

# Recent trends in energy prices - forestry, energy and a climate of change<sup>1</sup>

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## Abstract

Over the last thirty years average real prices for all major energy forms electricity, oil and gas have been relatively stable. Issues of national concern relating to energy, namely the dependence on imported oil and questions about longer term real energy prices, are similar now to concerns expressed 30 years ago. However, the drivers for these concerns have changed with greater emphasis now being placed on the negative environmental consequences of using fossil fuels

While average real price of fuels such as natural gas and electricity have not changed significantly over the period their relative cost to different sectors of the economy has changed. Costs to the residential sector have increased by 50% (electricity) and 100 percent (gas). This has improved the competitiveness of wood for space heating in this market. The economics of converting wood into liquid fuels has changed little over the last 30 years. Petrol prices have varied but at present the estimated retail cost of wood based liquid fuels is some one-and-a-half to two times that of petrol

The bioenergy programme of the Forest Industry Development Agenda (FIDA) provided the catalyst for the conversion of 31 school heating systems to wood fuels. FIDA has supported a number of other demonstration projects and funded development of an electronic bioenergy knowledge centre to address the perennial problem of lack of information about energy processes and products.

## Introduction

It is exactly thirty years since I spoke at my first NZIF Conference. Then, as now the Conference was held in a seaside town (Napier rather than Nelson) and change was in the air. The theme of that Napier conference was the 'Implications of the Expanded Planting Programme' - but it could as easily have been 'Forestry in a Climate of Change' for that indeed was what it was about. The world NZ forestry had to cope with was changing - and in some ways I suspect the change that did occur proved to be greater than any at that conference considered likely. The sector was then in transition from a cosy mainly domestically focused state to a situation where the international market would be dominant. There were concerns about what a projected doubling of wood supply might mean in terms of markets, product mix and energy supply. But I doubt that anyone considered that among the changes of the next 30 years would be re-organisation and/or disappearance of all of the then larger forest growers.

This year the conference organisers have suggested that the focus of papers should be forestry in a 'Climate of Change' - with suggestions that this might include matters such as the economic trade environment, climate issues, land use trends and ownership/management changes. However, forestry has, and always will have, to cope with a 'Climate of Change' so rather than looking resolutely forward I would like to look back at some of the energy issues of 30 years ago, the economics of those issues then and now; what we projected would happen, what actually did happen how we responded and what may happen in the future. Finally I will give a brief update on the Wood Energy Programme.

## Setting the Scene

The topic I spoke on at that conference thirty years ago was "The Energy Implications of the Expanded Planting Programme" (Horgan 1979) and the background to my talk was an expectation that by 2006 17.5 million m<sup>3</sup> of wood per annum - twice the then current harvest - would be available for processing. [It is perhaps worth noting here that in the March 2006 year New Zealand's actual harvest was 18.8 million m<sup>3</sup> and that of this harvest some 13.5 million m<sup>3</sup> was processed and 5.2 million m<sup>3</sup> exported as logs and poles]. Now expectations are that 30 years hence supply may be 50~75 percent greater than today.

Thirty years ago, as is true now, there were concerns about energy supply (electricity and liquid transport fuels) and of the impact that the forest sector could have on New Zealand's energy balance. Greenhouse gas emissions and anthropomorphic global warming were not an issue - and in fact at the time some were suggesting that only by increasing anthropomorphic emissions of these gases could the world hope to avoid global cooling and another ice age. There were arguments that some processing routes (e.g., pulp and paper manufacture) might be more at risk because they used substantially more energy than others (e.g., sawn timber production). However, it was the capital cost

of some processing options rather than the energy requirements that most saw as the greater barrier to their development. Now the concern with processing routes is more likely to be environmental, e.g. satisfying the requirements of the RMA and, perhaps, possible greenhouse gas emission charges. Then, as now, the issue of a stable supply of energy at an affordable price was an issue for some. Also then as now, industry has the ability to supply the bulk of its energy needs from its own resources.

<sup>1</sup> Reproduced from the paper given at NZIF Conference 2009, Nelson.

On balance though in 1979 as far as the forestry sector was concerned energy, with the possible exception of the liquid fuels used in harvesting, was not seen as being a significant constraint to growth. I suspect the same is true today.

