Wood Fuel Market, Trends & Future Opportunities

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Bioenergy Association Wood Fuelled Heat Plant Operators Forum
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BIOENERGY ASSOCIATION

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Sub-Theme

Measuring for Success

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Overview

- Role of heat plant operators in developing the wood fuel market
- Types of wood/solid fuels
- Current status of the wood energy market & trends
- New emerging opportunities for wood fueled heat plant
- Costs and prices
- Actions to improve the wood fuel market
- Conclusions

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Heat Plant Operators/Practitioners: Role in the Market

- Important contributors to the wood energy sector
- Broaden understanding of the wood fuel and heat supply chain
- Wood fueled heat plant needs to operate reliably with a high utilisation factors
- Better information and knowledge will reduce operational risks

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Range of Wood Fuels Available

Fuel Type	Features	Example
Wood Chips (WC)	Chipped wood biomass in the form of pieces with defined particle size produced by mechanical treatment with sharp tools such as knives	
Hog Fuel (HF)	Fuel wood in pieces of varying size and shape produced by crushing with blunt tools such as rollers, hammers or flails	
Wood Pellets (WP)	Wood that has been pulverised and pelletised under heat and pressure to produce a cylindrical wood derived fuel of consistent size	

Types of Solid Biofuels

Fuel Type	Features	Example
Urban Wood Fuels (UWF)	Wood residues derived from urban activities including packaging materials, off-cuts, C&D residues, land clearing	
Compressed Firelogs and Briquettes (CFB)	Block of flammable matter used to start and or maintain a fire	
Torrefied Wood (TW)	Desiccated biomass with devolatilised carbohydrate	

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Types of Solid Biofuels

Fuel Type	Features	Example
Herbaceous Wood Fuels (HWF)	Sourced from Miscanthus, Switchgrass, other grasses and straw – supplied as chips, hogged or pelletised fuels	
Firewood (FW)	Larger piece sizes of wood used for kindling or for sustaining combustion in domestic solid wood fire appliances	

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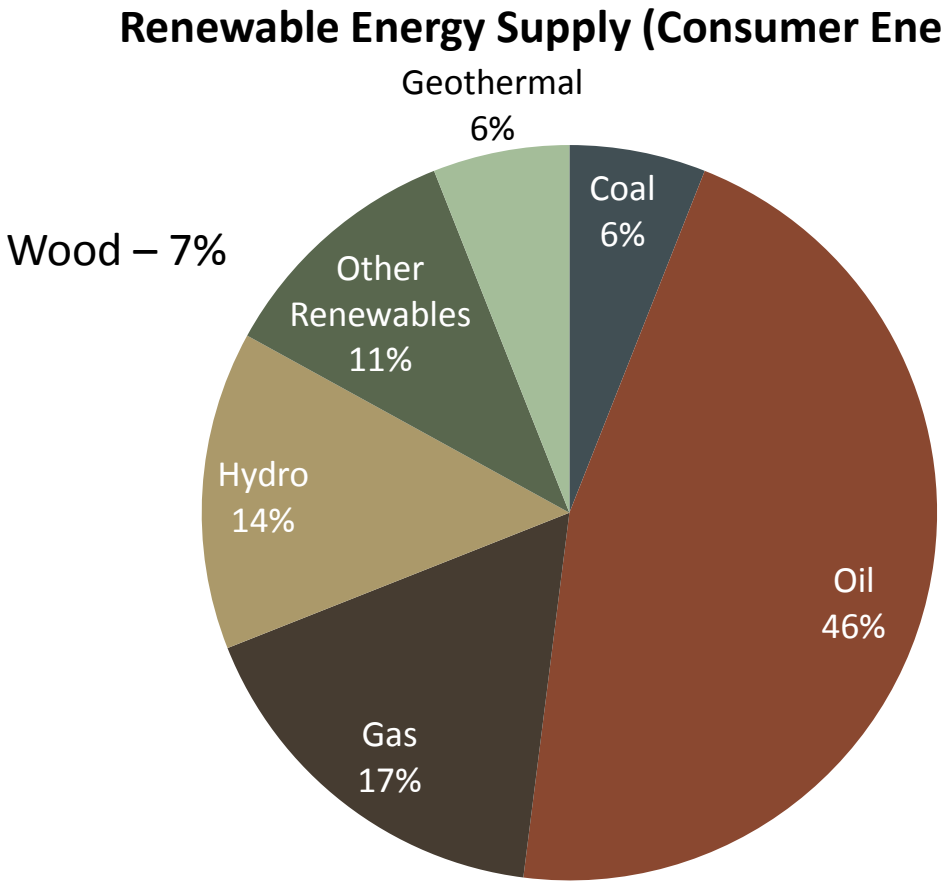
Wood energy is already a major source



Total Consumer Energy
536 PJ

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Use of wood fuels

- Wood fuel is 20% of the total consumer heat (38 PJ/190 PJ)
- Wood fuel is 55% of the total renewable consumer heat (38PJ/71 PJ)
- Wood is 12% to the total domestic heating requirements
- 40 - 50% of homes use solid wood heating

