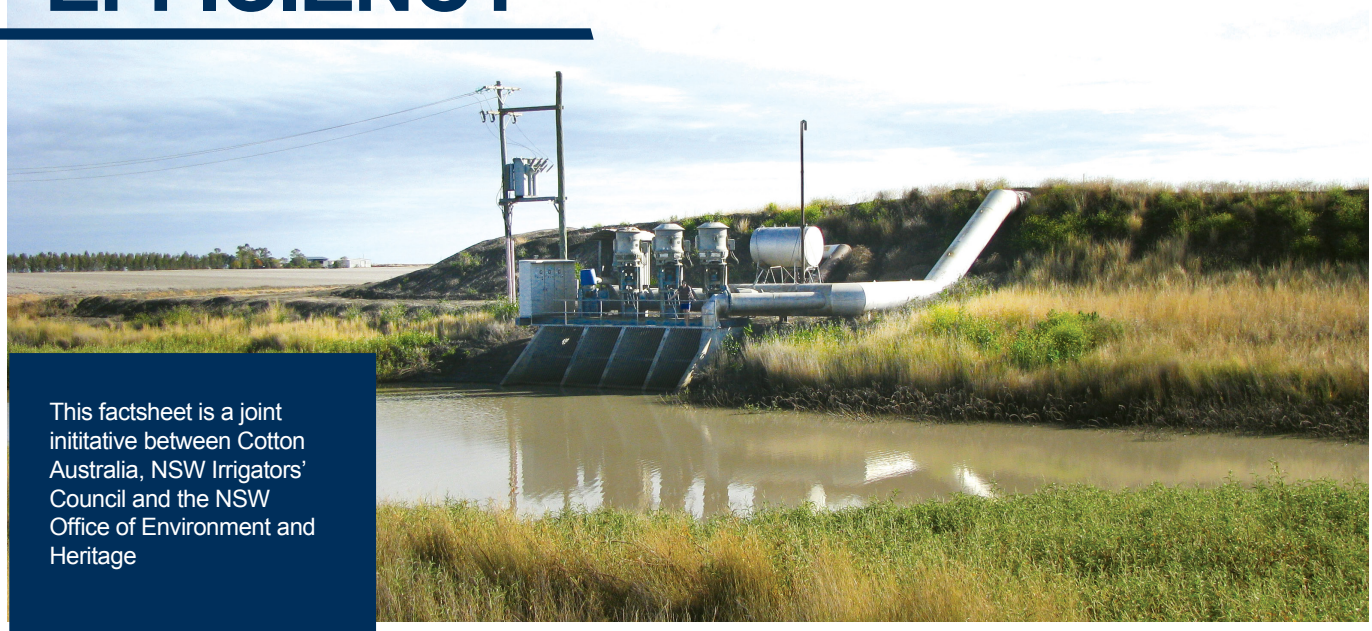
FACTSHEET

ENERGY EFFICIENCY



This factsheet is a joint inititative between Cotton Australia, NSW Irrigators' Council and the NSW Office of Environment and Heritage

For more information

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END OF LIFE PUMP CONSIDERATIONS

Pumping represents the most significant cost within an irrigation production system. While changing your pump can deliver significant energy efficiency gains, it can come at a high cost. This factsheet highlights the key consideration to ensure that your pumping system is achieving maximum energy efficiency even as it reaches the end of its life.

As a first step, we recommend growers engage a specialist irrigation engineer[1]. They will have the specialist expertise to make recommendations on changes to common issues such as total dynamic head (TDH), water flow rates, pump speed and motor throttle settings. Oversized pumps generate significant and ongoing energy costs for irrigators and growers – costs that can be avoided with specialist advice.

Key factors that will impact your pumping system's energy efficiency and ongoing costs:

Pump station design

- Pump station design should be managed to avoid cavitation. You will need to speak with your irrigation engineer but things to consider include placing the pump in a pit (below ground level) and avoiding too many fittings or undersize pipes.
- Pump cavitation can reduce pump efficiency by up to 10% and results in impellor damage. Long periods of cavitation combined with a failure to adequately maintain pumps can reduce pump efficiency by as much as 40%.

Pipe and fitting sizing

- Avoid installing undersize pipes and fittings that result in greater friction loss and higher pumping costs. Energy savings of up to 40% can be achieved through appropriately sized fittings and pipes. It is recommended that you check with an irrigation engineer that your valves, suction entries are specified and sized correctly.

Belts

- Ensure an appropriate number of belts to efficiently transfer power from the motor to the pump.
- Ensure that you have appropriate belt types (such as notched belts).

1 Your agronomist might be able to provide you with contacts

ENERGY EFFICIENCY

Motors

- It is important to choose an efficient motor. Studies indicate that a 1,800 rpm is most efficient (NCAT, 2006). Note: new electric motors need to meet Australian Government standards (MEPS). This means that modern motors, if selected as fit-for-purpose, will exceed the performance of older electric motors.

Suction and discharge pipes

- Suction pipes should have the following:
  - A well designed screen at the suction entry point to keep out trash and litter. The impacts of trash has been demonstrated to produce a 20% reduction in TDH and discharge for pumps.
  - Avoid high points in pipe design where air can collect. Small rates of air entry (2% by volume) can reduce pump performance by up to 20%.
- Discharge pipes should have the following:
  - Pipes that are the same diameter as the mainline.

System considerations that will warrant investigation include:

- Sprinkler set-up for pivot and lateral irrigation systems. Use low pressure and drop tubes to reduce pump size requirements and improve irrigation application uniformity.
- Making best use of gravity feed to reduce pump size.
- If multiple duties are required from the one pump, it would be appropriate to consider a variable speed motor to adjust pump operations according to irrigation requirements.

Pump maintenance

It is vital to maintain pumps. Check for impellor damage, as declines in efficiency will occur with time. Pump performance will drop between 5–15% over 10 years of operation.

Please contact NSW Irrigators' Council or Cotton Australia for further information.

Key references

OEH, Cotton Australia and NSW Irrigators Council Energy Audit Reports

NCEA (June 2015). Improving energy efficiency on irrigated Australian cotton farms

NCAT (2006). Energy saving trips for irrigators