RURAL WATER USE EFFICIENCY IRRIGATION FUTURES

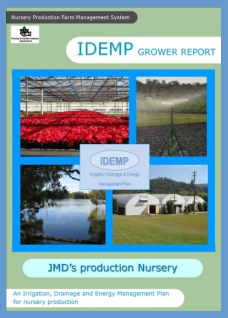
Improving irrigation management for a profitable and sustainable future

Queensland Government

Supported by the Qld Government
Department of Natural Resources and Mines

Irrigation, Drainage & Energy Management Plans (IDEMP) describe the infrastructure and management practices in operation at a production nursery and outline plans, designs, suggestions and opportunities for on-farm system and equipment improvements and upgrades.

IDEMPs support growers in nursery production to address both economic and environmental issues relating to water access, recycling, storage and use to ensure the business remains profitable and sustainable into the future.



IDEMP
Irrigation Drainage & Energy
Management Plan

Nursery & Garden Industry Queensland

The Pipeline

An electronic update on Nursery Production RWUE-IF project activities

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Nursery Production Rural Water Use Efficiency—Irrigation Futures (NGIQ RWUE-IF)

IN THIS PIPELINE

Video

See the latest video on calibrating pH and EC meters at — https://youtu.be/DYjFVODA2mE

DATE CLAIMERS

Growing media workshop - Thursday 1st December at Greenfingers Potting Mix

Nursery Production Farm Management System Energy Field Day

Thursday September fifteen provided the opportunity for more than thirty growers to attend a 'water and energy efficiency field day' at Aspley Nursery's Hunt Road site at Burpengary. The field day was organised under the Rural Water Use Efficiency – Irrigation Futures project, in conjunction with the Queensland Farmers Federation (QFF) Energy Savers Program, designed to highlight energy saving options and facilitate solutions to grower's energy issues.

Steve Hart welcomed attendees to the event and introduced Robert Percy who provided a history of Aspley Nursery's operation from its humble beginnings as a retail nursery, to its current position as a leading landscape supply nursery. Andrew Chamberlin, QFF Energy Project Manager explained the partnership between QFF, Ergon Energy and the Queensland State Government and the benefits available to industry emanating from the Energy Savers Program.

Brad Maltby from Renpro spoke on energy auditing; the intricacies of conducting an audit, the expected outcomes, and just how the upgrades and improvements can directly relate to improved on-farm energy efficiency. Energex's Glen Kolpak provided some background on the meaning of 'peak demand' and 'network peak demand'. Glen also highlighted the increasing pressure on the energy supply network and how programs such as the QFF Energy Savers Program assists in reducing, not only grower energy costs, but also the pressure to build additional network infrastructure.

Yolande Pepperall from the Clean Energy Finance Corporation and Ryan Dillon from the Websters Group provided data on finance options for on-farm energy saving initiatives.

Darren Dodson from Total Water Services and Jason Bickley from Grundfos Australia presented information on energy efficient pumping, along with a practical display on solar pumping that attracted a great deal of interest.

Tim Biggers from Palmwood Tropicals at Obi Obi provided a practical example of the issues his nursery encountered in attempting to reduce their energy consumption and their energy costs.

Noel Percy from Aspley Nursery presented a history of their involvement in the Ergon Energy and QFF Energy Savers Program dating back to 2015, when Aspley Nursery first received an energy audit. The audit highlighted opportunities for on-farm energy and water saving improvements, and over time the nursery worked through these as outlined in the energy audit report. Noel Percy stated 'Total water and

IDEMP Video and Technical Information

For an introduction to IDEMPs go to the following link to see a video explaining more— http://youtu.be/1YQXpO6IBYQ . For technical information visit the NGIQ Technical Information Library at www.ngiq.asn.au/technical-information or click on the resources tab on the home page.

energy efficiency installation costs at the Hunt Road site were $14,432, and this capital outlay was recovered in 12 months'. Aspley Nursery is further investigating a solar PV system with a projected three year payback period as the next investment in their nursery energy efficiency strategy.

