Obituary

Barry Moorhouse – 1909-1996

Barry Moorhouse was born in Auckland and moved to Cambridge with his family at the age of six. His father, a retired naval officer and martinet, had a profound effect on Barry's life, affecting his appearance, dress and character. His parents were firm supporters and practising adherents of the Anglican Church in Cambridge, and Barry remained faithful to those beliefs all his life, taking an active part in Church affairs wherever domiciled.

Barry attended King's College, Auckland, where he excelled in sport and became Head Boy. He later obtained his boxing 'blue' at University, and this expertise was put to good use in later life.

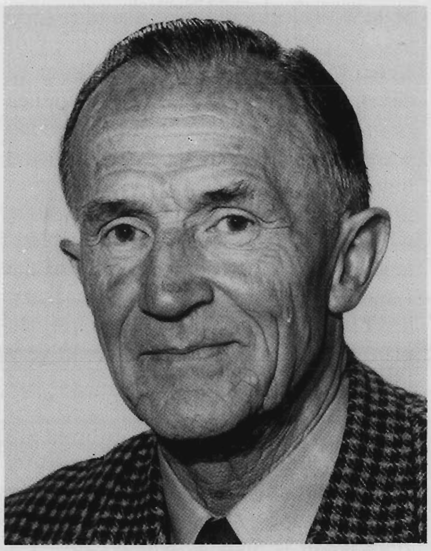
Barry decided on Forestry as a career and commenced his forestry training at Auckland University College in 1927. He eventually completed his B.For.Sc. degree at Canterbury College in 1933, following the closure of the Auckland School of Forestry, due to the economic depression.

He joined the State Forest Service as a Forest Guard, being stationed in Nelson Conservancy, where he was engaged in growth and sample plot studies in beech and rimu stands, as well as forest management work in Golden Downs State Forest. He was transferred to Head Office in Wellington in 1938 to work on management plans under C.M. Smith, and in 1939 he was transferred to the State Advances Corporation as a technical officer engaged on investigational work for the building industry, in formulating grading rules for the new *Pinus radiata* timber.

Barry decided to seek employment in the private sector and in 1943 he joined NZ Forest Products Limited as Assistant Forest and Milling Manager based at Pinedale near Putaruru. He had earlier spent two long vacations during his student days assisting Norman Hall in establishing sample plots and carrying out survival count surveys for this company's predecessor, NZ Perpetual Forests adjacent to Tokoroa.

In early 1946, after a three-month drought, disastrous fires ravaged the Central North Island forests, in particular private pine forests in the Taupo region. Extreme weather conditions and the lack of adequate protective measures resulted in a large block of 16-year-old pine stands being destroyed. This fact was the catalyst which saw the 1947 Forest and Rural Fires Act and Regulations draughted and enacted to protect state and especially privately-owned forests from fire.

Following these fires Barry was



Barry Moorhouse

appointed Forestry Administrator with direct responsibility for forest protection. He spent several months in the USA studying fire protection and, coupled with his experience during the 1946 fires, was able to play an important role in draughting the legislation for the 1947 Act as well as the many amendments incorporated since then.

He became the inaugural chairman and Principal Fire Officer of the Tokoroa Rural Fire Authority from its inception in 1948 and served in that capacity for 25 years until his retirement in 1973. Large areas of scrub land were burnt and developed into farmland on the pumice lands surrounding the company forests after the war, and the fact that no serious loss of forest, by fire, occurred is a testament to Barry's vigilant and sometimes over-protective measures. Anyone involved with the 1946 fires will realise what fire can do under extreme conditions and when so-called 'cost saving' measures are practised as regards fire protection and prevention.

Barry joined the Institute as a Student member in 1928, became an Associate Member in 1934 and advanced to Full Member in 1937. He served as a Councillor in 1938-39, Secretary/Treasurer 1940-41 and as Councillor again 1942-52 – a total of 14 years' service to the Institute – and was a member for 68 years. In recognition of his service to the Institute in particular and to the forestry industry in general he was elected an Honorary Member at the AGM in 1980.