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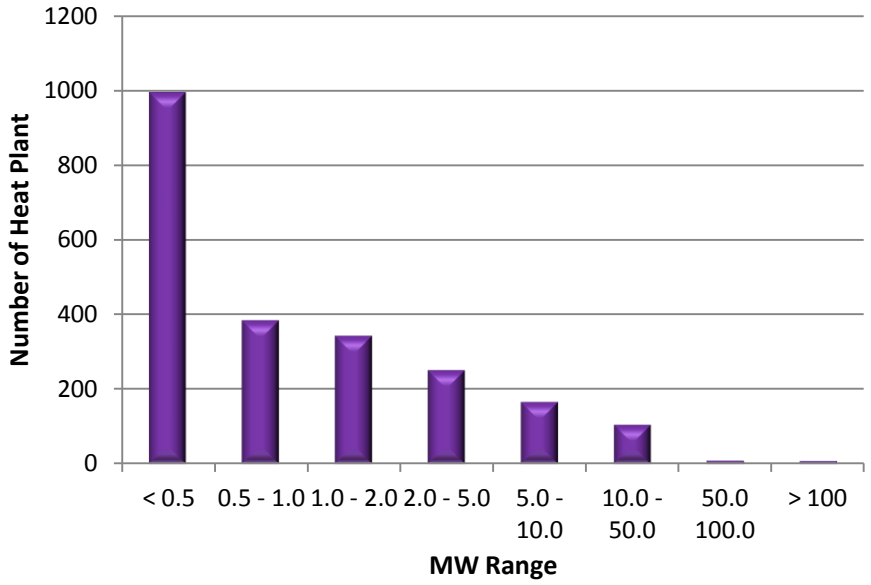
Heat Plant

- Total number of heat plant = 2260
- Total installed heat capacity = 6800MW
- Most heat plants < 0.5 MW (most used at schools, universities & prisons
- Dairy sector 64 heat plants > 10 MW – represents 52% of all heat plants > 10 MW
- Wood processing sector – 179 plants: 29 > 10 MW



From Heat Plant Database 2014

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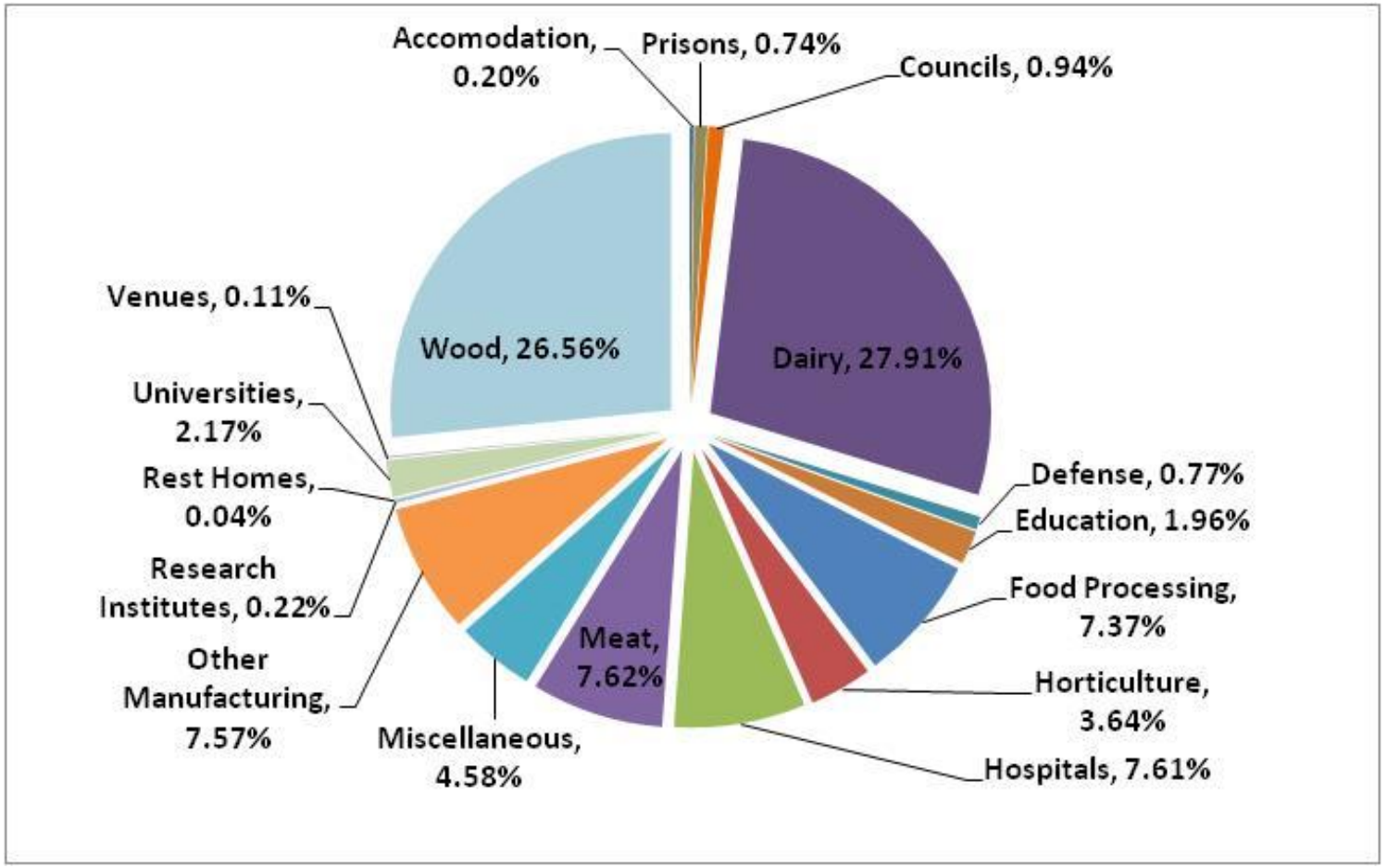
Heat Plant:
Percentage of Capacity By Sector