## Liquid Fuels

In the 1970s liquid transport fuels and the country's reliance on imported oil was the area of greatest national concern. I suspect some might be tempted to say 'what's changed?' Indeed the very first challenge mentioned in the 2007 paper New Zealand Energy Strategy to 2050 - Powering Our Future - is the country's reliance on imported oil for around half its energy needs and a need to be prepared to respond to supply disruptions caused by international events beyond our control and lessen our dependence on imported oil. The issue/challenge of imported oil is not new. So it should not be a surprise that in a 1979 paper on energy implications the possibility that the future may well see the increased use of wood as a fuel source, not only in its traditional role as a source of low-grade heat but and possibly in the production of liquid transport fuels such as methanol and ethanol was raised.

A major review of the potential for energy farming in this country (Anon., 1979) was at that point in the final stages of completion and I reported that this study would conclude that:

- (1) It was technically possible to provide all New Zealand's road transport fuels from energy farming;
- (2) Energy farming could show a high net energy gain;
- (3) Biomass fuels would be more expensive than gasoline (as of 1979); but that,
- (4) If oil prices continued to rise, biomass-based fuels could become competitive with oil.

The concern about net energy gain from energy farming is still raised today even though 30 years ago the NZ ER&DC study indicated that depending upon the management system and the fuel being produced a net energy input: output ratio ranging from 1 : 7 to 1 : 15 is achievable for radiata pine.

However, the big issue 30 years ago was cost. The NZER&DC study indicated that road transport fuels in the form of alcohol from large, efficient processing plants would probably cost some 19 to 26 cents/litre of gasoline equivalent<sup>1</sup>. That compared with the then (April 1979) ex-refinery but before tax price of gasoline of 16.2 cents/litre. In today's terms, using the Reserve Bank's on-line inflation calculator to convert the 1979 figures into current (2009) dollar terms, the alcohol cost becomes \$1.18 to \$1.62

<sup>1</sup> The Energy density of alcohols considered was half to two thirds that of gasoline but they burn more efficiently in engines meaning a lower amount of energy is required for the same distance travelled when compared to gasoline.

per litre and the gasoline price (ex-refinery and before tax) becomes 84 cents. (The delivered wood cost for these figures was, in today's terms some \$62.27 per m<sup>3</sup> through to \$125 per m<sup>3</sup>. The low end is about the equivalent of the current domestic price MAF is reporting for 'at mill' for S3 & L3 log grades or for pulpwood sold to export).

While even the top price of \$1.62 per litre might not sound too unreasonable - based on current pump petrol prices - the problem is that the pump price of petrol has a significant tax component. In fact, including taxes an ex-refinery price of 84c per litre is going to translate into an average retail price of something like \$1.67 a litre (MED, 2008). Putting the same taxes on the alcohol fuels and making allowance for the greater number of litres required to get the same amount of energy the alcohol fuel with a national cost of \$1.18 per litre of petrol equivalent would retail at something like \$2.50/litre - or about 160 percent of the current retail petrol price - while fuel costing \$1.62/litre would retail for around \$3.19/litre.

The 1979 study was a theoretical one so the production costs should be treated with some caution. However, in 1979 the costs were considered to be sufficiently low to suggest that continuation of research in this field was warranted. One can debate if the level of research over the last 30 years has been as great as that hoped for or envisaged in 1979 but what is perhaps interesting though is to compare the results of the 1979 study with those of a recent new 'desktop' study of biofuels - the 2008 Scion lead EnergyScape study. In that study fuel costs \$2.73 to \$3.13/litre to produce and the delivered cost of wood for biofuels production ranges from \$69.75/m<sup>3</sup> to \$105.40/m<sup>3</sup>.

**Table 1: Comparison of the 1979 NZER&DC Study with Scion's 2008 EnergyScape Study**

1979 NZER&DC Study		2008 Scion EnergyScape Study	
Wood Cost \$/m <sup>3</sup> (2008 dollar terms)	Pump Fuel Cost \$/litre (2008 terms)	Wood Cost \$/m <sup>3</sup>	Pump Fuel Cost \$/litre
62.27	2.50	68.75	2.73
125.00	3.19	105.40	3.13

There are differences between the two studies - after all they're almost 30 years apart - but....Overall from a 'results' point of view both studies seem to tell a remarkably similar story. In terms of a climate of change one would have to think that the change really hasn't been that great.

