Industry led bioenergy market development

Brian Cox  Executive Officer, Bioenergy Association of New Zealand
Bioenergy sector growth in New Zealand

A case study for when Governments aren’t interested or are not listening

Industry needs to organise and provide the leadership
New Zealand renewable / non-renewable energy consumption

![Graph showing energy consumption]

- **Electricity:**
  - Renewable: ~120 PJ/yr
  - Non-Renewable: ~100 PJ/yr

- **Transport:**
  - Renewable: ~50 PJ/yr
  - Non-Renewable: ~170 PJ/yr

- **Residential Heat (wood):**
  - Renewable: ~10 PJ/yr
  - Non-Renewable: ~5 PJ/yr

- **Industrial Heat (wood, geothermal gas, coal etc):**
  - Renewable: ~10 PJ/yr
  - Non-Renewable: ~70 PJ/yr
Political environment

• Previous Government
  – 9 years of not wanting to do anything
  – Limited Government involvement in markets
  – Private sector should be the driver
  – Focus on big business and not communities

• New Government
  – Climate change is a priority
  – Focus on what communities want and need
  – Government can provide facilitation and leadership
  – Encourages collaboration to make things easier
Bioenergy Association - Member focus

- Membership focus areas
  - Waste to energy/Biogas
  - Wood energy
  - Liquid Biofuels

- Strong focus on member services:
  - Assist members make more $$$
    - Confidential member business support
    - Contact an Expert Directory
    - Catalogue of products and services
    - Adviser and fuel supply accreditation
  - Development of policy, standards, best practice guides

- Education and skills development
  - Workshops and webinars

- Members active across NZ and Australia, Pacific, SE Asia.
Bioenergy Association - market development

- Advocacy
  - Market expansion
  - Sector policy development
  - Collaboration with government agencies

- Information dissemination
  - Potential investor information
    - Technical guidance
    - Demonstration case studies
    - Risk management tools
  - Best practice guidelines
  - Website portal
    - www.usewoodfuel.org.nz
    - www.biogas.org.nz
    - www.liquidbiofuel.org.nz
    - www.bioenergyfacilities.org.nz

- Bioenergy Knowledge Centre

- Biomass supply market development
Association Focus Areas

- **Proactive Membership**
  - BANZ Interest Groups
  - Robust Information
  - Credible Analysis
  - Active Programmes

- **Low Carbon Economy**
  - Broader Policy’s
  - Realistic Carbon Price/s
  - Positive Growth Outlook
  - Broader Based Incentives

- **Industry Credibility**
  - Policy Representation
  - Industry Standards
  - Industry Training
  - Certification

- **Public Sector Leadership**
  - NZEECS Policy
  - EECA Collaboration
  - Govt. Procurement
  - Regional Cooperation

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![BIOENERGY ASSOCIATION Logo](logo.png)
Market challenges

- Economics of bioenergy and biofuel are on the margin.
- Many structural barriers exist across bioenergy supply chains:
  - Few experienced quality fuel suppliers
  - Heat plant owners have limited biomass fuel purchase experience
  - Control of waste is commercially embedded with existing parties
  - Access to forest residues limited by harvesting practices and markets
  - No economies of scale vs fossil fuels
- Limited best practice:
  - Improve industry standards
  - Ensure reliability of fuel supply.
  - Develop integrated supply chains

By necessity a long term transition plan to achieve lower use of carbon fuels.
Bioenergy markets are complex

• Multiple short term biomass sources
• Need to match fuel to equipment
• Many players through the value chain
• Sale and purchase of biomass fuel is complex
• Raw biomass may need treatment to make it a suitable fuel
• Growing competition for biomass
• Biomass often treated as waste rather than a resource
Waste to energy value stream
Biomass is not homogenous like coal or gas
Fuel quality perceptions - Does this look like quality fuel
<table>
<thead>
<tr>
<th>Energy Source</th>
<th>Characteristics</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar</td>
<td>Emerging technology</td>
<td>Limited by cloud cover</td>
</tr>
<tr>
<td></td>
<td>Low capital costs</td>
<td></td>
</tr>
<tr>
<td>Hydro</td>
<td>Proven technology</td>
<td>Location dependent</td>
</tr>
<tr>
<td></td>
<td>Medium/High capital costs</td>
<td></td>
</tr>
<tr>
<td>Geothermal</td>
<td>Proven technology</td>
<td>Location dependent</td>
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<tr>
<td></td>
<td>High capital cost</td>
<td></td>
</tr>
<tr>
<td>Wind</td>
<td>Proven technology</td>
<td>Location dependent</td>
</tr>
<tr>
<td></td>
<td>High maintenance cost</td>
<td></td>
</tr>
<tr>
<td>Biomass</td>
<td>Proven technology</td>
<td>Constrained by biomass fuel availability</td>
</tr>
<tr>
<td></td>
<td>Low/medium capital costs</td>
<td>Complex market</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Many players in value chain</td>
</tr>
</tbody>
</table>
However we have achieved a lot

• Currently 16% of total consumer energy used comes from biomass.
• Near 100% of wood processors using wood fuel instead of fossil fuels
  – 58 PJ pa of biomass derived heat from wood by combustion
  – 4.1 PJ pa existing waste-to-energy reducing discharge of methane by anaerobic digestion
• Steady but small stream of new investment in bioenergy facilities
• Emerging wood energy supply market
• Growing collection of best practice standards
• Established education and knowledge transfer mechanisms
  – Bioenergy Knowledge Centre
  – Workshops and webinars
Bioenergy use driven by

