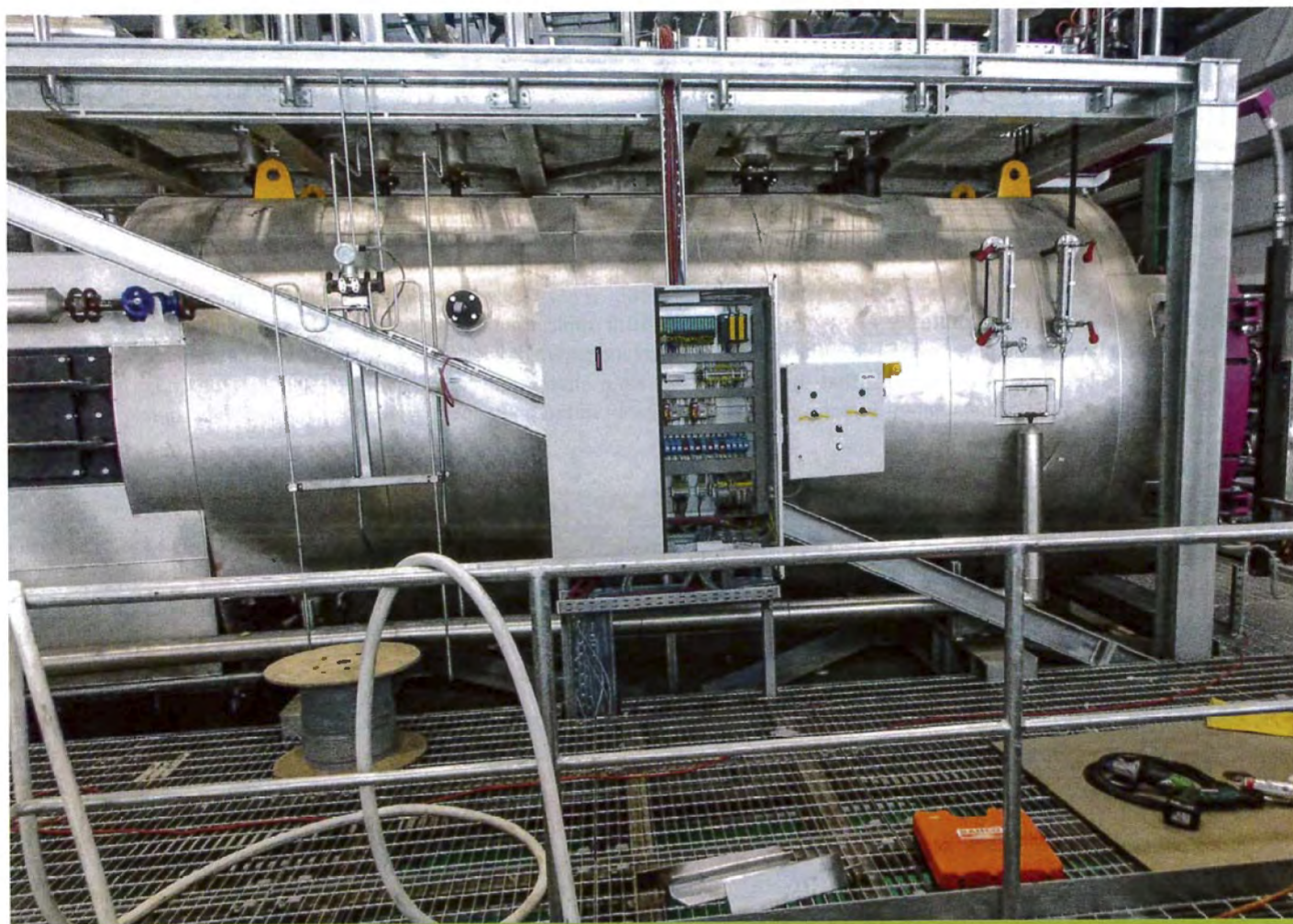


Clean wood energy prescribed for Burwood Hospital



One of Burwood Hospital's new chip boilers – this is the 2mgW boiler in operation prior to commissioning of plant.

