Farm Water Futures

What's that Electric pump costing you?

Pumping efficiency tests completed as part of system auditing within the Rural Water Use Efficiency Initiative found that many systems are operating inefficiently and costing growers more than is required.

Introduction

There are a number of reasons for inefficient operating:

- Worn pumps
- Poor pumpselection
- Improper motorsize
- Changes in application systems (big gun – drip tape).

This Farm Water Futures sheet provides information enabling you to determine pump costs. By repeatedly checking the system over a period of time you will be able to develop maintenance programs and determine replacement recovery costs.

When the irrigation system was originally designed, a pump would have been chosen to provide sufficient head pressure, including friction losses, so that the sprinkler located at the highest point in the irrigation block operated efficiently.

Invariably you would not have been provided with a projected operational cost for the life of the pump. Figures show that initial purchase price is only five per cent of the total cost over a ten-year period (electrical driven units).

Over time farming practices may have changed, new irrigation systems may have been purchased, water supply may have varied and/or the pumping unit has become worn. All these factors can contribute to an increase in costs that will directly affect your profit margin.

How to determine pumping costs

The measurements required to calculate costs are:

- Electricity consumption (killowatts) per hour (kW/hr)
- Flow rate (litres per second L/s)
- Pump operating pressure (psi or kPa)
- Tariff rate – on your electricity bill ($ or c/kWh)

What does this all cost?

Current benchmarks for electrical pumping costs are:

- High cost per ML: above 70c/mhead/ML
- Moderate cost per ML: 50-70c/mhead/ML
- Low cost per ML: less than 50c/mhead/ML

(mhead = metres head)

Based on a pump efficiency of 70%.

Using the information that has been collected for determining pump efficiency and your tariff rate, the following calculations can be made to determine the cost of running your pump and to compare with the benchmark figure.

The equation that is used to calculate **c/mhead/ML is:**

c/mhead/ML = [($/***ML***) x 100] ÷ **A**

1. First we will calculate kWh/ML

kWh / ML = *kW* ÷ (Q x 0.036)

Where kW = electricity used

Q = flow rate measured in L/s

0.0036 = a constant to convert kW/L to kWh/ML

To find the kQ used, you will record your energy meter twice and the time between readings.

Power used = reading 2_____kWh – reading 1_____kWh = kWh

kW = power used ÷ (minutes between readings ÷ 60)
= _____kWh ÷ (_____minutes ÷ 60)
= _____kW

To find the flow rate Q

You will record your water meter twice and time between readings.

Water used = reading 2 _____L – reading 1 _____L
= _____L
Flow rate Q = water used_____L ÷ (minutes between readings_____minutes x 60)
=_____L/s

kWh/ML = *kW*_____*kW* ÷ (*Q*_____*L/s* x 0.0036)

2. Next we calculate $/ML

To calculate this, you will need the kWh/ML you just found in Step 1 and $/kWh is your electricity tariff, e.g. 25c/kWh or $0.25/kWh.

$/***ML*** = ($/*kWh*) x (*kWh/ML*)

3. To get the final benchmark figure

You will need to divide by A, which is the metres of head, or operating pressure measured at the pump. There is a conversion for psi or kPa depending on your pressure gauge.

A = mhead = kPa x 0.102 **or** psi x **0.7**

So then you will use the $/ML from step 2 to get the benchmarked figure.

c/mhead/ML **=** [($/ML_____) x 100 ÷ *A*_____*mhead*

Then you can compare to the benchmarkng costs and check how much your pump is costing you.

For more details contact Growcom on 07 3620 3844.

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