

MINIMISING YOUR POOL'S ENERGY CONSUMPTION

GUIDE NOTE



KEY POINTS

- Pool pumps are the second biggest user of electricity in Australian homes after hot water systems.
- Pool pump motors are often more powerful and run longer and much faster than required.
- Significant dollar and carbon savings can be achieved by adjusting the pump's speed and run times to achieve maximum efficiency – by installing a controller or a variable speed and energy efficient pump.
- There is no negative impact on water quality, keeping your pool pristine.

THE CHALLENGE

Pools can be a major contributor to energy consumption. The challenge is to reduce the energy demands of the pumping systems for the pool's filtration, chlorination and solar heating without compromising water quality or the pool's thermal performance.

THE OPPORTUNITY

Heating and cleaning pools is energy intensive and the cost of energy is increasing. For example, in July 2017 three major energy retailers in Australia increased the prices for electricity and gas by ~20%¹.

One in every ten Australian homes has a pool, but it may come as a surprise to many householders to know that their pool pump is the second biggest user of electricity after their hot water system, contributing significantly to their power bills. Likewise, on a commercial scale, heating and filtering public pool facilities are expensive for councils and businesses. There is also a considerable cost for the environment, with pools responsible for around half a



CRC for Low Carbon Living

The CRC for Low Carbon Living (CRCLCL) is a national research and innovation hub that seeks to enable a globally competitive low carbon built environment sector and is supported by the Commonwealth Government's Cooperative Research Centres (CRC) programme.

With a focus on collaborative innovation, the CRCLCL brings together property, planning, engineering and policy organisations with leading Australian researchers. The CRCLCL develops new social, technological and policy tools for facilitating the development of low carbon products and services to reduce greenhouse gas emissions in the built environment. For more information visit www.lowcarbonlivingcrc.com.au/

percent of Australia's total annual greenhouse gas emissions, or about three megatonnes of carbon, each year.

The good news is that this presents a huge opportunity to reduce peak demand on the electricity network and contribute to sustainability targets while achieving real dollar savings - and it's easier and cheaper to do than you might think.

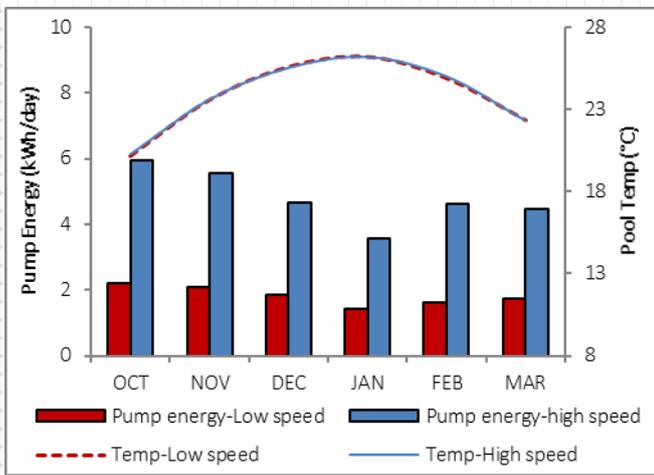
OUR RESEARCH

Our research looked at a typical residential pool heating system and the impact of running an 8 star variable speed pump (Viron eVo P280) at different intensities. We also investigated the impacts of running the pump at low speed on the solar pool heating system, pool chlorinator, pool cleaner, and pool water quality.

Pool heating

We now have robust evidence to establish that by operating a three-speed pump at low speed and adjusting the throttle valve properly, residential pool owners can see a 250% increase in the amount of heat produced by their pool heating system, for every unit of energy consumed. This leads to energy and **cost savings of around 60%** in comparison to the 'business as usual' operation of a solar pool heating system using a typical single speed pump (Fig. 1).