THE MOVE TO USE MORE CLEAN burning wood in modern biomass heating systems in the South Island continues to gain momentum, with Burwood Hospital in Christchurch being the latest to be prescribed the environmental energy treatment.

The hospital, which houses an internationally renowned spinal unit, is scrapping its two polluting coal boilers that had been belching out tonnes of CO₂ and sulphur dioxide annually. Not very healthy for a health service facility.

Story & photos: Jim Childerstone

In their place, two highly efficient, clean-burning, wood-fed chip boilers are being commissioned in a brand new building where they will generate a total of 6 megaWatts. They are going to save some 7,000-to-10,000 tonnes of CO₂ emissions per year.

And if Christian Jirkowsky, of Polyteknik Biomass Energy, had his way he would soon make use of the 3.4 million tons of logging residue going to waste each year in this country's plantation forests to not only feed

these boilers but a lot more that could be installed in other public service and private commercial buildings.

Talk about sustainability! Most plantations in New Zealand are Forest Stewardship Council certified and committed to a rotational replanting regime. In other words they can provide a never ending source of green fuels. It could be worth up to \$20 p/m³ in net returns to forest owners, according to Scion Forestry Research papers published a while back.

Mr Jirkowsky's Austrian-based mother



The chip bunker where wet chip is stored prior to feeding into heated chambers prior to drying for boilers is explained by Christian Jirkowsky (centre), General Manager of Polytechnik Biomass Energy, to potential buyers.

firm opened up a subsidiary branch in New Zealand five years ago in Havelock North, Hawks Bay, and has been busy installing these new age boilers in both Australia and here. On the list for other possible future installations are several Fonterra dairy plants, freezing works, plant nurseries,

market gardeners, saw mills, schools/tertiary institutions, hospitals and the various industries that have been reliant on fossil fuels for delivering heat energy.

A mechanical engineer with some 25 years' experience as a renewable energy specialist from Austria, Mr Jirkowsky is on a mission

to replace fossil fuels with wood biomass as a source of energy. By installing state-of-the-art boiler systems in our buildings he is hoping to convince sceptics about just how cost-effective they can be compared with other forms of heating.

Until recently, it has been all about cost. Lignite coal had always been considered the cheapest source, but is not a popular choice among health authorities, the green lobby, local and regional authorities these days. In fact, in some European countries coal is fast being replaced by other less polluting forms of energy, including wood pellets/chips. As an example, Austria's biomass wood energy sector is now worth \$2.3 billion, employing some 14,000 people and supplies at least 800,000 buildings, according to Mr Jirkowsky. By comparison, the wood energy projects in New Zealand currently employ around 250 people, mostly engineers, tradesmen and construction workers.

THE BURWOOD PROJECT

The architect-designed building that houses the Polytechnik Biomass Energy boilers at Burwood is impressive enough, but it is the internal installation that really impresses. It looks like something out of a futuristic science fiction film.

During my visit, workers were still scrambling around the three levels of piping, electronic paraphernalia, scaffolding, housings and heating chambers in preparation for commissioning. I tagged along with Mr Jirkowsky, who was showing a couple of market gardeners how the project works and the suitability of heating multiple glass houses. The company has already installed Polytechnik systems for Zealandia and K&I Horticulture green houses, two of the largest horticulturists and market gardeners in the South Island, which have both received ECCA awards.

The two Burwood boiler units are the main centre of attraction, delivering a thermal output of 2mgW and 4mgW each. One was already in operation at the time of my visit when there was low demand for heat. The company's boilers range from 300kW to 30,000kW (30mgW). Mr Jirkowsky explains that for power production, steam turbines with a standard electrical output ranging from 100kW to 20,000kW per turbine generator are also available, which might be of interest to saw mills and wood processors, given the rising cost of electricity drawn from the grid.

The crucial factor in making these wood-fired boilers work efficiently so they can

Wood energy supplies for lower South Island

WOOD ENERGY SOUTH, A JOINT INITIATIVE BETWEEN VENTURE SOUTHLAND and EECA, has been set up to promote the use of wood energy in Southland.

