

Energy Efficient Pool Pumps

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Domestic swimming pools contribute up to 15% of the typical household electricity bill. Energy efficient pool pumps are available allowing households to significantly lower this cost.

Introduction

Over 10% of Australian households have a swimming pool (or spa). Pools require regular filtering to keep them in good condition adding over \$600 to the annual electricity bill. Installing an energy efficient pool pump significantly reduces electricity costs.

Pool Pumps have been added to the Energy Rating Labelling scheme. The labels allow households to compare the energy efficiency of different pool pumps.

Energy Efficient Pumps

The Australian Government has added pool pumps to the energy efficiency labelling scheme. The labels use a simple star rating so households can quickly compare the energy efficiency of different pumps. Examples of the labels are shown below.



Example Pool Pump Energy Rating Labels

Pool pump star ratings start at 1 star (inefficient) through to 10 stars (efficient). The scheme is voluntary so manufacturers generally label their energy efficient pumps.

Assumption: An unlabelled pump is likely to have a low star rating

Annual Cost to run the pump

The star rating is based on the energy use of the pump. The following figure plots the annual cost to run the pump against the star rating.

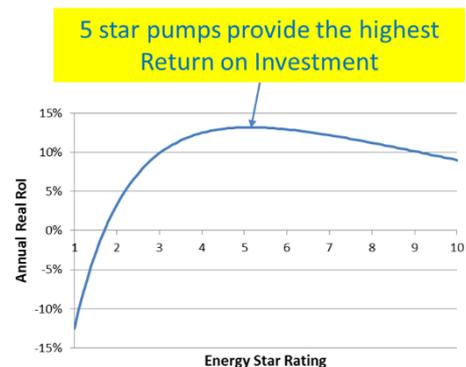


Annual cost of electricity against pump star rating

The figure shows the higher the pump's star rating the lower the annual electricity bill. For example replacing a 1 star pump with a 9 star pump potentially saves \$507 a year.

Optimum Star Rating

Treating the installation of an energy efficient pool pump as an investment reveals there is an optimum star rating. The optimum pump size depends on the installed cost of the energy efficient pump and resulting energy savings. For example:

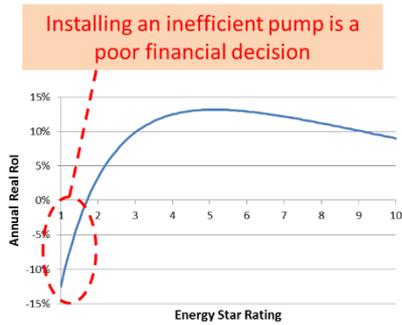


Return on Investment for star rated pool pumps

The above figure calculates the Return on Investment for different star rated pumps. The figure shows that using current pump prices installing a 5 star energy rated pump provides the optimum Return on Investment.

Replacing a failed pump

Households must replace their pool pump when it fails. The Return on Investment calculation shows installing an identical (inefficient) pump represents a missed opportunity to make significant savings.



Installing an inefficient pump is a poor investment

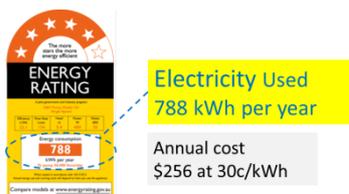
While 1 to 2 star pumps are inexpensive to purchase they are expensive to run. The Return on Investment calculation shows reinstalling an inefficient pump results in a financial loss (negative return on investment). The conclusion is that when the pump fails they should upgrade to an energy efficient pump.

Useful information on the energy label

Energy efficiency labels include more useful information households can use to choose their new energy efficient pool pump.

Projected Annual Energy Consumption

The energy label shows the Projected Annual Energy Consumption. This is the amount of electricity required to pump 50,000 litres of water through the pump every day for a year. The figure can be used to estimate the annual cost to run the pump.



Electricity use per year is shown on the label

The annual electricity cost is calculated by multiplying the figure shown on the label by the cost of electricity. The cost of electricity depends on their electricity tariff and is shown on the quarterly electricity bill.

Note that 50,000 litres is typical for a domestic swimming pool. Spas are smaller and require less filtering so the energy cost should be reduced.

Noise Level when running

The new energy rating labels allow pump manufacturers to (optionally) show how loud the pump is when running.

More than twice as loud as normal conversation

| | | | | | |
|-----------|-------------------------|------------------------|----------------|-----------------|-----------------|
| 1 ½ Stars | Efficiency L/Wh 10.3 | Flow Rate L/min 296 | Head m 15.7 | Power W 1725 | Noise dBA 74 |
| 5 Stars | Efficiency L/Wh 23.1 | Flow Rate L/min 174 | Head m 5.4 | Power W 450 | Noise dBA 55 |

Significantly quieter than normal conversation

Examples of noise levels shown on rating labels

Two rating labels with noise levels are shown above. The label at the top indicates when running the pump generates 74dBA of noise. As a guide normal conversation is around 60dBA. The 74dBA pump is more than twice as loud as normal conversation.

The second label shows a noise level of 55dBA. This is noticeably quieter than normal conversation. After installing a quieter pump households may choose to further reduce energy costs by running the pump in off-peak periods (mostly overnight).