From Heat Plant Database 2014

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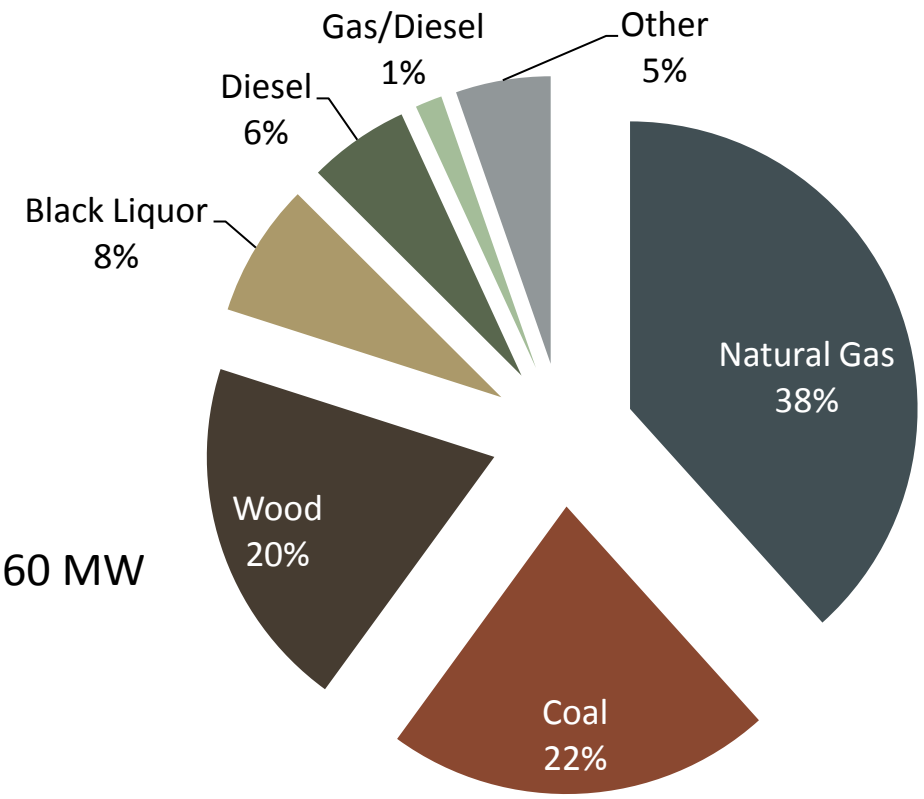
Heat Plant:
Percentage of Capacity By Fuel Type



1360 MW

From Heat Plant Database 2014

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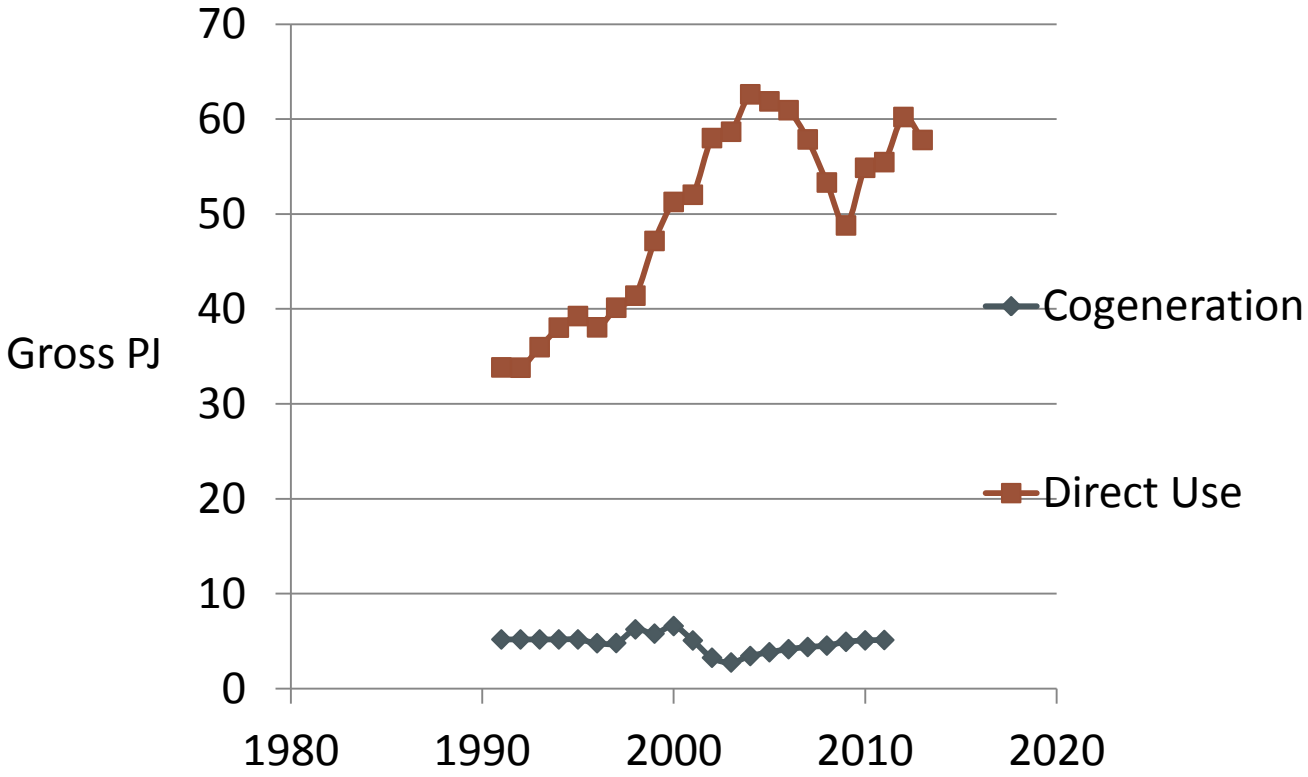
Use of Wood Fuels