Wood Energy South has funds available to assist Southern businesses contemplating boiler or heating system replacements and interested in choosing a cost effective, low emissions wood fuelled option.

The lower South Island's growing wood energy sector has been told that it can be confident that there will be enough fuel available to sustain it well into the future.

A wood energy supply study confirms available supply of wood for use in industrial boilers around Southland and Otago until 2050, providing assurance for businesses considering switching from fossil to wood fuels.

The Wood Energy South project identified this concern from the outset and commissioned a study to quantify the volume of waste wood in the South Otago and Southland regions.

More than one million tonnes of logs are harvested annually and this is projected to continue to increase at a rate of 2% per annum over the next 30 years. A large majority of this is exported but a quarter of the harvest remains in Southland. The study estimates the annual waste wood volume is currently 200,000 tonnes and will increase to 600,000 tonnes per annum over the next 30 years.

Wood Energy South project coordinator Cathy Jordan says that there are currently eight wood fuel users across commercial, education and local government operations around Southland and there is a steady demand for wood energy feasibility studies. The Wood Energy South project has technical expertise available and more information is on www.woodenergysouth.co.nz.

deliver competitively priced heat/energy is in the source material coming from the forest, which needs to have a relatively low moisture content so that it burns more efficiently.

Hogged chips coming straight out of the forest is probably the most efficient way of producing feedstock, rather than transporting wood to off-site chipping plants, but it usually ends up being pretty wet, especially at this time of year, when the moisture content may be as much as 60%. Ideally it needs to be lower than 14%.

However, the Burwood installation has been designed to overcome this issue. The chipped material is bunkered in a substantial sized bay (far bigger than necessary, according to Mr Jirkowsky) and can be dried through chambers using excess heat from the system before being fed into the boilers. The drier the material, the higher the calorific value of delivered heat.

Due to the hospital regulations there has to be considerably more emphasis on continuity of heat as well as health and safety, so a standby oil-fed boiler has also been installed. The whole system is electronically controlled with a variety of



Christian Jirkowsky (centre), General Manager of Polytechnik Biomass Energy, explains the workings of Burwood Hospital's new chip boiler plant to two visiting horticulturists.



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The inner workings of the Burwood Hospital chip boiler set-up.

gadgets to warn of potential breakdowns. It is virtually a one-man operation.

When it does need servicing and maintenance, this will be provided by Palmerston North-based Energy Plant Solutions, which was also involved in the installation of the system at Burwood.

Feeding the Burwood plant will require more than 10,000 tonnes of chip per year, which falls to Arundel-based Canterbury Woodchip Ltd to organise. It operates in the mid-Canterbury area using a mobile Morbark chipper capable of filling a truck and trailer chip-liner direct from the chipper feed-out.

The chip will come from a variety of sources, including left-over material from harvest operations in plantation forests and even wilding conifers.

But, providing a consistent supply of chips is still seen as a major impediment to the growth of wood biomass-fueled boilers in the future.

Polytechnik is currently working on several new installations in the South Island that will require a steady stream of wood biomass. This includes one for a Blenheim sawmill, Pan Pac's Milburn mill and Fonterra's

Studholme plant extension, which wants to install a large coal boiler, but considered a dual purpose unit taking 20% chip fuel – Fonterra believes there is insufficient

woody biomass available to feed a full chip boiler from existing forestry sources. This is disputed by Mr Jirkowsky, who says it would need only 30% of available residue lying on



Burwood Hospital is not the only medical facility to convert to chip boilers in the region. This is Dunstan Hospital's recently installed Binder chip boiler that was engineered by Pioneer Energy – wood fuel.



skid sites post-harvest, which he believes is achievable.

This is a question that needs some close attention if the rate of wood chip boiler installation carries on at the pace Christian Jakowsky is aiming at. Whilst there may, indeed, be sufficient waste wood out in the forests, recovering it and coordinating the supply will require a lot of forethought and planning to coordinate the logistics, from source of supply, processing of the material, transport to user and even storage.

Where whole trees, including branches, are pulled or dragged to a skid site/landing, it would be fairly easy to collect and chip the residues, although storing the waste until a chipper can be brought in to process it is always going to be a challenge. But far less of a challenge compared to trying to collect waste that has been left out at the cutover.

