

# What is energy efficiency?

Energy efficiency is more than simply reducing the amount of electricity used on your farm. It is about the appropriate use of electricity or fuel to generate the most production for the least amount of energy and cost.

Energy efficiency should be a whole-of-farm approach and for businesses to remain competitive, sustainable and profitable, all possible methods to increase energy efficiency without increasing costs or sacrificing production need to be explored. This can be achieved in several ways, either by installing new highly efficient technologies during a re-build or retrofit, improving operating efficiency, reducing waste or by servicing and managing equipment, and refining processes to provide the most efficient use of energy. This factsheet briefly discusses five principles of energy efficiency and how these principles can affect energy use in a greenhouse.

## **Efficiently operating equipment**

When selecting new equipment it is important to consider the efficiency rating as well as the cost and warranty of each available option. A product of higher quality may cost a little more but should have a longer life span than a cheaper product. Consider the purpose of the equipment and whether the function can be fulfilled more efficiently through better design or better systems. Ensure the equipment has the capacity to do the required job without straining. Consider the possibility of future expansion of your greenhouse. Seek advice about the most efficient location for the equipment and the level of control and integration that is available with the

various options. Make sure your existing equipment is operating as efficiently as possible and make plans to upgrade any equipment that is not performing well. A two percent increase in equipment efficiency could save hundreds of dollars each year in electricity costs.

## **Reducing waste**

Reducing waste can conserve energy. Simply changing your practices or equipment can limit the waste of resources. Common areas of waste include the loss of water and nutrients from excessive irrigation runoff, water leaks in the irrigation and heating systems, heat loss through damaged structures, poor insulation and incorrect programming of control systems.

Upgrade old worn equipment components, change irrigation scheduling to suit seasonal conditions and repair water leaks to provide an immediate reduction in pumping costs. Repairing damaged structures or cladding to reduce heat loss and heating requirements. Adjust control programs to suit the improved conditions and fit timers to non-essential equipment or use the built-in 'energy saving modes' to help reduce electricity waste and lower energy costs.

## **Providing optimal growing conditions**

Maintaining optimal growing conditions in a greenhouse can use large quantities of energy. The level of control over the growing environment and the level of technology used for production will greatly influence the energy efficiency of the facility. A greenhouse with little or no technology may use very little energy

compared to a high-tech greenhouse, but this doesn't necessarily mean the low-tech greenhouse is more energy efficient. The high-tech greenhouse will consume more energy but the energy is used more efficiently, resulting in a higher yield per square metre and a more cost-effective productivity.

To provide an optimal growing environment ensure the equipment being used is operating efficiently, is serviced regularly and is appropriate for the job. Calibrate equipment and temperature sensors yearly. Replace old analogue sensors with new digital sensors to increase accuracy by several degrees and shorten response time. Ensure the temperature sensors are measuring the plant canopy and represents the whole crop not just one small area or the air at roof height. Provide sufficient ventilation and air movement to improve gas exchange and humidity control, ideally air exchange should be once per minute in summer but can be reduced in winter. Keep doors closed, repair holes and block air leaks to stop ventilation dead spots and improve climate control.

### Using efficient control systems

The installation of some form of climate control equipment in a greenhouse will give a positive return on investment due to the improved uniformed growing environment. The way that equipment is managed will also affect the energy efficiency of the greenhouse. Understanding the influence of each climate control system on whole-of-farm energy use is as important as using efficient equipment. For example, a climate control system that integrates and automates heating, cooling and irrigation will be more accurate and respond faster than manual control. However, if the control program that integrates these three systems is not set up and managed correctly, the systems can work against each other and waste energy.

Inaccurate, faulty or damaged temperature sensor or thermostats will not function properly extending operation and response times. Replace old analogue temperature sensors and thermostats to reduce the error factor by 2°C or 3°C and save hundreds of dollars in heating costs per year.

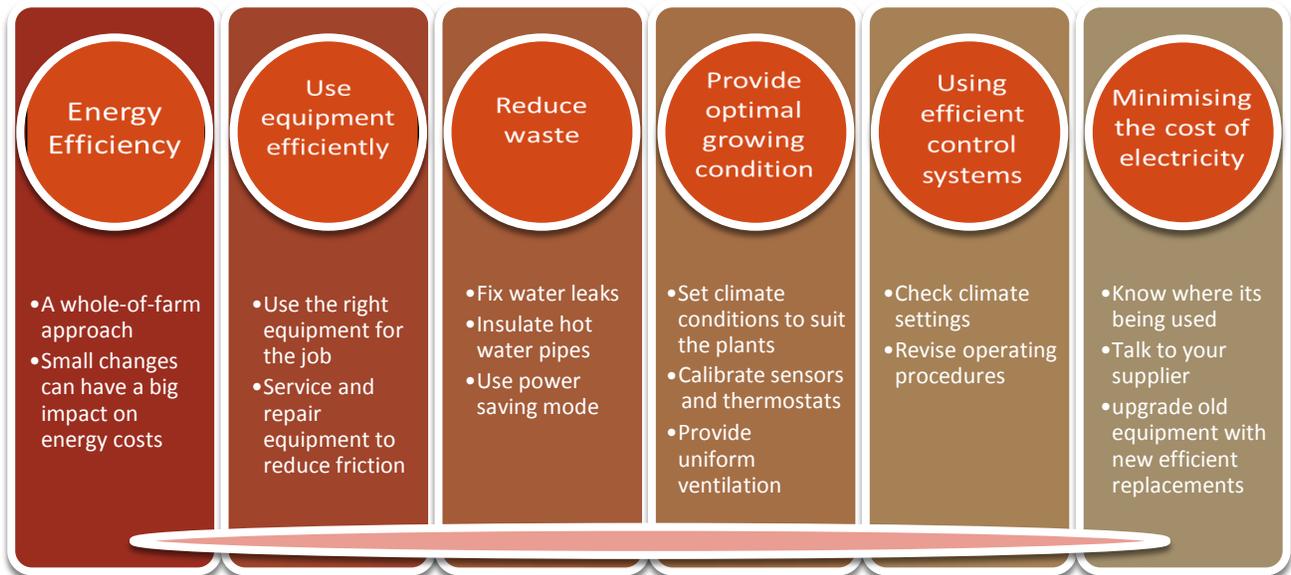
Refining management practices, regularly checking control systems and implementing a maintenance plan can significantly improve energy efficiency.

### Minimising the cost of electricity

No matter which way you manage energy use on the farm, increasing electricity costs and the introduction of an emissions trading scheme (ETS) mean it is important that you are aware of how and where electricity is used and the options to improve energy efficiency on your farm. There are three main options available: 1. install an alternative energy system, 2. negotiate the most cost-effective plan with your electricity supplier or discuss your options with an electricity broker and 3. use current equipment more efficiently.

If you have upgraded some of your equipment recently to more energy efficient units or changed your production practices, your electricity usage may have also changed. It is worth looking at your electricity plan or bill and reassessing the rate or plan you have for buying your electricity. If you know the peak power use periods it may be possible to reduce your electricity bill by changing the agreement or tariff to suit your electricity usage patterns. Talk to your electricity supplier about your contract and power usage as suppliers are regularly changing their contract rates and tariffs to be more competitive. You may be able to negotiate a cheaper rate or convert some equipment to off-peak periods, but don't forget to ask about any fees associated with changing plans. In some cases, agreements will have specific requirements

when changing plans and you may need to apply in writing or pay a release fee. Check all the consequences of changing electricity plans or suppliers, some tariffs or power plans have become obsolete and once you leave an obsolete plan there is no going back.



Energy efficiency principles