

## THE BUSINESS CASE FOR BIOMASS BOILERS



### TECHNOLOGY OVERVIEW

Some agricultural wastes, such as farm stubble, animal bedding and forestry wastes, can be used to offset coal use in combustion boilers for process heat. Of the wastes available through red meat processing activities, dewatered paunch waste (PW) is the most promising and has been examined in research previously administered by AMPC and MLA.<sup>1</sup> This work found that up to 30% of boiler fuel needs could be met with PW, with no major ill-effects on the boiler.

### IS IT SUITABLE FOR YOUR MEAT PROCESSING FACILITY?

This technology is broadly applicable to the meat industry. However, the most important factors influencing the viability of a project is the logistics of supplying the biomass to the boiler, and preparing the biomass to meet the fuel specifications of the boiler. This is particularly important if the biomass is the only fuel for the boiler i.e. it is a dedicated biomass boiler.

If the biomass is co-fired with another fuel, such as coal, then a steady supply of biomass is less important but it is then necessary to consider the type of boiler. The most favourable projects would be those that use existing waste streams, such as PW, which currently have a disposal cost and can be burnt using an existing boiler.

### HOW TO DEVELOP YOUR BUSINESS CASE

The actions to take when developing a business case for biomass boilers include:

- Determine the availability of a suitable biomass supply
- Investigate the type of boiler used at the site
- Calculate the cost of fuel.

<sup>1</sup> <http://www.ampc.com.au/site/assets/media/Climate-Change/On-site-Energy-Generation-Research/Use-of-paunch-waste-as-a-boiler-fuel.pdf>

### THE AVAILABILITY OF A SUITABLE BIOMASS SUPPLY

Previous research administered by AMPC and MLA has shown that co-firing a sawdust boiler with 5% PW had no impact on the boiler, but increased the rate of ash formation. PW could provide up to 30% of fuel for a non-dedicated biomass boiler, however this could have an adverse impact on the operation of the boiler. The PW will need to be collected, dewatered and then transported to the boiler. It may also need to be stored near the boiler if the demand for heat and the constraints on the feeding of the biomass into the boiler do not match the rate of supply of the PW.

### THE TYPE OF BOILER USED AT THE SITE

Ideally, the site would have an existing boiler designed to burn moist solid material. A natural gas boiler will not be suitable, unless the biomass was converted to biogas via anaerobic digestion or pyrolysis then fed to the gas boiler.

A pulverised coal boiler is also unlikely to be suitable, although such boilers tend to be very large and used in the power generation industry. A moving grate boiler could be able to combust the biomass efficiently, depending on the homogeneity of the biofuel.

### THE COST OF FUEL

The economic feasibility of a biomass boiler project is strongly correlated to the cost of the biomass relative to the cost of the fuel it offsets (i.e. coal). While using on-site waste such as PW might be cost effective, purchasing off-site waste, such as forestry waste, and transporting it to site is likely to be less attractive.

### EXAMPLE COST-BENEFIT ANALYSIS

A large abattoir has a coal fired boiler and wants to reduce its fuel costs. PW is a potential source of biofuel and they have estimated that 25% of coal use could be replaced by PW. The coal costs \$80/tonne and has a heating value of 28GJ/tonne. The boiler currently uses 0.8 tonnes/hr of coal for 12 hours a day and 0.4 tonnes/hr for the other 12 hours of the day. The abattoir operates for 5 days per week for 50 weeks per year.

The site uses 3,600 tonnes of coal per year, at a cost of \$288,000. Approximately 900 tonnes of coal can be replaced by PW each year. This will reduce the cost of coal by \$72,000/year.

The PW has a calorific value of 10.4 GJ/wet tonne. Therefore approximately 2,450 tonnes of PW goes to the boiler each year, instead of being sent to landfill. As the cost of this disposal amounts to \$15/tonne, there is a further saving of \$36,750/year.

The cost to modify the boiler and add the systems to deal with the PW feed was found to be around \$250,000. The simple payback on the investment is 2.3 years. The key figures in this calculation are shown in the table below.

Fuel saving (\$ p.a.)	Reduced disposal cost (\$ p.a.)	Cost to upgrade boiler (\$)	Simple payback
72,000	36,750	250,000	2.3 years