A contract I was engaged in for Holcim's

Pioneer Energy's Binder boiler established at Dunstan Hospital near Clyde. Richard Ireland at the heat chamber.

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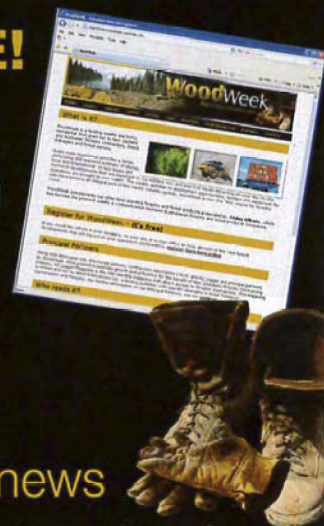
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potential cement plant at Weston, near Oamaru, involved looking into the biomass of plantation forests within 150 kilometres of the plant. I came up with some speculative answers.

Basically it was feasible for a big megaWatt plant when compared with using lignite, especially taking into account the negative effects of emissions from a coal-fired boiler on residents within several kilometres of the facility, compared to a cleaner wood-fired boiler. That was some 5-6 years ago, and the project never went ahead, however it did give an insight into what would be involved.

The project looked at recovery of residue from landings and skid sites as well as cut-over windrows, along with shelter belt clearance for dairy units and wilding conifers in the Mackenzie Country. It was definitely doable.

And, for anyone looking at wood-fired boilers, the same due diligence will be required.

There is a growing band of people who are set up to supply wood chips that can feed these boilers, but this supply chain is still in its infancy.



Brad Coleman's Morbark 4600XL Wood Hog chipper fills chip liner units for transport to Burwood Hospital from remnants of shelter belt felling.

Long-time readers of *NZ Logger* magazine may recall previous articles I have written on the likes of the big Bandit chipper run by Hall Bros, which is working in the Otago region. Doug Hall named his monster 'The Beast', as it is capable of chomping one metric tonne-sized stems and everything in

between.

Up in Canterbury there's the impressive Doppstadt owned by Phil Mauger, of Maugers Contracting Ltd, which can also devour whole trees in one go. And there's also Brad Coleman's operation, which he has set up at the old Arundel sawmill site

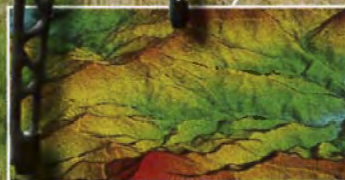
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Hall Bros 'The Beast' chipper chomping on willow roots near Dunedin Airport is capable of chipping up one metre diameter logs.

Phil Mauger's Doppstadt DH910 chipper.



Pioneer Energy's Heizomat chipper supplies to the Christchurch sewage plant heating system.

with a Morrow boiler for drying wood and a Morbark chipper feeding chip into sheds. This was mostly used for dairy bedding, but his new larger chipper is now producing chip fuel for Burwood Hospital's wood-fired boiler as well as other clients in the Washdyke/Timaru area.

Further south is Wood Energy New Zealand, now owned by Alexandra-based Pioneer Generation, which has since renamed the operation Pioneer Energy – wood fuel. It supplies chip to 12 boiler units in Christchurch and Dunedin tertiary institutions, swimming pools, hospitals and small-to-medium industries. Richard Ireland, Contracts and Performance Manager for Pioneer Energy, says the wood fuel business is based in Christchurch, Dunedin and Naseby using Heizomat chippers, a mobile unit, along with a stationary one at Naseby Forest. It currently supplies boilers ranging from 150kW up to 7mgW.

Although the number of new boilers being installed is increasing, most contractors supplying wood chip are nowhere near chipping on a full time basis. That will have to change as the biomass industry matures and requires increased supplies.

How much of Christian Jirkowsky's 3.4 million tonnes of residue that is calculated to be available each year can be exploited in the future, remains to be seen. As more users like Burwood Hospital come on line, they could make all the difference. And it will certainly assist New Zealand's efforts to mitigate our carbon emissions. NZL