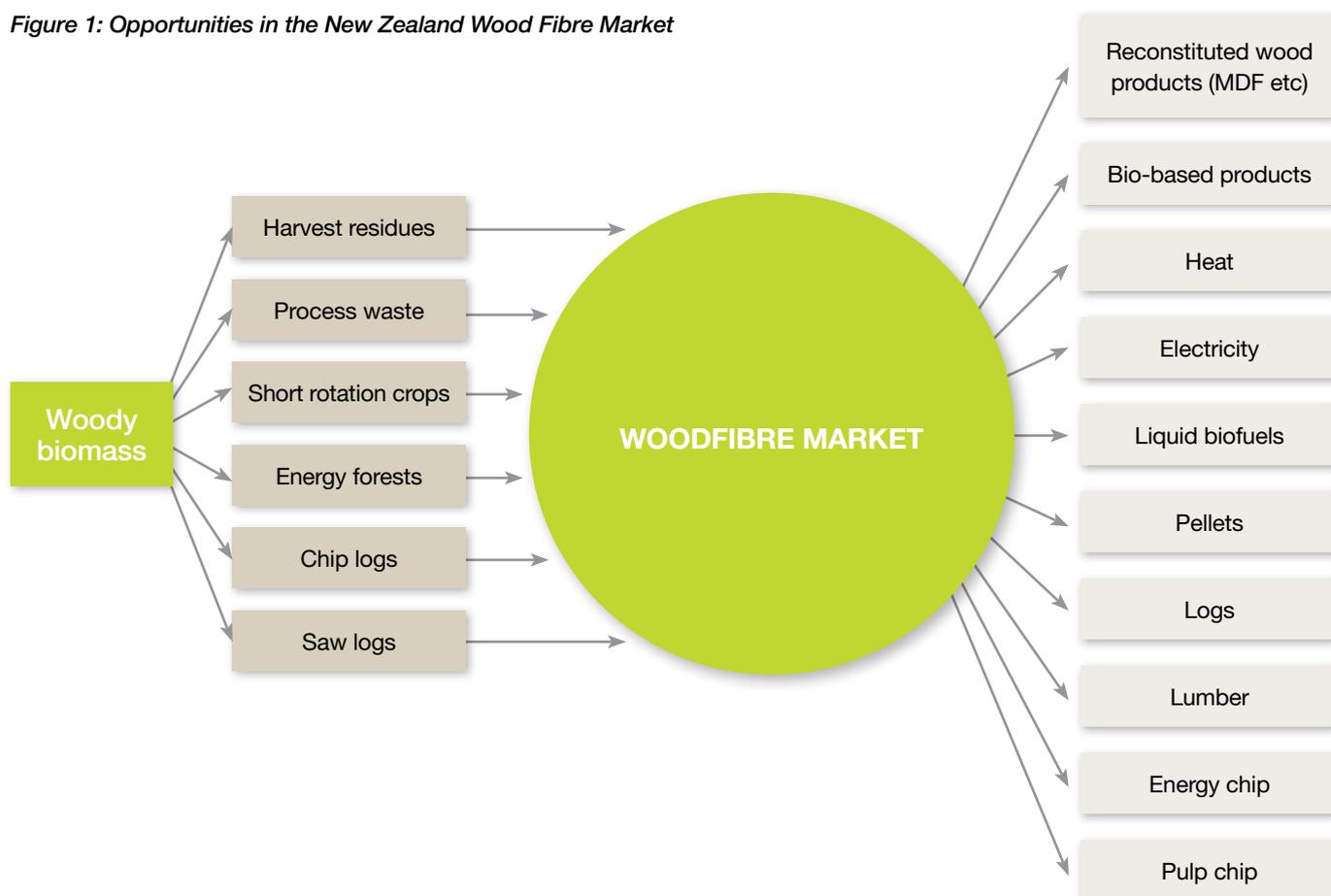
New Zealand's current and potential bioenergy resources include:

- conventional forestry harvests, including residues (with significant volumes currently exported as logs). Predominantly *Pinus radiata*, but with a wide range of other species available
- short rotation forestry crops including radiata pine, *Salix*, Acacias and Eucalypts
- agricultural crops including oil-bearing plants such as Canola, and grasses such as *Miscanthus*
- agricultural residues such as straws, poultry litter, dairy and piggery effluent
- municipal, agricultural and industrial process residues and wastes which may be burnt or digested to produce methane
- algae (a byproduct of waste treatment) as a basis for biodiesel production.