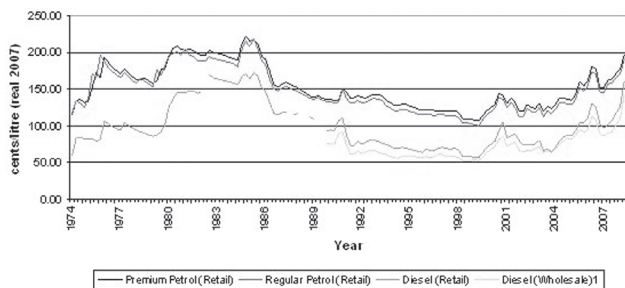
One should not be surprised by the apparent similarity of the results. One should not be surprised because, in fact,

many of the inputs are, in real terms, very similar. A tonne of wood now is the same as a tonne of wood then and its breakdown in terms of cellulose, hemicellulose and lignin pretty much the same now as then.

The process assumed to produce alcohol differs between the two studies but the conversion efficiencies from solid to liquid in both are similar. The average recoverable growth rate of radiata assumed in the 1979 study, at 26.7 m<sup>3</sup> per ha per annum, is also not too different to the average in the Scion analysis (31 m<sup>3</sup> pa). However, even if the productivity assumed for a current tree crop is dramatically greater than that used in the earlier analysis, the impact on final fuel price is not necessarily that great. For most forest regimes growing costs typically account for around half the delivered cost of biomass. So, for example, a doubling in the growth productivity of the crop could be expected to reduce the delivered biomass costs by around a quarter and result in an 8 percent reduction in the ex-processing fuel price.

From a grower's perspective, raising productivity does not necessarily mean the grower will sell for less. So long as material being grown for a liquid biofuels plant can be used by another process, say a traditional pulp or board plant or even a wood pellet manufacturer, and that process is able to pay more for the feedstock than the fuels plant economists are going to want to add a positive opportunity cost into the equation. Unless material is being used for its 'highest and best' use then there will be an opportunity cost.

Finally as can be seen from Figure 1 current petrol prices are, in real terms, similar to those applying in the late 1970s and (in fact) are a bit less than real prices that applied through much of the first half of the 1980s.



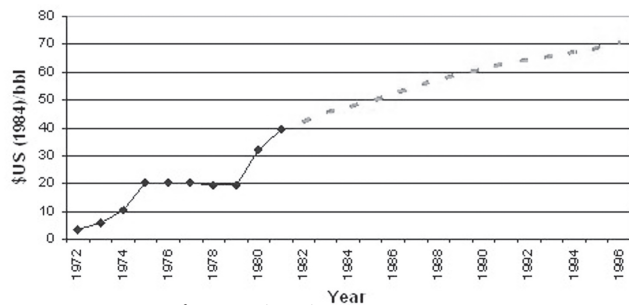
Source: MED

[www.med.govt.nz/upload/38330/PricesSETable4.xls](http://www.med.govt.nz/upload/38330/PricesSETable4.xls)

Figure 1: NZ petrol and diesel prices - real 2007 cents/litre

Of course back in 1979 the expectation was that crude oil prices (US\$ per bbl) would increase by a real 75 percent over the next 15 or so years. In reality over this period the price fell to little more than one fifth of the real price ruling in 1979/80 before again rising to peak in 2008 at something like US\$150 per bbl - or about 95% of the real price ruling in 1979. Currently, the price is about a third of last year's peak. So in terms of projecting the oil price we didn't do that well as the expectation was for a pretty steady rise in real price (see Figure 2) not the roller coaster ride that in fact occurred.

What can we expect in the future?



Source: Ministry of Energy (1984).