Energy data file 2011

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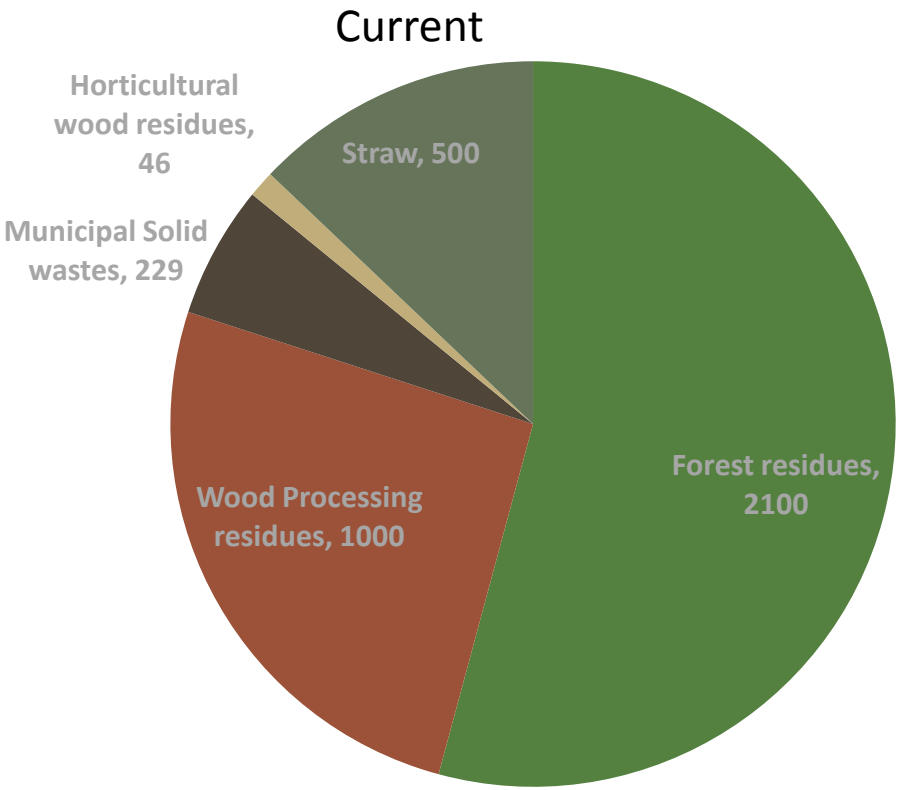
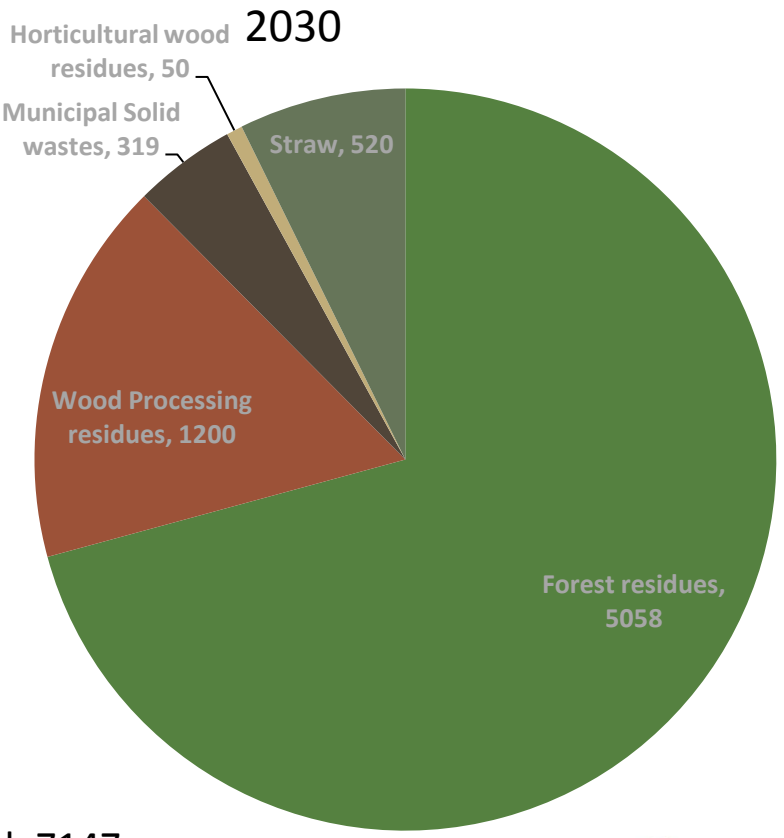
Estimated Quantities of Woody Residues Available (000 tonnes/an)