Of all these resources woody biomass, including the biomass derived from fuel crops, has by far the highest potential for wealth creation from the full range of applications (including bioenergy) shown in Figure 1. The bioenergy produced is often a byproduct of the production of primary bio-products.

The use of wastes and effluents, while small in energy potential, offers significant opportunities for reducing waste volume and green house gas emissions as well as improving quality of waste water discharge.

Figure 1: Opportunities in the New Zealand Wood Fibre Market



3 Current situation

The bioenergy sector has developed a firm footing from which growth is already occurring. This growth is based on the wood processing sector using processing residues for on-site heat production; biogas production from municipal liquid and solid waste; biodiesel and bioethanol production from food processing residues; and the production of biodiesel from canola seed. Further production of bioenergy from these resources will continue but will be limited by resource availability.

The export of wood pellets to Europe and Asia (as a result of demand for wood fuel to meet climate change targets) has commenced and is expected to grow as experience in the trade consolidates.

Currently many forest and other land owners do not recognise the potential for energy as a byproduct of forest harvesting, or the opportunity presented by new energy crops such as *Miscanthus*. They lack confidence in bioenergy market projections and the experience that would encourage use of the 20% of a tree that is currently wasted during harvesting or processing.

The annual use of bioenergy is already equivalent in energy terms to the gas output from many of the smaller Taranaki gas fields.

The wood processing sector is near self sufficient in the production of heat from wood fuel; however, other commercial heat users need greater confidence in the cost and availability of wood and other fuels before making the decision to convert from fossil fuels to wood energy or biogas.

4 The potential of bioenergy in New Zealand

Currently within New Zealand, 8.5% of consumer energy is derived from biomass, with the majority of this used in the production of heat for industry or homes. This strategy could see, by 2040, bioenergy supplying more than 25% of New Zealand's projected energy needs, including 30% of the country's transport fuels¹ and up to a 60% increase in biomass used to produce heat (excluding that provided by black liquor).

Continued incremental growth based on current policies and resources, and the limited requirements for heat supply, would see bioenergy provide only around 9.5% of New Zealand's energy needs in 2040; this figure includes very little transport fuel.

Adopting this strategy will allow the potential of bioenergy to be realised and the many economic benefits to be achieved.

Expansion of the bioenergy sector also provides opportunities for the export of biofuels to meet other countries' climate change obligations.

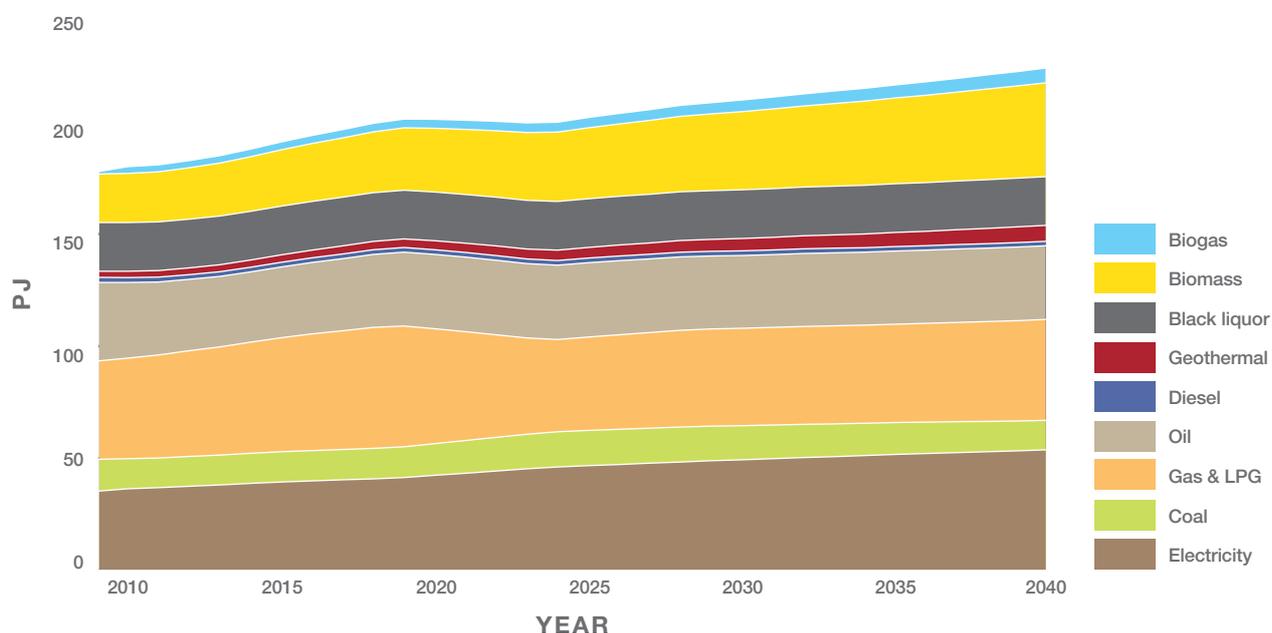
A 60% increase in the use of biomass to produce heat includes substitution of coal or gas, for current and anticipated heat requirements. The possible increased use of biomass to produce heat² is shown in Figure 2.