Barry Moorhouse will be remembered by his colleagues, particularly those working with him at NZ Forest Products Limited, as a true gentleman, a good dresser, who always kept an immaculate desk and office. He was known by some of the staff as 'Roger Barry' due to his radio technique, while his minute attention to detail tended to drive his subordinates 'to drink'. At least, he always knew where to find them after 5 p.m. in an emergency.

J.A. Church

Harvesting and utilisation of logging residue*

Peter Hall**

The 1995 John Balneaves Travel Award funded a study tour to the United Kingdom, Sweden and the United States of America. The study tour focused on the latest innovations in the harvesting and utilisation of logging residues. This report summarises the findings of the tour.

Wood Fuels

The study tour highlighted the strong potential for electricity generation from forestry residue. The Wood Fuels Into Practice Conference brought out many of the political factors which are influencing the development of alternative fuels. In the United Kingdom biomass energy projects are becoming viable due to the Non Fossil Fuels Obligation (NFFO) which allows a bio-energy plant to attract a government subsidy to allow its power to be sold into the grid at a competitive rate, even though the cost of generation is higher than that of power from other sources. In Sweden, the bio-energy developments are being driven by the decision to remove nuclear power from its generation system by the year 2010. Nuclear

* *Report on Study Tour to United Kingdom, Sweden and USA.*

** *NZ Logging Industry Research Organisation.*

power provides approximately half of Sweden's electricity generation capacity. Fossil fuels also attract a tax which renewable bio-fuels do not. In addition, short rotation coppice (SRC) crops for biomass energy are getting a lot of attention in the European Union generally due to internal over-production of food crops. This is leading to land being retired from agriculture under a subsidy system and the land then used for SRC.

One of the key factors for use of woody biomass in electricity generation is gasification technology. Although gasification technology is not new, it is receiving renewed efforts in research and development at present, especially for woody biomass. The new technology offers increased efficiency over steam cogeneration systems. The Sydkraft AB, BIOFLOW demonstration IGCC plant at Varnamo, Sweden was a good example of the new technology. With careful location of this plant, it is possible to gasify biomass, run a gas turbine on the gas produced to generate electricity, use the waste exhaust heat from the gas turbine to make steam for use in a steam turbine/electricity generator and then capture the remaining waste heat in a condenser for use as process heat. Total efficiencies of 85% to 90%, with electrical efficiencies of 44% to 49%, are now possible. Further development may improve these figures. Considerable research is also being done on the disposal of ash from the process, which is about 1% of the weight of the fuel fed into the system.

The Institute of Gas Technology (IGT) in Chicago, USA has developed a gasification process (RENUGAS) which is similar to, but further developed than the BIOFLOW system. The key factor is that the gasification system is simpler than the BIOFLOW system. The RENUGAS system is also being used to supply gas to gas turbine coupled to an electrical generator. The use of radiata pine logging residue in a IGCC gasifier was discussed and there appear to be no major obstacles to its success.

California provides a good example of the expansion of the biomass power generation industry in the United States. Over 50 wood-fired power stations were constructed in California in the 1980s, although this has gone into reverse, with alternative fuels and power sources proving cheaper. The main problem is that these wood-fired plants are steam turbine systems, and many are without co-generation of process heat, which makes them relatively inefficient in comparison with new technologies. The wood-fired power station industry is now focused on becoming a disposal point for biomass waste generated in large urban areas. A variety of fuels can be, and are, burned in these plants, as they are tolerant of varying moisture content.

Wheelabrator Shasta Energy Company Inc. in Anderson, California is an example of a large-scale operation, producing 50 MW of electricity and consuming 2500 tonnes per day of wood from a variety of sources. The company is looking to develop a wider range of fuel supplies from non-forestry sources. These include waste paper, agricultural, horticultural and municipal waste wood. The furnace at this plant is robust in its ability to cope with a variety of fuels and moisture contents due to natural gas co-firing of the furnace. This plant is recognised as being less efficient than newer systems, and the plant needs to get its fuel free or at very low cost to compete with natural gas and hydro-generated electricity.

Emissions controls in California are strict but biomass power plants generally have no difficulty with emissions unless the proportion of needles and leaves to stem wood is high, in which case NOx levels rise. As was seen at Pacific Ultrapower in Jamestown, California, one of the major considerations in California is the stockpiling of fuel for winter consumption. It is a substantial cost and there is a major problem with dust, smell, heap fires and microbial activity.

