

Heat pumps



A heat pump will reduce your energy usage, but care needs to be taken when selecting equipment and securing performance guarantees with a clear recourse for non-performance.

How much could you save with a heat pump?

See Figure D (on next page) for a quick estimation of your annual energy cost for hot water heating using a typical resistance heater.

There are two main options for implementing a heat pump for water heating:

- Partial heating with a low temperature heat pump to 65°C then resistance boosting, which can reduce heating energy consumption by 50 per cent.
- Full heating to 82°C using a high temperature CO₂ heat pump to reduce heating energy by more than 60 per cent.

To learn more about heat pumps and how they can save energy, please refer to **Technical Guidelines for Commercial and Industrial Air Source Heat Pumps** from the Victorian Department of Energy, Environment and Climate Action (DEECA). The Guidelines include dairy farm-specific advice and case studies.

A high-temperature heat pump will typically reduce your hot water heating energy by more than 60 per cent. For example, a dairy shed using 1,200 litres of water per day with an electricity tariff of \$0.20 per kilowatt-hour (kWh) will record an annual saving of around \$4,500.

A typical system will cost \$15,000 to \$20,000 to install giving a payback of three to five years.

Issues to be aware of with heat pumps

Domestic hot water heat pumps

Around 2010, residential grade domestic heat pump water heaters were installed on many dairy farms – and a large majority of these are no longer in use. These domestic grade units were designed to operate with clean town water rather than bore or river water, so experienced scaling on heat transfer surfaces which caused performance issues.

Heat pump performance

Electrical, water and temperature metering should be installed to ensure the guaranteed heat pump performance is achieved. It is recommended that commissioning and performance testing be included with the supply of the heat pump and a retention of at least 10 per cent of the capital cost until full performance testing is complete.

Back-up resistance heating systems

Some heat pump systems with back-up resistance heaters do not display a clear fault when the heat pump is malfunctioning.

Unless good energy monitoring is in place, the first indication of a fault with the heat pump may be extreme bill shock when the monthly or quarterly bill arrives and has increased. Or worse, the increase in energy costs may be overlooked or considered evidence that efficiency claims of heat pumps are false, and the additional costs are received for an extended period of time.

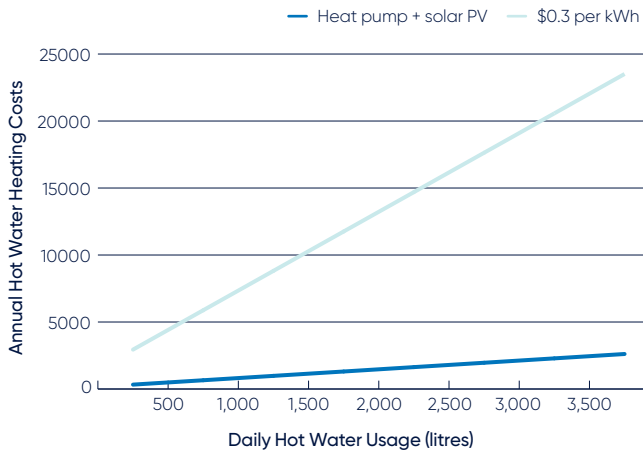
TIPS

Use the procurement guide in the **Technical Guidelines for Commercial and Industrial Air Source Heat Pumps** from DEECA paying special attention to the section on performance guarantees.

Savings from heat pumps

Coupled with a well-sized solar PV system, a heat pump can provide large savings compared to a site on a tariff of \$0.30/kWh as shown below. For a site using 1,000 litres of hot water per day, the difference in annual energy costs is nearly \$9,000.

Figure D Comparing best practice heat pump with solar PV vs standard resistance heating with an electricity tariff of \$0.30/kWh



Assumptions:

- Fifteen per cent heat losses.
- Average water inlet temperature 15°C, target hot water temperature 82°C.
- Heat pump coefficient of performance (COP) of three.