Total : 3875
Approx: 38 PJ
% of total consumer energy: 6-7%



Total :7147
Approx: 71 PJ
% of total consumer energy: 9.8%

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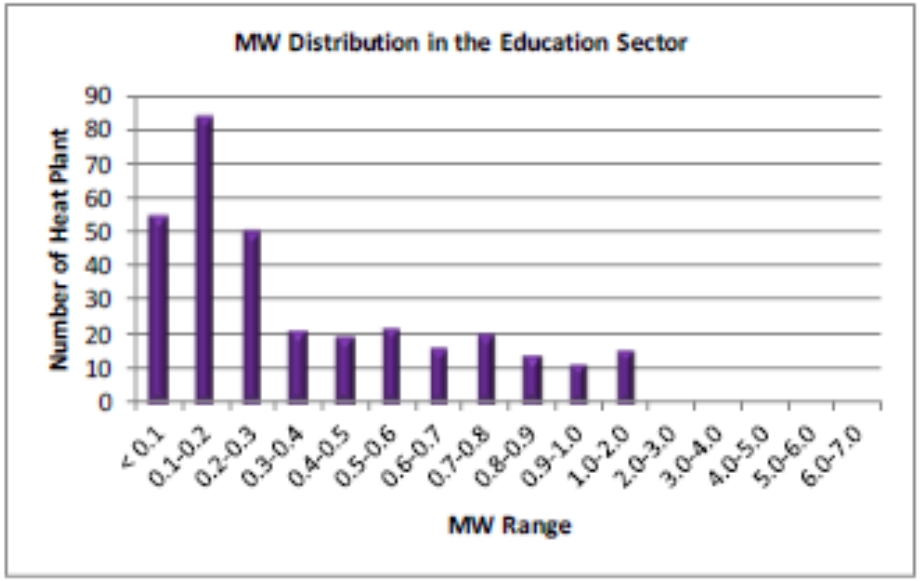
New and Emerging Markets Education

- Over 3000 schools
- Heat plants up to 4 MW
- Wood fuel use tripled since 2011
- Other fuels identified (solar and geothermal)



From Heat Plant Database 2014

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Schools in New Zealand:

Locations: North Island

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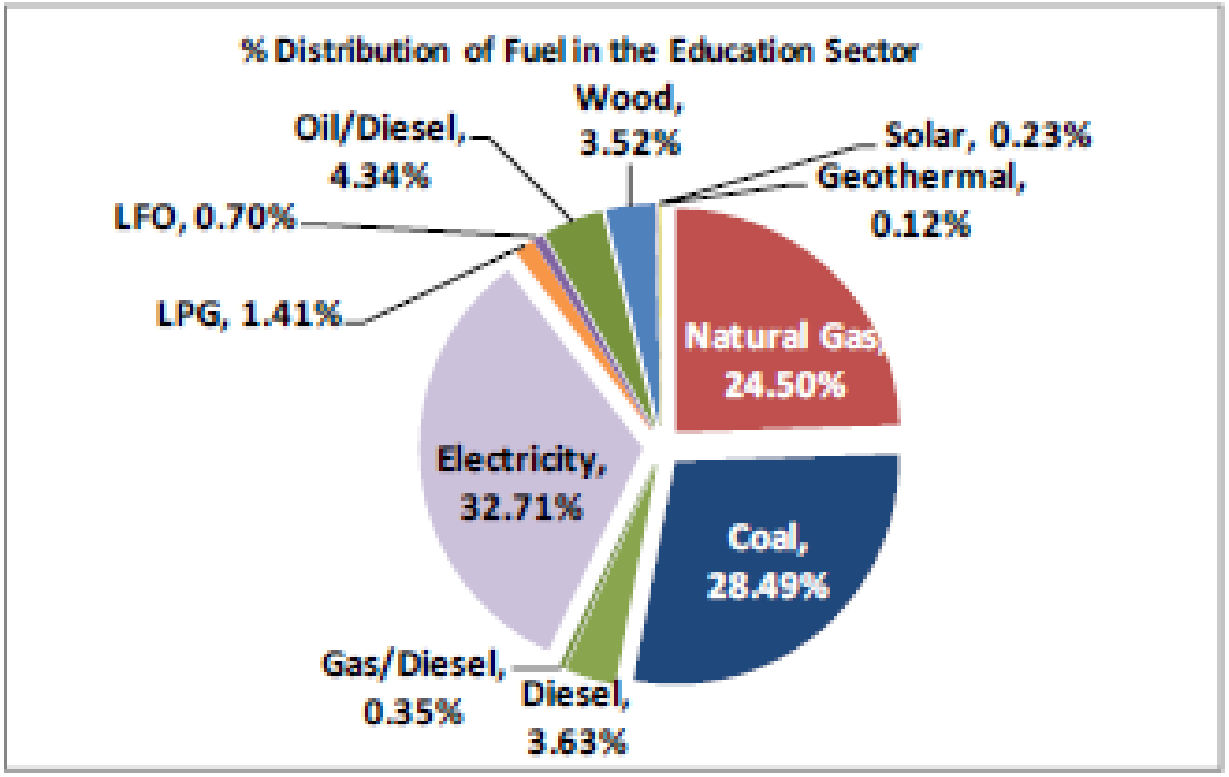
New and Emerging Markets Education Cont'd