Currently, plantings of radiata pine require 25 – 30 years before harvesting for present uses (primarily logs and lumber) but new radiata pine energy regimes and other species could have 1 – 16 year production cycles if grown for energy. Special energy crops could also return income after 2 – 10 years and then annually. The shorter establishment time and quicker returns from short rotation bioenergy crops will provide alternative options for land owners.

¹ The strategy target of 30% of transport fuels from bioenergy by 2040 is within the technical potential of 70-100% identified by Scion in the Bioenergy Options Project.

² It should be noted that the amount of biogas produced from gasification of wood for reticulated gas supply could be additional to that shown in Figure 2 if there was a need to substitute for natural gas because of accelerated gas field depletion.

Figure 2: Scenario – future heat use, by energy source



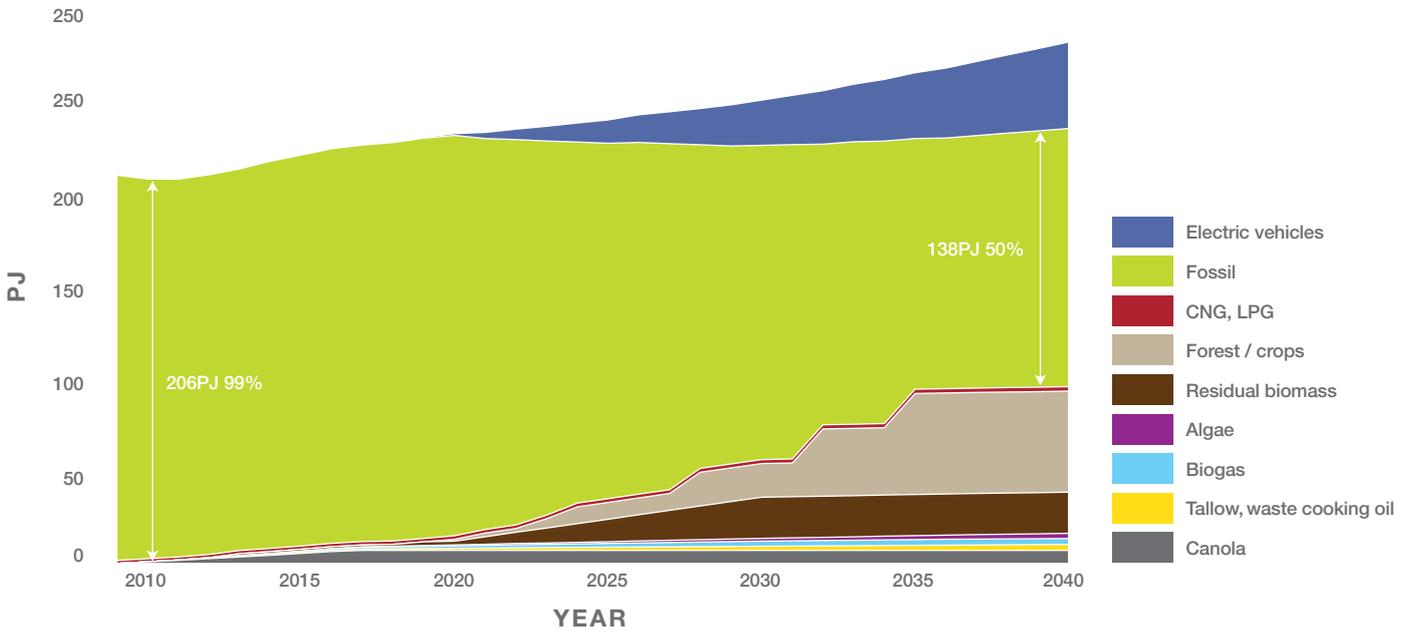
Source: Total heat use from Ministry of Economic Development Energy Outlook 2009/10 reference scenario. Energy mix based on interpretation by East Harbour Energy

Initial analysis suggests (refer Figure 3) that there is the potential to supply up to 30% of New Zealand's future transport fuel needs from biomass. Current cost predictions and the availability of existing infrastructure, indicate that much of the early growth will be from lignocellulose in the form of biodiesel. Bioethanol production to replace petrol provides a significant opportunity when the technology is proven in later years. Both biofuels are already available in the transport fuel market which is allowing producers, retailers and users to gain experience before demand becomes more widespread over the next few years.