Figure 2: Price forecast oil US Dollars (1984) per barrel

## Solid Fuel

Liquid fuels weren't the only fuel type I canvassed in that talk of 30 years ago and when it came to use of wood directly as a fuel my claim was that *although lacking the glamour of liquid fuels, the direct use of wood to provide low-grade heat may prove to be of great long-term importance. Wood is a very suitable fuel for supplying household water- and space-heating requirements, and such use would release oil, gas and electricity for other purposes.*

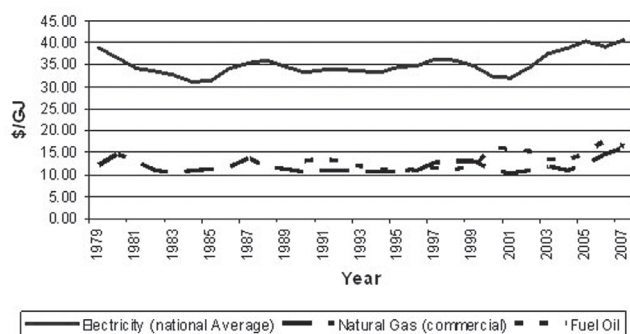
Then, according to my presentation *an average household in the northern part of the North Island use[d] some 23.4 GJ/year in water- and space-heating while the average household in Southland use[d] about 68.4 GJ for the same functions. With the new, efficient wood-burning appliances now coming on the market, an Auckland householder would need at most 3 tonnes of air-dried wood/year to supply all water- and space-heating requirements, and the Southland householder would need 11 tonnes to do the same job. And following on from this if the real price of other fuels continues to rise it is likely that wood will have an increasing role as a domestic and industrial fuel, particularly in areas where it is readily available.*

Given that the theme is a 'Climate of Change' what actually happened? Did household energy use and/or the demand for water and space heating increased, decreased, or stay much the same? Did real prices of alternate fuels continued to rise and, if they did, what happened to wood's share of household energy demand?

Let us start by first seeing what has happened to the real price of other fuels. Figure 3 sets this out and, if this were the full story, it is quite apparent that there has been very little real change in the real price per unit of energy for fuels such as gas, oil and electricity over the last 30 years.

Were Figure 3 the whole story that would surely be the end of it - at least as far as rising real prices for other fuels and the possible impact of this on demand for wood as a fuel. But, as with most stories, the 'devil is in the detail'. If instead of looking at average figures one looks at price by sector, using residential, commercial and industrial as the breakdown categories, the story changes quite significantly.

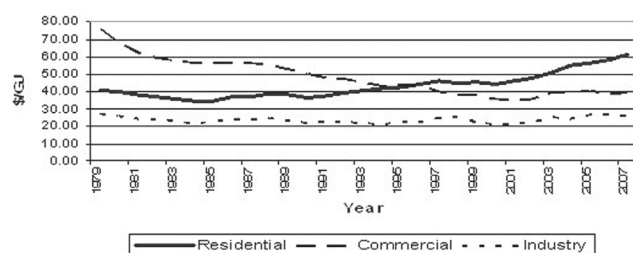




Source: MED

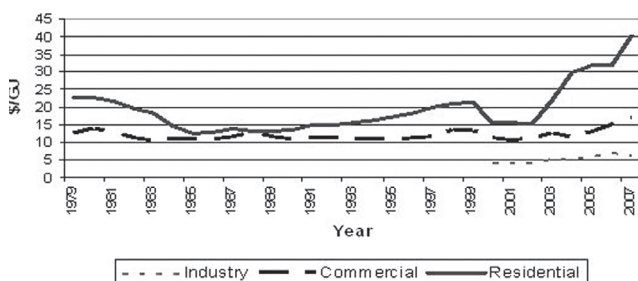
**Figure 3: Real price of oil, gas and electricity: 1979 - 2007 (\$2007/GJ)**

In real terms the overall national average real price of gas and electricity prices may have been fairly constant over the last 30 years but over this period the real price to the residential sector for both these fuels has virtually doubled (Figures 4 & 5) - something I suspect every household bill payer knows only far too well. Figure 4 also indicates that in the electricity sector the big winner has been commerce - where real per unit costs of the electricity have nearly halved over the period. When it comes to the gas sector (Figure 5) while there is no 'winner' in terms of a big real reduction in per unit cost there is just as clearly a growing differential between what is paid by the residential sector and other sectors.



