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.

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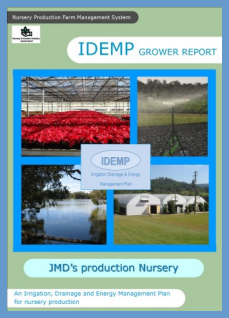

IDEMP
Irrigation Drainage & Energy Management Plan

Nursery & Garden Industry Queensland

The Pipeline

An electronic update on Nursery Production RWUE-IF project activities

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

IN THIS PIPELINE

Energy Savers Plus Program

Improving Irrigation Energy Efficiency

DATE CLAIMERS

Aspley Nursery Energy Field Day September 15th

The Link Between Energy Efficiency and Productivity.

As the Energy Savers Plus program rolls out audits to farms across Queensland, a number of the growers audited by the program have found that energy efficiency has not only cut their energy costs, but may have improved their productivity as well.

NGIQ has worked closely with QFF to ensure a number of nurseries are engaged in the program, and some are currently being audited. Nurseries use most of their energy for irrigation with some having water heating for propagation, and lighting.

General Audit Findings

From the audits conducted to date, a number of key recommendations have been made, including those in the table on the following page:

A number of nursery energy audits are being completed at present, and audit information and case studies will be available over the next few months.

Aspley Nursery

One of the nurseries that received an energy audit under the program was Aspley Nursery.

Following the audit, the owners implemented a number of the recommendations, including replacing a 7.5kW main irrigation pump with a 5.5kW pump with a built-in variable-speed drive.

As well as energy savings, the pump gives the nursery greater flexibility in irrigation and more consistent watering – with productivity benefits as well.

The owner, Noel Percy said "With irrigation, we now have constant pressure, so don't have to have a main pump and a pressure pump. We can turn on a tap or a whole section of irrigation, and it gives an even pressure across the system. Evenness of water is an important thing."

IDEMP Video and Technical Information

For an introduction to IDEMPs go to the following link to see a video explaining more—http://www.ngiq.asn.au/technical-information/?did=252. For technical information visit the NGIQ Technical Information Library at www.ngiq.asn.au/technical-information or click on the centre icon on the home page.

Project	Payback Period	Dependencies	Other Benefits
LED lighting	3 – 6 years	Types of fittings. Payback period will be shorter for lighting systems that are used for longer.	Bulb life – less replacements.
New Pumps and Variable Speed Drives	11 – 19 years (note that across all sectors, some pump and VSD recommendation payback periods were as low as 1 year).	The hours of use, variable irrigation duties. variable total dynamic head.	Pressure management Irrigation flexibility and consistency. Time savings
Solar Photovoltaics	5 – 6 years (note that across all sectors, some PV recommendations and payback periods were as low as 3 years).	The amount of power consumed and variability. Current power price to offset. Solar system appropriately sized (i.e. not too large where export is prevented or at a low feed-in tariff)	
Hot Water	Less than 2 years	The amount of hot water required	

A solar hot water system was installed to replace an 18kW electric storage hot water heater. Importantly, tracking of the solar hot water system meant the owners know how much energy to put into it. Spending an extra $24 on data loggers gave them the ability to control temperature and therefore energy cost.

Noel Percy said that the changes "make it easier to have similar style and size plant, it takes out a variable in production.

The nursery is on track to be well below its target of 100 megawatt hours per year (100MWh/y) with energy savings of around 33% and cost savings of around $14,000 per year, exceeding the $10,000 saving estimated.

Another nursery nearby that has had an audit under the program saw an immediate benefit from new pumps and Variable Speed Drives before he had even received his first power bill "I stopped having to fix burst pipes!"

One of the nurseries audited had made changes to variable speed drives, and the energy audit recommended the change-over of a final pumping system to variable speed pump. The payback period for that upgrade had been estimated at around 11 years, meaning it is more likely to be implemented as an end-of-life project. However, the grower is currently trialing new water-efficient sprinkler heads, meaning less water and more variable operation may be required.

THE Queensland Farmers' Federation is working with its members and Ergon Energy to help farmers reduce energy costs. The Program is funded by the Queensland Government, and is designed to support farmers in reducing on-farm energy use that will lower energy costs.

A number of audits are underway, including on-farm processes such as heating, cooling, lighting and irrigation, to assist growers in identifying potential savings and provide information on financing options.

The Energy Savers program is designed to help farmers find the right solution for their needs and to encourage them to make the right investments to improve their bottom line.

QFF encourages you to use the materials and case studies online at qff.org.au/energysavers to find out more.

The audits highlight that it's worth checking that you are on the right tariff, as some audits have recommended a move of tariff. Ergon Customers can call the Customer Service number on their power bill for a tariff check.

NGIQ and QFF, on Behalf of Noel and Robert Percy, are pleased to invite growers to attend a field day to hear about the outcomes of their energy and water efficiency projects, as well as some other well know nursery efficiency projects such as Palmwood Tropicals and Nursery Traders.

