

Business Case for the Beaufort Hospital Biomass Heating System

Executive Summary

A wood chip fired boiler system has been installed at the Beaufort Hospital (Figure 1) as a demonstration project for bioenergy. The 110kW Hargassner boiler supplied by Living Energy is housed in a 12.0 metre shipping container which also includes a fuel store and filling system. The system will take over most of the heating load from the existing LPG system and had an installed cost of \$438,937. The existing LPG boilers will be retained as backup and to cover peak loads. It is expected to reduce expenditure on LPG by around \$55,350 per year with overall heating costs being reduced by \$34,966 per year. The simple payback on the installation is expected to be 12 years at current LPG prices. This could be less if LPG prices rise.



Figure 1: Beaufort Hospital

Proposal summary (Value proposition)

The bioenergy system installed at the Beaufort Hospital had an installed cost of \$438,937. The 110kW Hargassner boiler was housed in a 12.0 metre shipping container which also included a fuel store and filling system (see Figure 2). The intended fuel is locally produced hardwood chips. The boiler was plumbed into the existing hydronic heating system with the LPG heating system retained as back up. The biomass boiler system will take over most of the heating load for the hospital with the LPG system only operating during periods of peak load (very cold weather) or when the biomass boiler is offline. The biomass boiler is estimated to deliver a financial benefit of approximately \$36,226 per year through reduced energy costs. In addition to reducing the energy costs for the hospital, the biomass system will also reduce its greenhouse gas emissions by approximately 140 tonne per year.

Safety and comfort of the public will also be ensured with the boiler system fully containerised and refuelling occurring well away from the hospital and homes.

The financial benefit is estimated as a simple payback of 12 years and the project will provide a reduction in hospital operating costs.



Figure 2: Boiler house and fuel store

Proposal development

Across the region there has been substantial investigation and active interest in bioenergy application led by the Central Highlands Agribusiness Forum (CHAF). The Beaufort hospital was flagged as a semi commercial entity to demonstrate the bioenergy concept. This proposal developed by the Project Manager as part of the Regional Bioenergy Project. Advice from consultants, various stakeholders and interested members of the public was sought in the development process.

The selection of a containerised boiler system allowed for a more flexible installation process with minimal disruption to hospital operation. It also gives the hospital the option to remove or relocate the system in future if required. Due to a lack of biomass boiler system suppliers in Australia, tender options are limited and it's an issue that potential users will need to consider.

The planning process is another area that could be difficult. Local authorities have no experience with these types of systems and residents are also unfamiliar with them. Providing detailed information on the likely appearance and amenity impact of any proposed system will help get through this process.

Technical changes required

The proposed biomass boilers will be plumbed into the existing hospital heating circuit parallel to the existing gas boilers. The biomass boiler system is linked to the existing hospital hydronic heating system and potable hot water system via separate heat exchangers. Heating fluid in the biomass boiler does not mix with fluid in the hospital system.

The biomass boiler control system will be linked to the gas boiler controls to ensure the biomass boiler operates as the primary heating source. The gas boiler will only operate if the biomass system is off line and for brief period each month for maintenance purposes. The boiler system is web linked and has an automatic notification system to alert hospital staff of any problems. Maintenance contractors can access the boiler system remotely, assess any problem and advise hospital staff accordingly. The system will automatically activate the gas boilers in the event of a failure

The boiler hose/fuel store is located in Walker Street with easy access for fuel delivery vehicles. Fuel deliveries will generally require the attendance of a hospital staff member to access the fuel quality and to operate the fuel store filling system.

Cost/Benefit analysis

Costs

Item	Value	Assumptions and accuracy
Purchase of boiler system and fuel store	\$418,150	Contract price
Other installation costs	\$10,787	Relocation of overhead power line to allow installation of boiler house/fuel store – actual cost.
Potable hot water system	\$10,000	Installation of potable hot water heat exchanger to meet current hot water needs of hospital

Financial and other benefits

Item	Value	Assumptions and accuracy
Hospital Heating Cost	- \$34,966/ annum*	Estimate output with proposed fuels ±5% accuracy. Includes an annual boiler maintenance cost of \$4,400.
Reduced carbon emission	-\$1,260	Estimated reduction based on current Australian carbon price of \$9/tonne
Reputation	Not included in this estimate	The resulting reduction in energy and greenhouse gas emissions by the hospital will ensure it is well ahead of current government emission reduction programs and places it as a leading in the area of sustainable health.

*Based on current LPG prices. The price of LPG is likely to rise in future. This forward value has not been included in the calculations.

Total costs = \$438,937 Quantifiable benefits = \$36,226

Approximate simple payback on the project is 12 years without inclusion of co-benefits such as fuel security and hospital reputation.

The installation of new condensing gas boilers in 2011 significantly reduced the hospitals' gas consumption. At current LPG prices and usage, the installation of a wood boiler could not be justified. Consideration of a wood boiler should be done prior to installing new boilers.

Figure 3 below is a graph showing the comparison of the previous heating system and the wood boiler. Estimated annual savings would have been \$63,976 giving a simple payback of 7 years.



Figure 3: Previous Boiler Fuel Costs with LPG and Wood Chip Fuels

Project risks

A risk assessment has been conducted in accordance with internal procedures. A summary of key risks and how they will be managed is described below.