There are other options to gasification for processing woody biomass, including rapid thermal processing into liquid fuels. Gas produced from biomass gasification can be used in piston engines as well as turbines. Natural gas can be co-fired with the biomass gas to increase its fuel value or to augment a limited supply. The main barrier to further development is that energy from woody biomass is more expensive than current conventional alternatives.

Harvesting and Processing of Woody Fuels

Forestry biomass comes from two main sources – logging residues and small-tree-size thinnings. As in New Zealand, other countries face problems with the build up of logging residue around hauler landings and are seeking solutions to similar problems such as the remote locations of the material, transport costs and volume of supply.

The IEA/BA Workshop and Study Tour in Glasgow, Scotland, highlighted that there are many transport options for forestry biomass. The decision on which is best will depend on local transport laws (Gross Vehicle Weights in particular) and lead distances. There were numerous examples of different approaches to harvesting biomass. M I Edwards Engineering in Brandon, England, provided an example of terrain chippers (chipper forwarders) which had a production rate of 15 to 17 m^3 of chip per hour. The use of set-out bins was a significant contributor to the success of the operation as the terrain chippers did not have to wait for trucks.

At Sodra Skogsenergi in Varnamo, Sweden, the piling of logging residue at roadside for air drying (partly covered), storage and subsequent chipping into set-out bins is a common practice. Chipping is completed with chipper forwarders, which are large and have high production rates. The machine forwards the chip short distances (350m) and tips the chip into set-out bins. The bins are collected by a self-loading truck which picks up the bins with a hook system.

Tree section harvesting operations described at Skog Forsk in Uppsala, Sweden may offer a way to increase the recovery of pulp chip and fuel wood from thinnings operations. However, the investment in specialised equipment, especially transport and processing, required for these operations is substantial. Tree section harvesting has had a chequered history in Sweden, and generally operates only when pulp chip and wood fuel prices are high. Another promising development being pursued by Skog Forsk is baling of logging residue. This will offer increased payloads in logging residue transportation.

At Sierra Resource Management in Sonora, California, thinnings from overstocked stands for whole tree chips are a common source of fuel wood. Large drum chippers are used to process this material, with the chippers being capable of producing in excess of 50 tonnes of chip per hour. Another operation at Paul Warner Enterprises in Anderson, California used a disc chipper to create fuel wood from limbs and tops residue from a low-quality pine stand. A visit to tub grinder operations supplying fuel to power plants at Wheelabrator Shasta Energy Company Inc. in Anderson, California and Pacific Ultrapower in Jamestown, California showed that large tub grinders could process dry orchard trees, including stumps, at a rate of 50 tonnes per hour, and would cope with the residue produced from New Zealand logging operations. In the Californian operations, supplying enough material and trucks to keep wood fuel processors working at capacity is an issue, and highlights the need for good organisation of the raw material supply and truck scheduling to maximise the output of the chipper or fuel wood processor.

Conclusions

For processing of woody fuels, chipping at a central site has a lower chipping cost than in-forest chipping, but not necessarily a lower total cost. Integrated harvesting systems which harvest biomass in conjunction with conventional logging appear to be most effective, and work best in clearfell situations. Given the problems that many of the observed operations had in keeping the fuel wood processor working, comminution at point of use or a central site would appear to be worthy of consideration. This decision is dependent on being able to achieve suitable truck payloads with uncomminuted logging debris. A major problem is that comminuted wood is difficult to store for long periods without degrade occurring (heat build up, microbial activity, smell). Storage in the forest in unchipped form, covered, with 'just in time' chipping, appears to be the best solution. For logging residue collected from landings, hogs (or tub grinders) rather than chippers are likely to be a better option as they are less susceptible to damage from contaminants such as rock and metal.