The Field Day will be held at Aspley Nursery, Burpengary, on September 15th. Contact Steve Hart or Lex McMullin for further information.

Improving Irrigation Energy Efficiency

Nursery irrigation systems are often overlooked as being major users of electricity. However, a survey of production nurseries showed that 26% of energy costs were associated with pumping, and 42% of total energy costs were attributed to irrigation. With predicted price rises, energy costs of irrigation are an area that should be looked at more closely, as a means of reducing the cost of this basic, but vital part of nursery production.

The following tips can be used to help reduce energy costs in pumping installations.

Quantify pumping system requirements, and seek professional advice on changes that can be made. When assessing potential energy savings, a simple rule to remember is that one unit of energy saved at the pump saves 3.3 units at the motor. Many nurseries have started with pumping systems that were able to supply the demands of the nursery at the time. However, as the business has grown, the same pumping system is expected to cope with the extra demand, and in many cases, isn't suited to the changed pump duty. The hydraulic requirements of an irrigation system can be analysed, and compared to the performance characteristics of the existing pump, to determine if they are a satisfactory match and, if not, which pump would be able to meet the demands of the system.

Operate pumps near their Best efficiency Point (BEP) and ensure no cavitation occurs. To improve the efficiency of oversized pumps, install Variable Frequency Drives (VFD's), downsize/replace/trim impellers, or replace with a smaller pump. Controlling flow by speed regulation is always more energy efficient than using a control valve, because valves reduce the flow, but not the energy consumed by the pump e.g. you can reduce your energy costs by 80 percent if you halve the motor speed. This is due to a phenomenon known as pump affinity laws. These state that doubling the pump speed will double the flow rate, increase operating pressure by 4 times, and raise power consumption by 8 times. This is why VFD's are more energy efficient, as halving the speed of the pump will result in the motor only using 1/8th of the power required at full speed i.e. a small reduction in speed will result in a large reduction in power consumption. While VFD's add to the cost of a pumping system, depending on the application, energy savings of up to 50 percent a year can be achieved, giving payback periods of as little as 2.5 years. It should be noted though, that prolonged use of an oversized motor with a VFD at low speeds can reduce the life of the motor, and there are situations where VFD pumps do not work efficiently.

If a pump is continuously throttled to 10 percent less than its BEP, trim the impeller to reduce the energy demand by up to 25 percent. Impeller pumps can be trimmed if they have a constant flow rate, have a partially closed discharge valve, and no system changes are planned.

Reduce energy lost due to friction by minimising the number of bends and valves in pipe work. Increasing pipe diameter by 15 percent will halve pressure losses due to friction.

High Efficiency Motors (HEM) are about two to four percent more efficient than standard electric motors, offer lower operating costs and reduced energy consumption. The initial investment will be greater, but this will be recouped by the additional savings in energy costs over time. HEM maintain efficiency over a wider range of loads, and have greater thermal tolerance, but it is important to match the HEM to its application, as these motors operate at a slightly higher full-load speed than standard motors. This may mean replacing an existing motor with a smaller one, trimming impellers on pumps or changing gear or pulley ratios.

Check for motors that are running hot (60°C or higher), as this is a sign of excessive energy loss.

Establish a regular maintenance program for pumps to prevent dirt and dust build-up. Ensure the availability of basic instruments at pumps, such as pressure gauges and flow meters, to assist with performance monitoring.

Replace worn seals and pump impellers. Use low friction coatings on internal surfaces of pumps to improve efficiency, and ensure drive belts are in good condition, evenly matched and correctly aligned.

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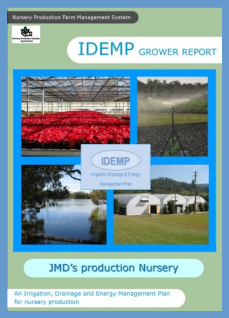

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Replace a motor rather than rewinding it. Efficiency is reduced by up to three percent each time a motor is rewound. If a motor burns out, the best solution is to review your load needs and purchase a high-efficiency motor to match that load.

Investigate how the irrigation is being scheduled, and how different growing areas are managed. If it is possible to combine areas without impacting on operating pressures and system efficiency, the length of time the pump is running for may be able to be reduced, and this may also mean the pump is operating closer to its BEP. Aligning irrigation scheduling to plant water use may also reduce overall energy use by only applying the amount of water the plants require.

Consider total lifetime costs when buying a new pump. Industry figures quote energy costs as being 85% of the lifetime cost of a pump, with maintenance being 10% and initial cost 5%. This shows how replacing an inefficient pump may be cost effective in the long term.

In the Pipeline for September/ October 2016

- Burnett/ Wide Bay, Sunshine Coast, Brisbane, Gold Coast, and Lockyer Valley - IDEMP development.
- North Queensland visits and IDEMP development
- Aspley field day September 15th