

VIABILITY OF USING BIOGAS TO POWER A WATER CHILLER

CLARIFYING BIOMETHANE AND SMALL SCALE BIOGAS OPTIONS FOR AUSTRALIAN PIGGERIES



Recently, APL finished a hypothetical case study (based on a real 535 sow farrow to finish piggery in VIC) to explore the viability of biogas to powering an absorption chiller as well as for general electricity.

What is it

Biogas is a renewable source of energy that can be produced from organic matter. In our industry, this is mainly piggery effluent. Biogas has been around for years but, previously, uptake by piggeries in Australia has been affected by the perceived lack of viability for systems with less than 1000 sows.

How it works

Piggery effluent is collected in covered anaerobic ponds (or in some cases large tanks) where it is broken down by microorganisms that produce biogas which powers:

- Electricity
- An absorption chiller

Benefits

Biogas can be used on farms to generate electricity and therefore reduce running costs, but can also be used to directly power an absorption chiller to chill water. Sows provided with chilled water over the summer months experience less heat stress.

Scenario assumptions

Water requirements:

- 38L per lactating sow per day
 - Equal to 4600L per day for a 535 sow piggery
- Water cooled from 35°C to 18°C

Biogas required:

- 4m³ per hour at 65% methane

Capital Cost: \$657,700

Operating Cost: \$20,000 per annum

Benefit: LPG and electricity savings - \$105,170 + production benefit from chilled water in summer \$8,200

Payback: 6.4 – 7.9 years depending on finance

About the chiller

- Scenario would require a chiller retrofitter to be fuelled directly by biogas (rather than electricity); this is expected to be marginally more economical than purchasing and using a generator to burn and convert the biogas into electricity which would then be used to run the chiller.
- The chillers are not currently available in Australia, and would have to be imported in from Europe. It is possible the capital cost of this (which was higher than expected) could reduce over time, especially if an Australian market was developed.
- Also worth exploring would be chiller units that can cool and heat water simultaneously – heated water could then be used in the farrowing house/nurseries, and the cooled water could be used for sow drinking water and/or shed cooling.

Research conducted in Australia (2007) and South Korea (2006 and 2014) has demonstrated that lactating sows provided with chilled drinking water during summer have:



Increased feed and water intake



Increased milk production



Piglets with a higher average daily gain, which in turn results in a higher weaning weight (0.7kg in the Australian study, and 0.55-0.6kg in the Korean studies)



This could be worth up to \$61 per sow per year, or \$7625 per summer for a 500 sow piggery.