Source: MED

**Figure 4: Real price of electricity by sector: 1979 - 2007 (\$2007/GJ)**

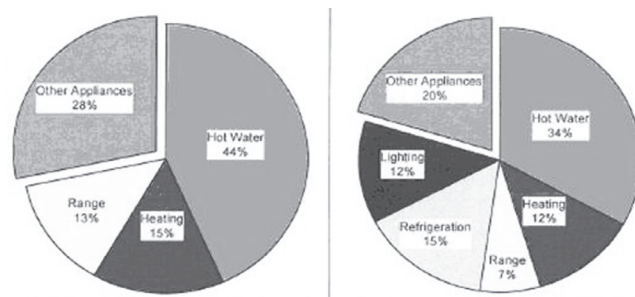


Source: MED

**Figure 5: Real price of gas by sector: 1979 - 2007 (\$2007/GJ)**

As might be expected the increasing real price of electricity to the residential sector has resulted in some (small) reduction in usage of this fuel in that sector - and a change in the pattern of use of this fuel too. Data from the

Household Energy End-use Project (HEEP) indicates that current average annual household electricity use is only 86 percent of what it was in the early 1970s. Figure 6 shows that lighting and cooling are bigger deals today compared to 30 years ago. Water heating, though still the major use, has reduced in importance by almost a quarter.



Source: Isaacs et al. 2006

**Figure 6: Household electricity use**

But what of the 30 year old claim that total household annual demand for water and space heating could all be supplied, if the household was an Auckland one, by the energy in 3 tonnes of air-dried wood? [And what about that Southland householder and the claim made then that he/she would be looking at some 11 tonnes to do the same job?] Does this still hold?

Figure 7 provides a summary overview of the current household energy end-use patterns in different parts of the country. Measured energy use by the HEEP study gives the average Auckland household water and space-heating use as 23.7GJ per annum (compared to the 23.4GJ/household in my 30-year old paper). So in terms of tonnage of wood to provide all water and space heating the answer is yes the Auckland householder would still need around 3 tonnes of air-dried wood per year - the same as was the case 30 years ago. However, over the 30 years the Southland householder's requirements to do the same job have dropped from 11 tonnes to some 5~6 tonnes - a compelling pointer to the benefits of insulation.



**Figure 7 Regional patterns of energy end-uses**

<sup>2</sup> Note the impact of changes to the number of people per household have not been factored into the figures.

Prior to 1978 there were no thermal performance standards for new homes and insulation was not required when a new home was built. It may seem unbelievable now but then the vast majority of homes did not have any insulation installed when they were constructed. The first national insulation standards only came into being in 1978. Homes built or extended since then are required to be insulated, and the level of insulation required to comply with the building code has been refined/increased over the last 30 years.

While the current housing stock is not made up of solely homes constructed since 1978 the HEEP study indicates that today over 73 percent of the pre-1978 housing stock have some roof insulation (often of lower R-value than current Building Code requirements). About 25 percent of the pre-1978 stock has some wall insulation and around 15 percent of those on piles have floor insulation. [Pre-1978 houses on a concrete slab floor usually have floor R-values high enough to meet the current requirement of the Building Code without any additional insulation]. Most homes now, whether of pre or post 1978 construction, have a level of insulation.

The real message in the dramatic reduction in cool climate space heating energy needs is that insulation works and, not surprisingly, that it has its greatest impact in those areas where heat loss is the biggest issue. There is another message in these figures too - a message for anyone projecting a possible future market for their product. That is the need to be aware of changes outside the immediate area of interest that may impact on the targeted market. If one had simply concentrated on the space-heating demand thirty years ago and projected them forward to now, the answer would clearly have been wrong - and the cooler the climate the more incorrect the project would have proved. However, 30 years ago it was perfectly possible, and reasonable, to predict that the then new insulation requirements of the Building Code would have a major impact on the need for household space heating.

There is one final matter concerning household wood energy demand that I should touch on before leaving this

topic and that is whether the residential demand for wood actually increased over the last 30 years. I've sketched how the real cost of other fuels has increased. I should also mention that the evidence, sketchy as it is, suggests that the real cost of wood energy has changed little over the period.

So does that 30-year old claim that this if the real price of other fuels continues to rise it is likely that wood will have an increasing role as a domestic fuel stack up?

Well the short answer is.... I don't know. The statistics are not compelling and they highlight a number of uncertainties and risks.