Regardless of technology and fuel produced, the biomass required to produce liquid fuels at the scale envisaged will require new planting of trees and crops in addition to the use of existing forest residue. This could also potentially draw on some of the increasing volume of chip logs from existing forests.

On top of making a substantial contribution to meeting New Zealand's energy demand, bioenergy provides significant opportunities to increase revenue for farmers and landowners (improving business resilience), reduce greenhouse gas emissions, and improve water and air quality. It will contribute to national energy supply security, improved trade balances, social and economic development through employment in rural communities, and improved management of wastes and resources.

Figure 3: Scenario - potential transport fuel supply, by feedstock



Source: Total fuel use from MED options study.
 Bioenergy contributions based on an interpretation by East Harbour Energy

New Zealand has abundant forest resources and large areas of underutilised land with high potential for biomass production. We also have the ability to transfer and adapt new international technologies to use biomass from these sources. Given these strategic advantages, New Zealand has excellent potential to extract wealth from bioenergy, and bio-based products.

Research in Canada³, where a similar integrated bioenergy strategy is being developed, shows that the economic and social opportunities of bioenergy and bio-based products are stronger when integrated within the traditional industry’s operations, rather than being developed on a stand-alone basis.

Specific initiatives proposed under the three phases of the *New Zealand Bioenergy Strategy* are detailed in the companion document *A Picture of Bioenergy Opportunities for New Zealand*.

³ The Forest Products Association of Canada’s (FPAC) Report from the Future Bio-pathways Project

5 Drivers

Drivers for a large scale uptake in the production and use of bioenergy include:

- economic benefits and wealth creation associated with the establishment of a \$6 billion⁴ industry
- the need to improve New Zealand's future security of energy supply and reduce national dependence on imported fuels⁵ (particularly given forecasts of reducing global oil reserves and increasing prices)⁶
- the projected increase in world demand for biofuels and bioenergy
- international and local commitments to reduce greenhouse gas emissions
- greater forest (and potentially energy crop) plantings and biomass availability prompted by the Emissions Trading Scheme
- the potential for the development of alternative, higher value bio-materials from wood fibre
- increasing wood volumes available (especially low quality logs) in a constrained demand market
- the demand for sustainable, non-food biomass resources to be used in bioenergy applications which are socially acceptable and environmentally sound
- the potential of fuel crops to add additional value, and diversified revenue streams, for land and forest owners – improving income and business resilience
- the need to reduce environmental damage arising from land erosion
- the opportunity to develop new markets beyond traditional forest products by building on the experience and infrastructure of the wood processing sector
- the development of new skills and technologies for obtaining additional value from wood
- the need to develop better management strategies for municipal, industrial and agricultural waste including reduced waste to landfills
- the opportunity to develop new industry and employment in rural New Zealand and to strengthen rural communities
- the potential to enhance New Zealand's 'clean and green' image and mitigate possible market perception issues that could impact on our reputation, exports and tourism sector.

While bioenergy use will grow under current strategic drivers and initiatives, the size of the opportunity has immense national significance. Realising this potential will require very substantial investment, co-operation and collaboration across industry, Government support and a commitment to a clear and defined strategy.

⁴ BANZ, *A Picture of Bioenergy Opportunities for New Zealand*

⁵ *During the Foundation Building Phase there may be a need for some imported fuels to firm markets until domestic production is fully established.*

⁶ *Analysis indicates that over the next three decades there will be only limited opportunities for the generation of electricity from bioenergy. Where these do occur they are expected to be in niche distributed generation applications associated with on-site energy supply.*

6 The opportunity for economic growth

Within the next decade increased use of wood for the production of heat and transport fuels is expected to be economic in New Zealand. Initially this should come from residues and low grade logs from existing forests and short rotation energy crops; longer term, it will come from the planting of new energy forests on marginal lands. By 2040 this could increase to a level whereby bioenergy provides 25% of New Zealand's energy supply (principally 30% of transport fuel coming from biofuels).

