

Want to use less power to pump your water?

Lodi Pameijer

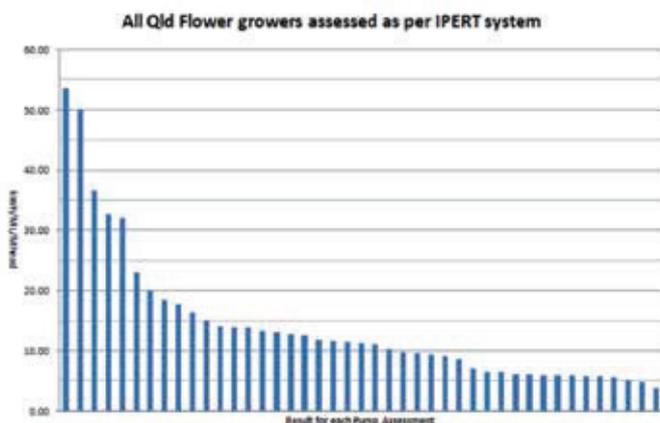


Feeling the increasing cost of electricity for pumping water to your crops?

How does the running cost of your pump rate?

FAQI has been recording a key measure for flower growers throughout Queensland. The measure is kilowatt hours per megalitre per meter head (kWh/ML/m Head). This measures the amount of energy (electricity, petrol, or diesel) to pump one megalitre of water for each meter of head.

The graph below shows the results of the Pump Assessments where this measure was calculated.



If you have had a Pumping System Assessment carried out by FAQI at your business you can compare your result with other businesses. A useful benchmark is 5 kWh/ML/m head. Only three pumps measured across Queensland have achieved this. If your assessment indicates levels above this benchmark, action is required as you are using too much energy to apply water to your plants.

If you have not had a Pump Assessment carried out on your farm, then you can assess your pump's performance yourself to get an approximate benchmark number.

The following information is an excerpt from an original article written by Lex McMullin as part of the RWUE 4 project for the Nursery and Garden Industry Queensland. It explains some of the issues with pumps and how you can go about calculating your pump's efficiency.

Lex is now also working with the Flower Association of Queensland Inc. to support the RWUE-IF project outcomes by delivering his technical support to the project.

Pumping efficiency

As with all machinery, pumping systems will decline in efficiency over time, either due to abnormal operating conditions, or through normal wear and tear. To keep the system functioning at peak efficiency it's important to monitor pumping performance on a regular basis, but it can be difficult to pick up gradual declines in performance by observation only. Unless regular checks on the system are made, it's likely the decline in efficiency won't be noticed, until the system fails to the point where there are significant equipment and or crop losses.

"The irrigation industry has a method of determining efficiency of a given pump setup, which can be compared against benchmark figures and is expressed as kWh/ML/m head."

Regular testing of operating pressures at the pump, and throughout the irrigation system, is a quick way of checking for reductions in performance and efficiency. Pump efficiency is only one of the factors that will affect pressure within the system, but if the pressure at the pump changes for a given pumping situation, further investigations should be made to determine if the pump efficiency has declined.

The irrigation industry has a method of determining efficiency of a given pumping setup, which can then be compared against benchmark figures, and is expressed as kilowatt hours/megalitre/metre head, abbreviated as kWh/ML/m head. If the electricity consumption, pumping rate and operating pressure are known, this figure can be calculated and compared against an industry benchmark, or against the previous performance of the system. It can be quite a challenge to derive these figures in flower growing situations, due to the complex nature of the many different irrigation systems. For example, the efficiency of a pump depends on the flow rate being generated and, in many situations, the flow rate can be quite variable. The best way to compare system efficiency over time would be to have a standard test situation, e.g. do the test when a certain irrigation zone is running. Alternatively, measuring the



efficiency of the system when different zones are running, may give information on how the system could be managed better to reduce pumping costs by increasing pump efficiency.

Flow rates can be calculated by measuring the flow from a number of emitters and multiplying emitter flow rate by the number of emitters in the irrigation zone. If the pump has a dedicated electricity meter, the electricity use can be measured directly, or it may be possible to turn off all other appliances and take a direct meter reading.

How to measure kWh/ML

When a 1kW pump is applying water to your flower crop and it is delivering 10,000 litres per hour at a pressure head of 20 metres (about 200kPa), then after a day's irrigation (8 hours), the pump has delivered 80,000 litres (0.08ML) while consuming 8kWh. The specific power consumption in this case for a megalitre is:

$$= 8\text{kWh} / 0.08\text{ML} = 100\text{kWh/ML}$$

To calculate the cost of pumping a Megalitre of water, assuming a cost of 22 cents per kWh, this equates to \$22.00 per ML.

How to calculate kWh/ML/m head

To calculate the benchmark figure divide the kWh/ML by the Meter head of 20 and the result is 5 kWh/ML/m head.

For this example we have used round figures to help the understanding of the calculations. This is not meant to reflect the actual figures of any particular pump.

The benchmark figure for an efficient pumping system is a calculated value less than 5 kWh/ML/m head, but the small pumps commonly used in the flower industry are notoriously inefficient, and are frequently higher than this benchmark figure. Consequently, in many flower farm situations, the aim should be to start with the best efficiency system achievable and aim to maintain the efficiency as close as possible to the installed efficiency. 🐾

The Rural Water Use Efficiency-Irrigation Futures (RWUE-IF) for the Queensland flower industry is a project managed by FAQI and funded by the Queensland Government Department of Natural Resources and Mines (DNRM).



Improving irrigation management for a profitable and sustainable future

Winning with Water

Find Us On Facebook



Scan To "Like" Us

Scan with smart phone. You may have to download QR Code app.