From Heat Plant Database 2014

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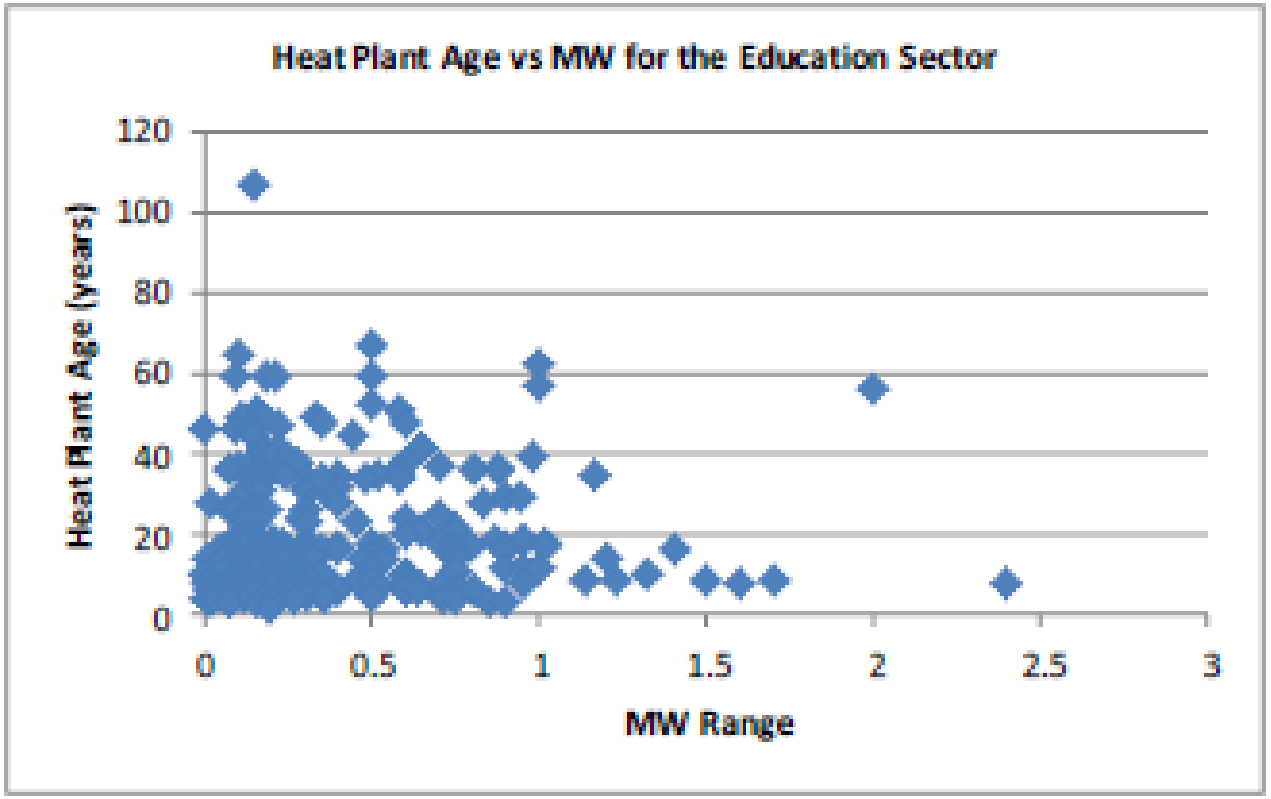
New and Emerging Markets Education Cont'd



From Heat Plant Database 2014

Heat plant stock is relatively old

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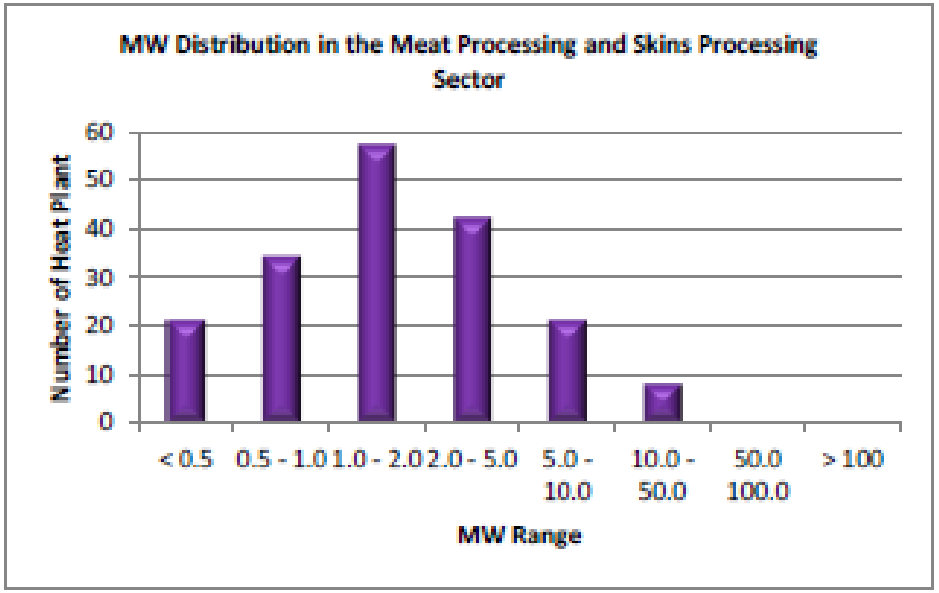
New and Emerging Markets
Meat and Skins Processing

- Over 200 heat plants
- Heat plants 1 - 5MW
- Well over 50% of the plants are over 25-30 years
- Natural gas share in this market increased in 2014