Public recognition by Government of the economic opportunities from conversion of wood into heat energy and transport biofuels will provide confidence to international investors (some of whom are already looking to NZ's underutilised forests and available land for biofuel production). Such recognition by Government would also give confidence to forest and other land owners that biofuel production is a viable means to increase revenue. Inclusion of bioenergy in the Government's Economic Growth Initiatives could be a powerful means of publicly recognising the many economic opportunities presented by bioenergy.

Biomass is the only renewable energy fuel that can be exported and thus improve the national balance of payments situation. Over the period of the strategy it is expected that there will be an increase in the use of existing forest resources for production of exportable added value products (rather than exporting as a low value commodity) in addition to new crops.

This Bioenergy Strategy is consistent with the New Zealand Energy Outlook 2009/2010 Changing Gear scenario⁷ published by the Ministry of Economic Development.

7 Dependencies

The New Zealand bioenergy sector has the potential to grow significantly but the speed of growth will depend on:

- the extent to which land and forest owners seek to maximise economic benefits from utilising land and getting additional value from wood via bioenergy
- aspirational leadership from Government – ideally bioenergy would be integrated into the Government's economic development programme with demonstrated examples of support
- the level of demand for lignocellulose from international investors who have the appropriate technology but lack access to large volumes of feedstock for conversion into biofuels
- New Zealand's ability to encourage investment by demonstrating a transparent, stable long-term commitment to biofuels
- development of the overall supply chain to minimise the risk of up-scaling supply and production
- degree of support available to emerging companies including professional advice and international links to technology and capital
- continued investment in research and developing technologies
- the successful engagement of the agricultural sector and local government.

This strategy identifies that a focus on developing capabilities and experience during the Foundation Building Phase will best position New Zealand's bioenergy sector for growth.

⁷ Energy Outlook Changing Gears Scenario http://www.med.govt.nz/templates/MultipageDocumentTOC____41969.aspx

8 Barriers

Barriers currently impeding the development of New Zealand's bioenergy sector include:

- the difficulties inherent in moving a mature sector (forestry) into new crops, products, markets and challenges
- a lack of recognition among forest and other land owners of the additional value they can get from production of multiple bio-products
- lack of infrastructure for biofuels (the focus should be on drop-in fuels to enable existing infrastructure to be used)
- lack of capital. Additionally, there is a need for investment partners with some technology capability
- the current poor economics of producing liquid biofuels. The speed of biofuels uptake is driven solely by the market, due to an absence of subsidies
- lack of local scientists to adapt international technology (though NZ scientists are skilled in this area, their numbers are few)
- lack of access to feedstock supply including a lack of sufficient capital to validate performance and long-term potential of technologies
- regulatory compliance and cost/project risk for start up companies with limited initial cash flow.

9 Research and development

Internationally a range of biomass-to-energy conversion technologies are under development, offering prospects for improved efficiencies, lower costs and improved environmental performance. The focus of these is largely on the production of bio-oil, bioethanol, biodiesel and jet fuel. With many countries investing heavily in the development of second generation bioenergy technologies, it is proposed that New Zealand position itself to be a fast-taker and adaptor of these advances, modifying them to suit local conditions as required. This will require close collaboration with international bodies with access to this research.

Priority for research and development should be on activities in the Foundation Building Phase, to achieve a firm foundation for subsequent phases. Failure to establish a sound base for the sector will make it more difficult to achieve the target for transport biofuels in particular.

Research during the Foundation Building Phase should focus on encouraging the transfer of existing technology, while research in the Development and Expansion Phases are focused more on the need for suitable energy crops and lignocellulose-to-energy technologies to achieve the vision of 30% transport fuel from biofuels.

While the strategy sees New Zealand as an adaptor of overseas technology, there is an immediate need for funding to support research to identify the most suitable crops and planting and harvesting regimes, and appropriate conversion technologies.

10 Role of Government

The Government has identified development of natural resources as a major plank for achieving national economic growth and wellbeing. With aspirational leadership from Government alongside shared industry vision and collaboration, bioenergy can contribute strongly to economic growth.