Switching to off-peak rates potentially halves the running cost. For example assuming 30c/kWh the 5 star pump has an annual running cost of \$250. Running the pump during off-peak times on a time of use tariff could halve the cost to \$125 (assuming an off-peak rate of 15c/kWh).

Flow Rate

Households should only run the pump for as long as necessary to keep the pool in good condition. Running for longer periods increases running costs. Energy efficient pumps typically have a lower flow rate and must be run for longer (similar to driving a car quickly takes less time but uses more fuel). After installing an energy efficient pump households should adjust the length of time the pump is operated. The rating label provides guidance on how long the pump should be run.

The 1 ½ star pump will take 2 hours 50 minutes to filter 50,000 litres of water

| | | | | | |
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The 5 star pump will take 4 hours 50 minutes to filter 50,000 litres of water

Using flow rate to calculate pump run time

The above figure provides two examples of flow rates shown on ratings labels. It uses the provided flow

rates to calculate the run time needed to filter 50,000 litres of water.

Other Considerations

The installation of an energy efficient pump may require the household to make other changes.

Automatic Pool Cleaners

Many pool owners rely on automatic pool cleaners to remove leaves and dust falling into the pool. These may not operate effectively when used with the low flow rates of energy efficient pumps.

Some energy efficient pumps allow the flow rate to be increased for use with a pool cleaner. While this allows the existing automatic pool cleaner to be used the higher flow rate reduces potential energy savings decreasing the benefit of installing an energy efficient pump.

An alternative is to install an automatic cleaner which is independent of the filter pump. Separating the pool cleaning from the pool filtering enables the household to gain the full benefit of installing an efficient pump.

Pool Heaters

Households using a pool heater should check if there is a minimum flow rate through the heater. Too low a flow rate may result in overheating and damage to the system. The manufacturer of the pool heater should be able to provide the necessary advice.

Note: If the heater uses a separate pump then it is only when the household is considering changing the heater pump that the flow rate should be checked.

Salt Water Chlorinators

Some early salt water chlorinators may not be suitable for use with low flow rate pumps. Households should check with the manufacturer of their chlorinator unit before installing pumps with a lower flow rate.

Conclusion

The installation of an energy efficient pool pump can significantly reduce the electricity costs of pool filtering. For example choosing a 9 star pump over a 1 star pump can reduce annual electricity costs by more than \$500.

Households are encouraged to consider both the star rating *AND* the purchase price of the new pump. Calculating the Return on Investment reveals 5 star pumps currently provide the best financial return.

Citation

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Comments or Questions?

The author is happy to receive comments or questions about this article. He can be contacted at martin@drmartingill.com.au.

References

Australian Standard AS5102 : Performance of household electrical appliances-Swimming pool pump units. Parts 1 and 2.

Energy Rating Website (www.energyrating.gov.au)

Loudness Scale

(www.gcaudio.com/resources/howtos/loudness.html)

Points of Clarification

Expert advice

Each pool installation is slightly different. After installation the flow rate of an energy efficient pump should be adjusted to suit the particular installation. Households are encouraged to seek expert advice when upgrading to an energy efficient pump.

Return on Investment Calculations

The Return on Investment calculation has assumed the lifetime of the pump is 8 years. Over this period electricity prices are considered to rise in line with the consumer price index (inflation).

Pump Prices used in this article

Pool pump prices were obtained after reviewing Australian websites in October 2015. The prices include GST and installation. For the ROI calculations the pump price was assumed to be:

$$\text{Price} = \$211 \times \text{Star Rating} + \$350$$

Electricity Costs in this article

Electricity tariffs vary widely. This article has assumed a 'typical' price of 30c/kWh. Households on different tariffs should consider the rate they are paying when running their pool pump.

The annual costs are based on pumping 50,000 litres of water each day. Households should adjust costs to suit the installed size of their pool.

Australian Standard Measurements

The star rating and Projected Annual Energy Consumption shown on the energy efficiency label is the result of testing under specific laboratory conditions. Actual consumption will vary depending on numerous practical factors. In common with the fuel rating shown on modern cars actual electricity use will probably be higher than indicated on the label.

Variable Speed Controllers

Variable speed controllers can be used to reduce the speed of the existing pump and consequently reduce electricity use. Typical claimed energy savings are similar to a 6 star pump.

Online prices of variable speed controllers are similar to 6 star rated pumps. If the existing pump is more than a few years old replacing it with an energy efficient pump is probably a better financial investment than installing a variable speed controller.

About Dr Martin Gill

Dr Gill specialises in the provision of advice and data analysis to the energy industry. As a consultant he has prepared advice for government regulators, distributors, retailers, consumers, asset operators and equipment vendors.

Dr Gill has lead teams researching and developing new products across a broad range of industries, including advanced communication modems, burglar alarms, high voltage fault monitors and power quality analysers. One of his teams developed the first in home display and web-portal providing Australian customers the ability to view their electricity use. This innovation was recognised with the Green Globe Award, NSW Government's Premier's Award and Best New Product by the Australian Electrical and Electronics Manufacturers Association.