From Heat Plant Database 2014

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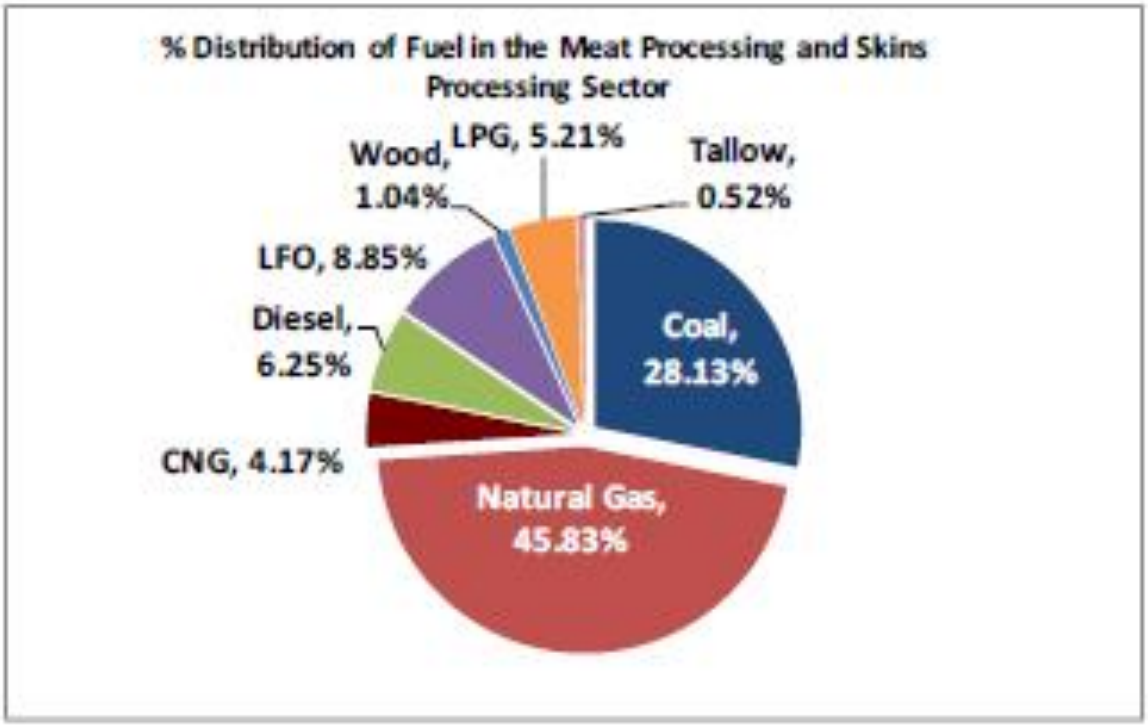
New and Emerging Markets
Meat and Skins Processing Cont'd



Coal is still an important fuel for the horticulture sector

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Wood Fuelled District Heating: Owhata

Issues to address:

- Particulate emissions
- Healthy homes
- Improved land use change
- Employment opportunities

Lakes High School Coal Boiler
District heating
Phase 1:30 homes
Phase 2 > 100 homes
Boiler switching to biomass - Wood/torrefied wood/pellets/bio-oil

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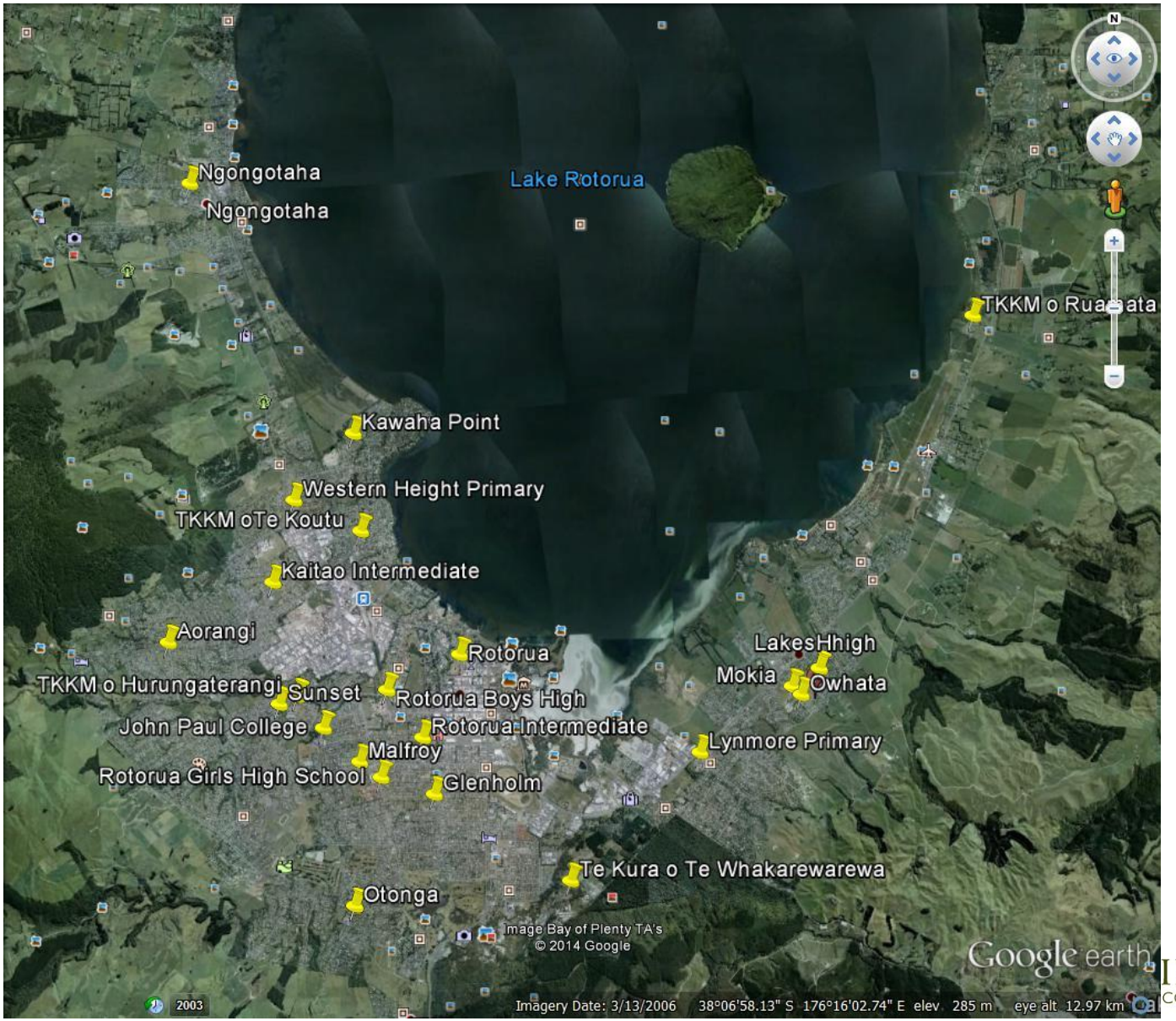
Rotorua Schools