- Public good benefits
  - Climate change policies
    - Reduced greenhouse gas emissions
    - Biological emission offsets
  - Clean air and waterways
  - Waste utilisation objectives
- Private business interests
  - Reduced operating costs
  - Green branding
  - New business from use of renewable natural resources
  - Increased added value from wood
  - Integrated land use
  - Agricultural emission offsets

Giving potential investors confidence that they can manage business risk
Principles for growth programme

• Focus on development of sustainable markets
• Wide benefit framework
  – Energy is an enabler and not an end goal
  – Climate and environmental benefits
  – Bioenergy and biofuels are tools for economic growth and societal wellbeing
• A paradigm shift in thinking
  – Move from technology focus to market focus
  – Biomass was readily available but underdeveloped market
  – Biomass residues not a waste but a valuable resource
• Collaboration
  – Addressing market development too much for individuals
• Government hand up not a hand out
• Focus on quality fuel supply
Biomass pyramid of value
Recognise the role of Government

• Identify and pursue public benefits
  – Competes with other funding needs
  – Need to know what the public benefits are

• Act where market failure
  – Inefficient for everyone to repeat what others also have to do
  – Set standards on behalf of all

• Address market barriers

• Facilitate markets
  – Demonstration projects
Market emergence has occurred because

• Driven by industry
• Assisted by collaboration with Government
• Focus on perceptions
  – Availability of biomass fuel
  – Reliability and consistency of fuel supply
  – Competence of advisers
  – Success leads to success
• Focus on government owned facilities
  – Achievement of public good externalities
• Stop competing for slices of a small pie – grow the pie
Industry collaboration

- Driven by those with skin in the game
- Industry is best placed to know the opportunities
- Industry also understands the barriers
- Get government policies and programmes to support industry driven initiatives.
- Needs a proactive sector identifying what is needed and then collaborating with government to address the barriers.
- A strong and collaborative sector supported by good analysis and advocacy can get attention but it has to be results driven.
Focus on targets

- Diverse range of opportunities required coordination and facilitation
- Many small opportunities primed the sector
- Building a sector takes time and focus on market barriers

<table>
<thead>
<tr>
<th>Waste to Energy</th>
<th>PJ</th>
<th>Kt CO₂-e</th>
</tr>
</thead>
<tbody>
<tr>
<td>2030</td>
<td>2.2PJ</td>
<td>90</td>
</tr>
<tr>
<td>2040</td>
<td>2.7PJ</td>
<td>150</td>
</tr>
<tr>
<td>2050</td>
<td>3.4PJ</td>
<td>220</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Wood Fuels</th>
<th>PJ pa</th>
<th>Kt CO₂-e pa</th>
</tr>
</thead>
<tbody>
<tr>
<td>2030</td>
<td>4PJ</td>
<td>400</td>
</tr>
<tr>
<td>2040</td>
<td>11PJ</td>
<td>1000</td>
</tr>
<tr>
<td>2050</td>
<td>15PJ</td>
<td>1300</td>
</tr>
</tbody>
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Leadership has paid off

• The bioenergy and biofuels sector lifted its profile
  – Stepped up to the plate
  – Stopped waiting for Government
  – Identified markets
  – Worked with markets to promote and actively lead the sector to deliver benefits

• Identified how bioenergy and biofuel solutions could deliver Paris targets

• Recognised the power of collective action

• Bioenergy sector developed a Bioenergy Strategy
  – Provided guidance to local and central government

• Bioenergy and biofuels sector partnered with government and other parts of industry
Recognised creation of wealth and societal benefits from renewable natural resources

• Communities recognised that renewable natural resources provided comparative trade advantage
  – Biomass contained a wealth of chemicals
  – Biomass from waste
  – The skills already exist but under utilised

• Recognised that organic waste was valuable as a feedstock
There is money in muck
Farm biological offset opportunities

- Carbon credits from farm forestry
- Woodlot
toppings as supplementary feedstock to digester
- Anaerobic digestion
- Holding ponds
- Heat & power to milking shed
- Electricity to neighbours/grid
- Electricity for irrigation
- Chipping, pulp and wood fuel
- Gas engine
- Biogas fuel for tractor and farm vehicles
- Runoff
- Supplementary wood fuel from shelterbelts and 'paddock' trees
- Electricity to farm house (biomass, micro hydro & solar)
- Runoff
- Wood fuel sales
Rethinking land use and farming

• Agriculture has a lot of on-farm opportunities for GHG offsets
  – Farmers offsetting a significant part of biological emissions
  – Dairy effluent collection and processing into biogas for on-farm electricity, heat and vehicle use

• Expanding farming scope to include additional products
  – Trees to provide GHG sink
  – Trees to produce wood fuel
  – Biogas from dairy effluent and crop waste

• Rural townships and agriculture integrate “waste” streams with nearby agricultural or food processing wastes
  – economies of scale

• Dairy farmers contract to sell milk and wood fuel to their milk processor.
Vision - by 2050

• Biomass providing around 20% of energy supply
• Few heat plant still using coal as fuel
• Waste water treatment plant producing biogas
  – On-site electricity
  – On-site vehicles fuelled with bio-methane
  – Biogas for local heat business
• Zero organic waste to landfill
• Food processors with waste-to-energy facilities
• Increased forestry and added value processing of wood -> wood fuel
• Significant bioenergy offsets vs farm biological emissions
• Heavy transport, shipping and aviation using biofuels