## Data

The first and most obvious issue is that a lot of the data, particularly the older data, is not always that comprehensive. A lot of firewood usage was (and still is) part of an informal economy. So figures from the 1970s that indicated wood/coal accounted for 20~30 percent of household energy usage (e.g., O'Malley & Roberts, 1980) may understate actual usage. There's also a problem that a number of studies fail to distinguish between wood and coal, simply classifying these as 'solid' fuels. Coal usage by the residential sector was clearly declining in the 1970s but it wasn't (and still isn't) zero.

The ten year HEEP study has done a lot to improve understanding of household energy usages. In fact one noteworthy outcome of the HEEP study is a revised estimate of woods share of residential energy use - up from the 5 percent level that was the standard in so many analyses of the last 30 years to 14 percent. (The HEEP study found that solid fuel accounts for 20 percent of total residential energy use - meaning that wood is 70 percent of all solid fuels used by the residential sector). The HEEP study confirmed solid fuel (56%) and electricity (24%) as the main source of household space heating. Making a reasonable allowance for differences in the efficiency for the various sorts of heating appliances these figures means that solid fuels account for around 45 percent of delivered household heating and electricity around 32 percent (see Figures 8 & 9).

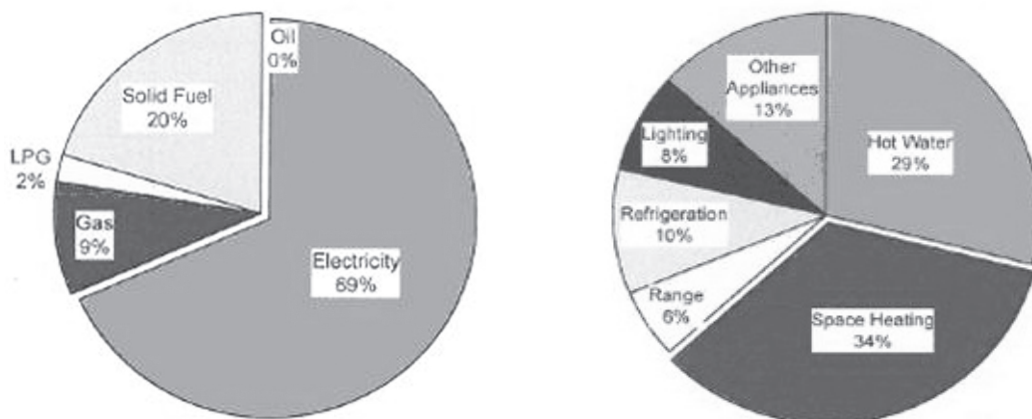


Figure 8: (left) Total energy use by fuel type; (right) total energy by end-use.

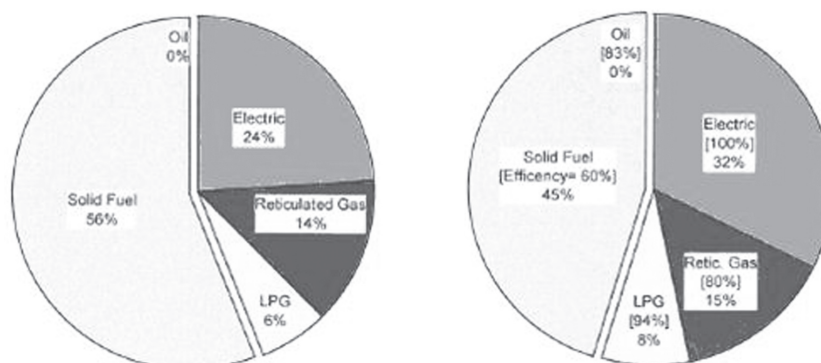


Figure 9: (left) Space heating gross energy by fuel; (right) Space heating delivered - energy by fuel.

