

# Energy Savers Plus Program

targets significant energy savings for  
Queensland meat processors

PROPOSED SOLUTION 

Potential site energy savings

16%

## Key facts

### Farm / Industry

Beef Cattle, Sheep & Pigs

### Product

Meat processing

Production Metric:  
Hot Standard Carcass Weight (HSCW)

### Location

Southern Queensland

### Case Study Focus

Hot water generation

### Solution

Proposed: CO<sub>2</sub> heat pump installation

## Site profiles

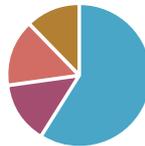
Energy audits were completed for several meat processors in Southern Queensland that process mainly beef cattle as well as sheep and pigs. Whilst the majority of site energy consumption is refrigeration significant energy consumption is associated with production of hot water for wash down purposes.

Hot water is generated primarily using LPG instantaneous burners to reach a temperature of 60°C for wash down purposes or around 80°C for sterilisation. LPG is stored on site in cylinders or in large vessels that are replenished regularly.

## Typical energy demand

### Typical Site Energy Consumption Breakdown

Refrigeration = 59%  
Compressed Air = 14%  
Hot Water (gas) = 15%  
Other = 12%



Total = 4,687 GJ p.a.

Post implementation total usage would reduce to 3807 GJ p.a. after electric CO<sub>2</sub> heat pumps introduced across three sites.

## Action

Audits of site energy consumption evaluated:

- CO<sub>2</sub> heat pump installation
- Refrigeration plant heat recovery system

## Outcome

Across all 3 sites a total site energy saving of an average of 16% would be achieved by implementing CO<sub>2</sub> heat pumps.

## Results

A common outcome across the multiple meat processing sites was that due to the relatively high cost of LPG at the sites in comparison with electricity the cost saving opportunity presented was to replace the LPG burners with electrically powered CO<sub>2</sub> heat pumps.

Hot water at 60°C can be very efficiently generated by CO<sub>2</sub> heat pumps, which is sufficient for the majority of hot water requirements in the meat processing facilities. 80°C water for sterilisation can be generated using an alternative booster system as required. Recommendations from the audits include installation of different sized heat pumps at each site to replace the LPG burners.

CO<sub>2</sub> heat pumps are also eligible for Small-scale technology certificates (STCs) under the Clean Energy Regulator Small-scale Renewable Energy Scheme, which will reduce the initial capital cost of the system. The financial results of the installation of heat pump systems at each site are listed in the table below where the STC rebate has been taken into account.

In some circumstances, operators should consider heat recovery from refrigeration equipment when establishing new systems to reduce the cost of hot water.

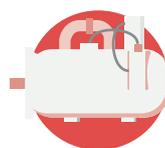
The Energy Savers Plus Program is funded by the Queensland Department of Energy and Water Supply



# Recommendations

The energy audit recommendations are summarised below:

## Solution



### CO<sub>2</sub> heat pump installation

Site	Site A	Site B	Site C
Est. electricity consumption of CO <sub>2</sub> heat pump systems (kWh/annum)	81,424	12,046	2,025
Est. LPG saving (per annum)	1,173 GJ 325,833 kWh	244 GJ 67,778 kWh	36 GJ 10,000 kWh
Nett Est. energy saving (kWh/annum)	244,409	55,732	7,975
Est. operating cost saving	\$32,881	\$11,633	\$1,432
Est. cost to implement	\$138,000	\$37,000	\$7,000
Payback period (years)	4.2	3.2	4.9
<b>Est. energy savings*</b>	<b>75%</b>	<b>82%</b>	<b>80%</b>

\*kWh savings calculated on conversion from LPG to CO<sub>2</sub> pump energy equivalent.

### Forecast savings in site production costs following HWS upgrades

	Site A	Site B	Site C
Baseline Electricity consumption (per tonne)	260 kWh	230 kWh	200 kWh
Baseline Gas consumption (per tonne)	0.31 GJ 86 kWh	0.41 GJ 114 kWh	0.17 GJ 47 kWh
Total Energy consumption (per tonne)	346 kWh	344 kWh	247 kWh
Energy savings (per tonne)	65 kWh	67 kWh	28 kWh
<b>Total energy consumption following implementation (per tonne)</b>	<b>281 kWh</b>	<b>277 kWh</b>	<b>219 kWh</b>

## Quick Wins

### Lower Wash Down Temp:

At one site the hot water system was providing water at 80 degrees which is higher temp than required. Accordingly, a mixing valve was recommended to reduce temperature with a cost of \$6000 and a payback period of 1.4 years.