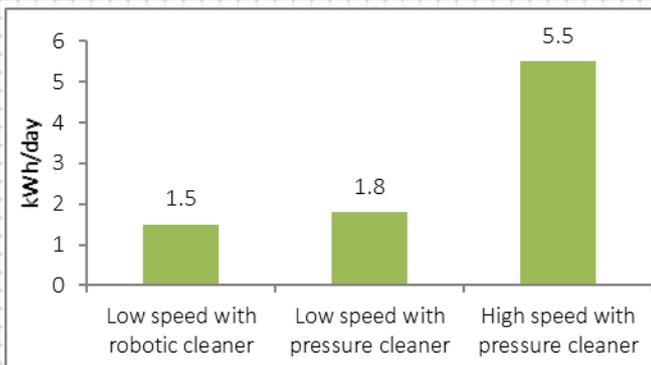
¹Electricity price rises locked in from July 1, 2017: <http://www.news.com.au/finance/small-business/electricity-price-rises-locked-in-from-july-1-2017/news-story/0bad2dcddc1a3040c4abbf07d25cb7fc>
RP1014: Optimising the energy efficiency of pool pumps



Pool filtration

As for pool filtration systems, we concluded that retrofitting a variable speed pump and a robotic cleaner can achieve **savings of over 70%** on electricity bills (Fig. 2).

Overall, for heating and filtration, these relatively minor upgrades translate to real dollar savings of nearly 70%, and pool owners can still enjoy acceptable pool thermal conditions and excellent water quality.



VALUE PROPOSITION

- **Savings:** Save up to 60% for solar pool heating, and 70% for the pool filtration system in comparison to the business as usual case. Further reductions in energy usage can be achieved with the installation of robotic (as opposed to pressure) pool cleaners.
- **Quality:** See no reduction in pool water quality, and significantly improved water quality with the use of robotic pool cleaners.
- **Simplicity:** Installing a variable or multi-speed pump is as easy as engaging your local qualified technician, who should be able to complete the job within a couple of hours. Once installed, the pumps are ‘set and forget’ – they don’t require specialist knowledge. No manual work is required to clean the pool except to sweep the steps or collect the debris on pool surface if a robotic pool cleaner is used.
- **Compatibility:** Variable or multi-speed pumps are compatible with all pools.
- **Affordability:** Upgrade costs are low relative to gains. A typical single speed pool pump costs in the order of \$775, while the variable speed pump used in the study was just

\$1150 and cost around \$300 to install. Typical robotic cleaners cost around \$1500, with no installation cost.

- **Leadership:** Positively influence the behaviour of friends and neighbours by demonstrating the benefits of having an energy efficient pool.
- **Impact:** Reduce CO₂ emissions and peak electricity demand.

Two types of pool cleaners - pressure cleaner and robotic cleaner



Run your pool filtration system off a PV?

If you own a pool and have a solar photovoltaic system on your roof then the great news is that you may run the pool filtration system off the PV. On a sunny day, you can run your efficient pool filtering system using solar electricity from your own roof while still having sufficient PV output left for other appliances. What’s more important is that, even on a cloudy day a typical solar PV system can still supply the majority of the electricity required to keep your pool clean!

FURTHER INFORMATION

For more information about this project, please contact:

CRC For Low Carbon Living W: lowcarbonlivingcrc.com.au
 E: s.summerhayes@unsw.edu.au T: +61 2 9385 0394

AUTHORS

Assoc. Prof. Alistair Sproul
 Faculty of Engineering
 UNSW

Jianzhou Zhao
 Faculty of Engineering
 UNSW

REFERENCES

1. AstralPool, E-series Pump. Technical specifications. <https://www.astralpool.com.au/products/pumps/eseriespump>.
2. Ausgrid, Pool & Spa Guide - Swimming pool efficiency.
3. DEE, Consultation Regulation Impact Statement - Swimming Pool Pumps, Department of the Environment and Energy, Commonwealth of Australia, 2016.
4. Energy Efficient Strategies, Energy use in the Australian residential sector 1986-2020. Department of the Environment, Water, Heritage and the Arts. Commonwealth of Australia, 2008.
5. Woolcott Research and Engagement, Pool Pumps: An Investigation of Swimming Pool Pumps in Australian and New Zealand, Department of the Environment and Energy, Energy Rating Australia, 2016.