There are data indicating wood's share of the domestic space heating market may have grown during the last 30 years. However, growth has not been as great as might be had expected based on the changes in the price of other fuels. Wood is not always the easiest or most convenient fuel - and one challenge for the future is how industry might address this issue. Material relating to current household energy use would indicate that provided issues such as possible impacts on air quality are properly addressed there are still prospects to grow this particular market for wood fuels<sup>3</sup>. So today, as was the case 30 years ago, it is not unreasonable to suggest that, *if the real price of other fuels continues to rise it is likely that wood will have an increasing role as a domestic and industrial fuel, particularly in areas where it is readily available.*

## The Forest Industry Development Agenda (FIDA)

I started this talk with a promise to end with an update on the wood energy programme. The programme began in 2005 when the government initiated the Forest Industry Development Agenda (FIDA) with a budget of \$18.2 million. The funding for the initiative ends this July (July 2009) so it is timely to look briefly at what in the energy area was the purpose of the funding and what has actually been achieved.

Bio-energy was only one of five work areas under FIDA and each was designed with, ultimately, the idea of increasing the demand for, and return from, the products

of forest growers. (For the record the other four areas FIDA are: Market Development, Market Access, Labour and Skills, and Excellence in Wood Design). In the FIDA Bioenergy programme the goal was to help speed the development of woody residues as a bio-energy source and the programme had three themes:

- **Information.** The objective here being to provide a free and readily accessible source of bioenergy information to a broad range of stakeholders to help encourage new projects utilizing woody biomass. [The goal of this theme has, I believe, been fully achieved via a Bioenergy Knowledge Centre (BKC).]
- **Engineering Solutions.** Here the goal was a reduction in the cost of recovering, processing it and delivering woody biomass to energy users. [The logic is that reducing the cost of woody bioenergy will lead to greater interest in this fuel resource, increasing demand for it and increasing returns for the forest owners. It should also help secure long term woody biomass supplies]. Projects within this theme are focused on developing and refining cost-effective forest harvest techniques and on equipment to better capture all/part of current wood waste streams for use as a source of energy.
- **Pre-Commercial Assistance.** The objective within this theme is to widen the options available to those looking for an energy solution and reduce the uncertainties, risks and costs involved in developing projects that extend the use of woody biomass. [To achieve this theme FIDA was resourced to provide (part) funding for both wood based feasibility studies and for wood using bioenergy demonstration projects].

FIDA's Bioenergy Programme was aimed at two perennial problems - lack of information about processes and products and, (flowing on from this), the issue of access to capital at an appropriate risk adjusted rate for any project. The FIDA Bioenergy programme had a budget of \$2.5 million, or less than 14 percent of the total FIDA budget. That budget has been fully spent on a set of projects that will help fill the information gaps and, I believe, facilitate the development of a market for bioenergy. These are:

<sup>3</sup> Having just penned these words I received an e-mail invitation to a meeting to educate Rotorua locals as to the causes of local air pollution and what can be done to reduce the problem. Material accompanying the invitation claimed Rotorua's air to be among the worst in New Zealand. The claim was not as a result of the area's natural geothermal features. Instead, sixty percent of the city's air pollution was attributed to domestic sources, in particular fires for home heating and back yard burning; 24 percent to industry and only 12 percent to transport. The material indicated that by 2013 sixty tonnes of fine particles need to be removed from the air (annually) in order to meet the National Environmental Standards for Air Quality





*Making sense of our energy supplies. Photo courtesy: Julian Maclaren*

- Creation of a bioenergy knowledge centre website (<http://www.bkc.co.nz/>) in conjunction with a 0800 number to provide information about bioenergy;
- A survey of forest waste in the central and southern North Island;
- A report on the merits of co-firing woody biomass with coal;
- A publication on drying woody biomass prior to burning;
- Creation of a nation-wide data base of all heat plants greater than one megawatt;
- A study to develop the economics of recovering forest residue;
- A scoping study to develop an information handbook on the use of woody biomass as a fuel.
- There are also a number of part-funded wood energy demonstration projects. Reports on these can be expected to be produced over the next 1~2 years and will be available on the website of the bioenergy knowledge centre.

Associated with the FIDA programme, but not part of the original programme, has been a pilot project that has funded the conversion of 31 schools to wood fuels. To date 23 schools have been switched to wood fuel with a further 8 to be switched in time for the 2009 heating season. To put these 31 into context there are approximately 640 coal boilers in schools throughout New Zealand and in total these boilers, are estimated to consume 0.24PJ (66GWh) of energy annually.