Risk	Mitigation strategy
Safety during installation	Risk management plan will be in place and standard operating procedures will be followed,
Impact on hospital operations	The boiler system will be stand alone and not connected to the existing heating system until the installation is almost complete. Disruption to normal operation while the final connects are being made is expected to be minimal.
Savings not achieved	Based on case studies from similar installations overseas there is a high level of certainty that the savings will be achieved. The financial saving is likely to be higher in future due to likely increases in LPG prices.
Local wood chip fuel becomes unavailable	The boiler system is able to utilize a range of fuels and there are suitable alternate fuels available in Beaufort and in the region. Commercial wood pellets are also an option and would still be cheaper than LPG.

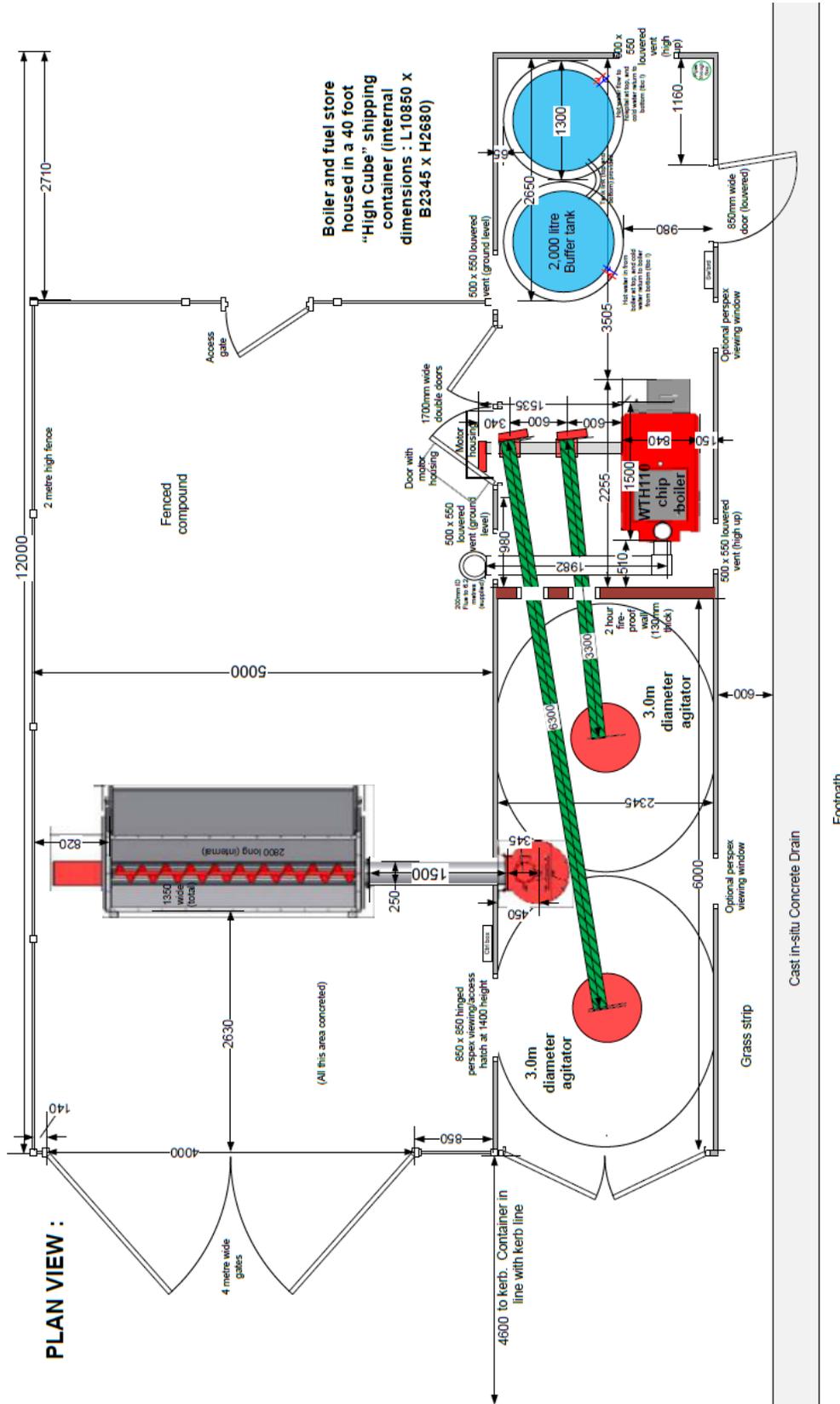
Next steps

The biomass boiler's management system is programmed to collect information on the amount of heat produced and LPG replaced. Once the boiler installation has been operating for 12 months, this information will be used to produce a detailed assessment of actual operating costs and any operational issues discovered. The results of this assessment will be available on the public via the Beaufort Hospital and Pyrenees Shire websites.

Attachments

Engineering diagrams and detailed costings are attached.

Plan View of Boiler House and Fuel Store



Breakdown of Installation Costs

Description	Amount (excluding GST)
Project management	\$50,000.00
Site Preparation	\$30,000.00
Construction of Boiler house	\$40,000.00
Supply and Installation of Boiler	\$208,150.00
Fuel Bunker/Silo	\$40,000.00
Fuel Handling and Feeding System	\$50,000.00
Relocation of Overhead Power Line	\$10,787.00
Installation of potable hot water system	\$10,000.00
TOTAL	\$438,937.00