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Domestic Market

Fuel Heating Costs	cents/kWh (inclusive GST)
Home heating for stand alone appliances	
Wood pellets: Consumer survey (2013)	12.5 – 26.5
Azwood	12
Mitre 10 (Azwood pellets)	14
Mitre 10(Natures Flame pellets)	13
Pine Tree Pellets (Wood Pellet Fuels)	11
Southern Wood Pellets Ltd	12
Natures Flame	9.4
Electricity (Heat Pump)	7.5 - 10
Electricity (Night store)	12.5 - 23
Electricity (plug in heaters)	22 - 31
Natural Gas (flue heater)	7.5 - 18
LPG(flued heater)	22.5 - 26
LPG (un-flued heater)	36 - 39
Diesel	19 – 21.5
Fire wood (wood burner)	8 - 24
Central Heating Systems	
Wood Pellets	11 - 25
Natural Gas	6 - 15
LPG	20 - 22
Diesel	16 - 17.5

Consumer, 2013

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Commercial & Industrial Market MBIE (2013)

Fuel Heating Costs	S/GJ
Wood pellets	13 -16
Coal	7 -8
Natural Gas	11 – 16 (can be as low as $8/GJ for large gas users)
Heavy fuel oil	17.92
Diesel	28
Hogged wood fuel	7 - 10

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Cost of Forest Residues

Activity	Option1	Option 2	Option 3	Option 4
Pile	2.90	4.20		
Fill bins			3.50	5.90
Load	3.50	3.50		
Fill bins				
Transport to CPY		8.00	8.00	14.00
Truck to user	19.60			
Hog and screening	14.65	18.30	18.30	30.80
Reload Truck to user		24.60	19.70	33.15
Wood cost	20	20	20	20
Total	60.65 $9.35/GJ	78.60 12.10/GJ	69.50 $10.70/GJ	103.85 $9.10/GJ

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EECA Good Practice Guide , 2010

Wood Fuel Price Schedule

Wood Fuel Characteristics and Prices

Fuel Type	Size	Moisture Content	Ash	Indicative Price ($/tonne & $/GJ)
Chips - Grade 1	S30 -S50	M20-M35	A0.5-A1	$132-156/t $11-13 /GJ
- Grade 2	S30-S50	M40	A0.5-A1	$120/t $10/GJ
- Grade 3	S30-S50	M55-M65	A0.5-A1	$110/t $15/GJ
- Grade 4	S100	M40-65	A<3	$100/t $12.50/GJ
Hog Fuel - Grade 1	S63	M<35	A<3	$109/t $9.10/GJ
- Grade 2	S63	M35-M65	A<3	$100/t $10/GJ
- Grade 2	S100 – S300	M35	A<3	$80/t $6/GJ
- Grade 3	S100-S300	M35-M65	A<3	$69.50/t $10.70/GJ
- Grade 4	S100-S300	M35-M65	A>3	$55/t $8/GJ
Horticultural Residues				$65/t $7/GJ

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Actions to Improve the Wood Fuel Market

1. Be aware of projects (replacement and new) and local drivers for uptake – air emissions, competitive heat, managing residues, adding value to residue streams
2. Fuel supply chain
   I. Wood energy quality system
   II. Well established and recognised quality wood fuel suppliers (accreditation)
   III. Acceptance by forestry sector that use of forest residues for energy is worthwhile
3. Up-skilling of all stakeholders through the supply chain
4. Active promotion of the benefits (energy, environment, economic development)
5. Efficiencies of scale
6. Information and data
7. Measuring

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Conclusions

- Heat plant operators and asset managers are an important part of the wood energy supply chain – have a role in building the market
- Wood energy is 7% of the total consumer energy – 55% of renewable heat
- Wood fuel is 20% of the total heat capacity (MW)
- Use of wood fuels has become static
- More wood fuels likely to be available?
- New opportunities exist for education, and primary processing
- Emerging opportunities for district heating (Rotorua example)
- Developing better information on the economics and costs of fuels
- Data, data, data – as a sector we need more - Measuring
- Vigilant to opportunities and identify other ways to bring projects to fruition

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