The study tour highlighted the strong potential for electricity generation from forestry residue. Based on the information gathered during the tour, a New Zealand example of a wood fuel power plant using the BIOFLOW system was developed. The generation cost of electric power would be $0.12 to $0.14 per kilowatt hour (assuming no sales of waste heat). This is similar to other estimates for the cost of electricity produced from biomass gasification systems ($0.08 to $0.10 per kilowatt hour). The indications are that biomass-fuelled electricity generation in New Zealand will be economically unattractive in the short term, unless the fuel has a zero or negative value. This may change in the future as demand for electricity rises, the number of rivers available and suitable for hydro dams drops, and we are faced with reducing our greenhouse gas emissions.

Note: This article is a summary of LIRO Special Report No. 18 1995, Harvesting and Utilisation of Logging Residues. Copies of which can be obtained from LIRO. The proceedings of the Wood Fuels into Practice Conference is also available on loan from the LIRO library.

NEW INFORMATION

Forest valuation standards

The New Zealand Institute of Forestry has just released its Exposure Draft of Forest Valuation Standards. This is a substantial revision of an earlier Discussion Draft released in August 1994. The revision has taken into account the submissions received on the earlier document together with discussion with a wide range of interested parties.

The document has been prepared by the NZIF Forest Valuation Working Party whose membership consists of: Bruce Manley (Convenor), Alan Barnes, Peter Berg, Peter Casey, Peter Clark, Steve Croskery, Jeremy Fleming, Peter Gorman, Tanya Lieven and Bill Liley.

The Exposure Draft follows from terms of reference to develop guidelines for forest valuation, primarily for members of the NZIF engaged in the physical and financial description, and the valuation of a forest resource for internal or external reporting. It applies to a range of purposes of forest valuation including prospectus promotion.

The format of the Exposure Draft consists of five parts. It includes, in Part A, a discussion of the background issues, including the purposes of forest valuation (there are many), the nature of value (market value is the subject of the Exposure Draft), the methods of forest valuation (five basic approaches are explained), and finally and extensively, discount rate. Standards for describing and valuing a forest are presented in Part B in a format similar to Accounting Reporting Standards with stated standards followed by guidance notes and discussion. Part C deals with presentation issues. Part D contains a "Valuation Checklist" and the final Part E contains glossaries of Forestry Terms and Forestry Economic Terms.

The working party states a preference for values based on forest transaction evidence but notes that the evidence necessary to construct the value of the subject forest from reported forest sales is generally very thinly available and subject to practical interpretation difficulties. In the absence of forest market sales evidence, calculation of the market value of the trees as the "Crop Expectation Value" (CEV) is required. CEV is "the present value of cashflows arising from the crop". In this calculation the cost of the underlying land is to be included by a notional rent based on the "Land Expectation Value" (LEV), the economic value of the land in a forestry use. Some complexity is introduced into the concepts because the LEV is not necessarily the current land market value as calculated by a land valuer. The standards point out that any difference between these land value measures should be separately reported as it represents (when the LEV is higher) an indicated value not yet represented in the land market, or conversely, a forest (possibly inappropriately) placed on highly-valued land.

All the ingredients for the CEV calculation are explicitly described. The approach is essentially descriptive, with emphasis placed on disclosure of assumptions and leading factors in the valuation. The discount rate chosen is of course crucial to the level of value reported and accordingly the choice of discount rate and its application to cashflows receives detailed attention. However, no standard discount rate is prescribed.

Those readers expecting a mandatory "recipe book" approach to forest valuation with fixed major parameters (like discount rate and log prices) will therefore probably be disappointed. The typical managed forest is subject to wide variations in composition. This complexity suggests that a simple recipe is an unreasonable expectation and every valuer will need to inject judgement and experience to an often complex set of facts.

Copies of the Exposure Draft are available from the NZIF Secretariat, PO Box 19-840, Christchurch at a price of $30 to members and $60 to non-members. It is intended that the Exposure Draft will remain current for at least the next 12 months to enable practitioners to apply it. At this stage submissions will be called before a final set of Forest Valuation Standards is produced.

Meanwhile the task of the Working Party continues, as it considers means of implementing the Standards (such as training and providing worked examples) and the possibility of the collection and publication of commonly-applied valuation inputs. The Working Party is aware that although the Ministry of Forestry publishes the results of a quarterly survey on log prices there is limited information available on discount rates. It is currently looking at opportunities for information to be provided.

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Alan Barnes
Valuation Working Group