



**Project Number & Title:**

4C-114 - Options for cost-effective and efficient use of piggery biogas energy

**Project Leader:** Alan Skerman

**Project Participants:**

Department of Agriculture and Fisheries; Simons Green Energy.

**Aims and Objectives:**

To investigate and evaluate the feasibility of implementing a range of alternative uses for biogas generated by Australian piggeries, focusing on biogas-fuelled tri-generation systems to provide electrical power, heating and cooling.

**Key Findings**

- Whilst site specific assessment is recommended, annual methane (CH<sub>4</sub>) capture by covered anaerobic lagoons (CALs) at Australian piggeries is conservatively estimated at 19 m<sup>3</sup> CH<sub>4</sub> per standard pig unit (SPU), assuming that the raw effluent is screened prior to discharge into the CAL.
- This CH<sub>4</sub> volume can provide 177 kWh (637 MJ) of primary energy per SPU annually, which may be converted to approximately 142 kWh of thermal energy in a hot water boiler (80% efficiency), or 53 kWh (191 MJ) of electrical energy (30% efficiency) and 88 kWh (318 MJ) of thermal energy (50% efficiency) per SPU annually, in a cogeneration system.
- To maximise the benefits from the growing adoption of biogas capture, treatment and use systems, producers will require access to a range of robust, practical, cost-effective technologies and appliances, which can be tailored to match on-farm energy production and use, and cost-effective export of any excess energy.
- Hot water boilers and cogeneration (CHP) systems are likely to continue to be the main biogas use options used at many piggeries.
- The current lack of cost-effective absorption chillers within the required energy range and their unsuitability for large-scale space cooling applications may limit industry uptake of trigeneration systems, in the medium term.
- Feasibility studies identified several alternative biogas energy use options including chilling sow drinking water, sow cooling and tallow tank heating, in addition to current uses such as piglet nest and shed space heating.
- The biogas use options recommended in the Feasibility Studies employed a combination of hot water boilers and cogeneration units, resulting in overall return on investment (RoI) ranging from 12 to 25% and payback periods of 4 to 8 years.
- The use of biogas as a fuel for pig transporting trucks and farm tractors does not appear to be financially viable currently, given the technical and operational demands associated with biogas upgrading and compression for on-board storage.
- There appears to be limited scope for Australian piggeries to supply biomethane into a centralised natural gas grid, given the cost and level of technology required for upgrading biogas to the required standard.

**Application to Industry**

The research findings from this project are expected to assist pork producers and industry service providers in planning biogas capture and use systems, and in selecting a range of practical, cost-effective uses for the available biogas. Adoption of the options outlined in this report will mitigate the economic risks associated with implementing biogas use systems, resulting in reduced farm energy and production costs, and lower greenhouse gas emissions from individual farms and the wider industry.

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