Energy tool - centre pivot irrigation systems

This tool will provide a guide to understanding if the energy use of your irrigation system is optimal, irrigated, and your irrigation goals.

The tool has 2 steps and a System Analysis report which can be selected via the tabs at the bottom

- **STEP 1 Benchmark** - Provides a rough estimate of pumping costs from your water and ene cost savings are likely.

- **STEP 2 Detailed analysis** - Enter measured pressures at designated points on your irrigatio and potential cost savings from improving the system. This step will also identify if your syst capacity is also calculated which gives an indication if your system is designed well enough t

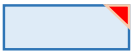
- **System Analysis Report** - This provides a summary of data entered in step 2, showing curr system.

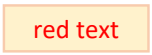
To use each sheet:

 input your own data in the light blue cells,

 select the appropriate options from the dark blue cell menus

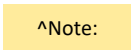
hover mouse over the help button (top left corner of each tab) for data input and ir

 hover mouse over boxes with red triangles and red text for additional explanation.



results and outputs are shown in yellow boxes with red text

shown when there is a problem with the irrigation system or data inputted.



shown when there is an oportunity to improve a component of the irrigation systen

shown when a component of irrigation system is working well.

Data you will need:

- Water use (monthly, quarterly or annual)
- Diesel or electricity usage (monthly, quarterly or annual)
- Diesel or electricity costs (monthly, quarterly or annual)
- Pump flow rates
- System pressure at the pump, pivot base and end of the pivot
- Vertical lift heights for water

Is your pumping system efficient?

This tool will give an indication of how efficiently your pump is operating. **The minimum acceptable** It will also indicate if the system pressure is within the desired operating range. Operating pressure emitter pattern. Operating pressure also may be too low, which reduces operating costs but always

pressure is too low, potential energy savings will be reduced because energy costs will likely increas
first priority. Improved application uniformity can increase crop production.

This tool also calculates the pumping cost per ML and breaks down where the costs occur in your sy

Causes of excess energy use

Excess energy use can be caused by poor system design, typically in pipes being too small to carry th
system to operate as intended. Operating outside of the pump's optimal performance range throug
costs. Running your system at a higher pressure than required reduces efficiency, although this dete
to ensure the emitter(s) are performing as required.

Notes/assumptions

* 1 ML lifted 1 metre of height requires 4.55 kilowatt hours (kWh) of electricity, allowing for efficier
motor (90% efficient).
* 1 ML lifted 1 metre of height requires 1.10 litres of diesel, allowing for efficiency losses for pumps

Total Dynamic Head consists of 3 components added together:
1. vertical height difference between the water supply level and the level the water is being pumpe
2. losses due to friction in pipes and fittings (Friction Head, FH).
3. pressure at the emiiter (Pressure Head, PH).

- Fundamentals of energy use in water pumping
- Energy use efficiency
- Reading your meter

Acknowledgements

Disclaimer

*This tool is provided for information purposes only. Because user input is required, no claim is made
or is wholly appropriate for your particular purposes. The NSW and Victorian Governments and their
do not accept any liability to any person for the information or advice (or the use of such informatio*

of Primary Industries
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, based on the total head, energy source (diesel or electricity) and cost, area

of the page:
rgy bills and benchmarks your pumping costs against other systems to see if

n system to calculate the energy costs of different components of the system
tem pressure is too low, negatively impacting on application uniformty. System
to keep up with crop water requirements.

ent operating costs and potential savings made by improving your irrigation

nterpretation help

n.

pump efficiency is 70%.
may be too high, unnecessarily increasing costs and possibly upsetting the
diminishes irrigation performance and reduces crop productivity. If system

se if changes are made to improve application uniformity, which should be your

ystem components.

he volume of water required at the necessary flow rate and pressure for the
gh varied speed or incorrect impeller size reduces efficiency and increases
ermination should be based on the pressure at the furthest point of the system

ıcy losses for pumps (70% efficient), drive train (95% efficient) and electric

(70% efficient), drive train (95% efficient) and diesel motor (35% efficient).

d to (Static Lift, SL, or Static Head, SH).