Government can assist development of a strong bioenergy sector by directing funding to:

- assist expansion of the biofuels market through targeted programmes
- continue to support biofuels industry growth (i.e. extend current biodiesel grants scheme beyond 2012)
- develop programmes to encourage existing users of fossil fuel to convert to bioenergy (e.g. funding demonstration projects)
- establish mechanisms to encourage early investment in processing plant (e.g. accelerated depreciation to reduce high capital costs)
- establish mechanisms to assist with the transfer of applied technology knowledge and experience to NZ
- support research and development that focuses on improving the quality of feedstock available to the bioenergy, biochemicals and bio-based product sectors
- expand research and applied development into the conversion of lignocellulose into biodiesel and bioethanol
- establish mechanisms to encourage investment in demonstration plant e.g. suspensory loans
- encourage early investment in trial planting of energy crops
- facilitate capacity-building of the wood energy, municipal biogas and biodiesel markets during the Establishment Phase.

Clear signals from Government encouraging the use of bioenergy would be advantageous. This could include leadership on the use of bioenergy in central and local government buildings, and biofuels in vehicles.

Specific policies to help promote investment in bioenergy plant, building on the introduction of the ETS, will encourage planting in forestry and energy crops. Reduction of the five metre height limit on trees covered by the ETS (to be consistent to the Kyoto Protocol) would allow for short rotation energy crops to replace deforestation of conventional forests.

To achieve maximum benefit, this strategy should be integrated with other Government programmes focused on obtaining greater value from New Zealand resources (including land and forestry), and job creation.



11 New Zealand's comparative advantages

To maximise the achievement of potential benefits, this strategy builds on New Zealand's numerous international comparative advantages.

Existing natural resources

These include:

- a well educated population open to innovation and new ideas
- large tracts of unused or under-utilised land suitable for growing trees as energy crops for conversion to liquid biofuels
- a strong forestry industry with short rotation cropping and potential for large-scale biomass production from purpose-grown forests on marginal land
- extensive *Pinus radiata* plantation forests producing soft woods and waste streams from milling and processing
- large amounts of existing forests where significant additional value can be provided by extending the range of bio-based products
- nutrient-rich wastes produced by domestic sewage, agriculture and agricultural processing industries that can be used to grow algae
- equable climate for growth of trees, plants and algae
- existing strengths in the use of renewable energy.⁸

Markets

As an island distant from markets, New Zealand has often had to take an original approach. Our advantages include:

- an absence of subsidies means New Zealand developments must be commercially robust. Our approach has to be smarter and sharper to be economic (we've avoided developments driven by subsidies which fall over when the subsidy is removed)
- we have to be good at commercialising our developments to compete in world markets
- we have experience in partnerships to reach larger markets (such as Fonterra's collaboration with the US dairy industry to help grow the wider dairy market)
- the small size of the New Zealand market makes it easier to balance supply and demand in introducing biofuels
- few regulatory barriers (regulation is primarily about safety and quality)
- the liquid biofuels market is being developed around biodiesel (from used cooking oil, canola, tallow). This is developing the market, helping pave the way for greater uptake when second generation biofuels become economic.

Technical expertise

- New Zealand has a long history in forestry – others can look to us as a significant source of biomass.
- We have a strong history of investment in our agricultural and process industries. Biofuel production can link to our track record in establishing efficient production in the primary sector.
- We have been making ethanol from whey for many years – a model for other biofuel developments.
- Our scientists develop a deep capability due to the need to be innovative and find solutions requiring limited funding.
- NZ focuses on specialist activities suitable for niche applications e.g. algae.
- Our science often targets multiple products/benefits (e.g. reduction of waste or clean up of rivers, while using the organic waste to make biogas).

⁸ 32% of consumer energy (including transport) comes from renewable sources; 73% of electricity comes from renewable sources.

12 Putting it into action

Following the release of this strategy, detailed implementation action plans will be developed for wood energy, biogas and liquid biofuels.

Partnerships will be established with forestry and wood processing organisations, and with relevant government agencies to ensure a supportive regulatory and investment environment. Close working relations with other biomaterials organisations will be fostered to ensure coherence across the sector.

This will support the development of further plans, covering:

- an industry led bioenergy research action plan
- biofuels export and technical capabilities
- specific initiatives to transfer international knowledge and experience to local practitioners.

This strategy is the embodiment of shared ideals, vision and goals across the forestry, wood and bioenergy sectors. Many stakeholders across a broad range of interests and expertise have helped bring it to fruition. This spirit of co-operation and collaboration will continue to drive the achievement of the next steps.



Notes: Supporting documentation

The New Zealand Bioenergy Strategy is supported by the background document *A Picture of Bioenergy Opportunities for New Zealand*, August 2010. The document can be accessed on the BANZ website: www.bioenergy.org.nz/bioenergyopportunitiesfornz.pdf

SEPTEMBER 2010