The Nursery Production Farm Management System 'Energy Field Day' concluded with a guided tour of the nursery production facilities at Aspley Nursery's Hunt Road site.

Pumping Energy Costing

As the cost of energy, and the pressure to reduce greenhouse gas emissions increases and combines with the problems energy supply companies have maintaining supply during peak times, the issue of energy efficiency becomes much more important. Field tests have shown there is a large variation in pump efficiencies and costs in many of the irrigation sectors in Queensland, and the nursery industry is no different. On-farm pump performance tests completed over a period of 10 years, as part of the Rural Water Use Efficiency Initiative, found that irrigation systems that functioned poorly were often linked to poor pump performance. This testing showed a significant variation in efficiency, with some results as low as 23% and an average around 48%.

When designing a pumping system, it is critical that the pump selected matches the duty required to operate the irrigation system. Pump efficiencies vary significantly, and the best time to determine if a pump is suitable for the intended purpose, is during the design phase, as it is unlikely that the system could be modified sufficiently to improve pump efficiency once the pump is installed. When designing new pumping systems, the aim should be to select and operate a pump as close to its Best Efficiency Point (BEP) as possible. Pumps not operating at their BEP will have higher operating costs, and will suffer additional stresses on the pump, which can reduce the life of the equipment and lead to premature failure. As a rule of thumb, a minimum of 70% pump efficiency is desirable, but some pumps can't achieve this level even when new.

For existing systems, pump performance can be evaluated in the field to determine how the pump is performing under actual operating conditions. One way of assessing the effects of efficiency on operating costs is to determine energy consumption per megalitre (ML) of water. The importance of knowing this information can be seen when it is realised that 85% of the total cost of a pumping installation over its lifetime is due to energy costs.

The first step in calculating energy costs is to measure the flow rate being produced by the pump. For the results of flow tests and energy measurements to accurately reflect the true situation the system must be operating under its normal load. Measuring flow rates can be difficult in systems where there isn't a flow meter installed, and the easiest way to measure flow rates in this situation, or to verify a flow meter reading, is to measure the output of the emitters on the system, and from this, calculate the total flow rate. The accuracy of this method depends on the amount of leakage in the system. If the calculated flow rate varies from the measured flow from the meter, or the calculated flow rate the pump should produce, this may highlight areas where there are problems in the system.

The second measurement required for energy cost calculations is energy consumption. If the pump has a separate electricity meter, this information can be read directly from the meter while the pump is operating. However, in situations where the energy consumption of the pump isn't metered separately, obtaining this information can be a challenge. One method is to turn off all other appliances so that only the pump is operating, otherwise, a current draw test will need to be done, and this usually requires the services of an electrician if the electricity supply is hardwired or three phase. Once energy consumption figures are obtained, the cost per kilowatt hour needs to be identified. If the tariff is a time of use tariff it can be useful to calculate the difference between the high and low tariff rates. This may show where savings in electricity costs can be made simply by adjusting irrigation scheduling to take advantage of off-peak tariffs.

From these two measurements the kilowatt hours per megalitre (kWh/ML) can be calculated, and from that, the pumping cost per megalitre derived. Calculate the flow rate in L/hr and then the kWh of electricity the pump has used in an hour. Divide the kWh by L/hr and multiply by 1,000,000 to give the kWh/ML. This is then multiplied by the cents/kWh at the appropriate tariff to give the cost/ML e.g. 1.5 kWh ÷ 5000 L/hr X 1,000,000 = 300 kWh/ML x $0.25/ kWh = $75/ML.

Once these calculations have been made, investigations into how pumping costs can be reduced can then be made, by either changes to scheduling, or changes to the pumping and piping layout. If this exercise is done regularly, the energy consumption over time can be compared and be used as an early indicator of declining system performance.

In the Pipeline for November/December 2016

- Burnett/ Wide Bay, Sunshine Coast, Brisbane, Gold Coast and Lockyer Valley - IDEMP development.
- Growing Media Workshop - Thursday 1st December at Greenfingers Potting Mix.