The school heating project has been successful in achieving a number of goals. Firstly, and most importantly it is a clear demonstration of Wood Energy as a cost

effective solution to heating in what might be classed as a 'light commercial' setting. Secondly, this project is directly responsible for creating demand for around half a million dollars of wood fuel per annum. That wood fuel will displace 1,700 tonnes of coal and establish a demand for a commercial wood energy supply in many parts of New Zealand. Furthermore, EECA has, as part of the project, been successful in gaining blanket resource consent for switching of up to 40 schools in the Auckland region to wood fuels.

There are other benefits too. The \$1.3 million project is estimated to avoid around 3,300 tonnes of carbon dioxide (CO<sub>2</sub>) emissions per year. Over the project lifecycle the cost of avoided emissions is estimated to be around \$20 per tonne CO<sub>2</sub>. To date the replacement and/or retrofitting of existing boilers have involve six different boiler manufacturers. Product from three different New Zealand manufactures and 8 imported boilers has been used. This has aided the introduction of new European technology into New Zealand. Finally, six boiler replacements and eleven conversions, or roughly half of the total pilot programme, are in airsheds that are currently in breach of the National Environmental Standards for Air Quality - and in each case the new plant is expected to lead to an improvement in air quality.

## Conclusion

Thirty years ago I ended my NZIF talk with a series of questions. Those questions were not about energy but concerned availability of capital and water, issues of environmental constraints and the shape of future international markets. I ended that way because I believed that analysis showed that it was answers to questions about these matters that would shape the future and have implications for forestry in the energy field rather than the reverse. That Conference was really about the same issue as this one; change. Provided change was evolutionary rather than revolutionary, energy did not appear to be a binding issue.

Today questions of capital, markets and environmental constraints are as important as ever. A Climate of Change and/or the risk of irreversible climate change is a greater issue now than 30 years ago and will mean that the answers given to those big questions now will differ from answers given then.

When we look, in big picture terms, at

- current liquid fuel prices
- N.Z.'s ability to grow its own fuel needs, and
- even the economics of producing fuels from wood,

the situation appears remarkably similar to what it was 30 years ago. Now as then, there are concerns over our dependence on imports. However, the burning of fossil fuels and Climate Change issues are much more to the

fore now than in 1979. If forestry does have a future in the liquid fuels area it appears that one of the changes that will have to be faced is a future where liquid fuels are going to cost more than at present - with all the ramifications that this will bring.

Will greater knowledge of forestry's potential in the energy area, easier access to that information and better assessment of risks of forest-based energy systems axiomatically result in a greater role for forestry as a source of liquid fuels energy? Not necessarily. However, better information and access to it should help ensure that any role forestry does play in this energy area is well grounded. Will forestry have a greater role in meeting domestic water and space heating needs? There is clear potential for a greater role for wood fuels in this market and in light commercial use too - even at current prices. If the real differentials in the cost of supplying other fuels to these sectors continue to increase, so too will the pressure to use wood fuels. However, rather than waiting and hoping for the pressure to become so great that it is irresistible, the real and immediate challenge for forestry is to recognise the already existing opportunities and to translate them into reality.

## Acknowledgements

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## Student Membership NZ Institute of Forestry



The New Zealand Institute of Forestry (NZIF) is offering students the opportunity to join for free. The Institute is an association of professional foresters. As an independent advocate for forestry it offers advice on issues of significance that are related to forestry, and has profoundly influenced legislation relating to a number of recent issues. It serves as an ethical guide for foresters, and sets standards for professional forester registration. In addition, the NZIF provides several fora for debate and ensures that professionals interact socially. Student members are eligible for a range of benefits, including:

- A weekly electronic newsletter
- Access to all issues of the New Zealand Journal of Forestry on-line (back to the very first issue over 80 years ago)
- Eligibility for scholarships
- Financial support for attending the NZIF annual conference
- Free attendance (along with drink and nibbles) at the Canterbury NZIF local section's event evenings
- A "Meet the employer" evening at the NZ School of Forestry each year
- A student debate sponsored by the NZIF
- A student representative on the NZIF Council (the Institute's governing body).

Join on-line at <http://www.forestry.org.nz>, and name your professors (ensure that they are members first) as nominators. The stated \$45 fee on the form is officially "refunded". Join today!