

# Lighting in packing sheds

*The 'Watts in Your Business' project has completed energy audits of 30 packhouses and orchards Australia-wide. This fact sheet shows how lighting changes can cut energy use and save money.*

Lighting is a vital part of packhouse and grading operations. On average, lighting uses 3% of total electricity at an average cost per facility (orchard / packhouse) of just over \$4,000 per year.

The audits identified that whilst there are opportunities to improve the energy efficiency of lighting, savings will be small. For example, improved lighting energy efficiency could reduce a site's electricity consumption and cost by 1% and \$750 respectively per annum (based on the average above).

Despite the small saving, improving lighting is worth implementing because it can be done easily and is low cost. Current inefficient lighting and fixtures can be easily replaced with 'off the shelf' efficient alternatives. It is a simple solution to cut operating costs and energy consumption.

## **Top tips to cut energy costs:**

- Use T5 fluorescent tubes.
- Use LED tubes.
- Use LED highbay bulbs.
- Replace halogen bulbs with LED bulbs.
- Install lighting controls.



*Good lighting is essential in packhouses and taking simple measures can help to reduce energy costs. FS (Sep 2014)*

## *Lighting types*

**Fluorescent tubes**—most older style fluorescent tube lights use significantly more energy for the same level of light when compared to newer types. T12 and T8 tubes are not as efficient as T5 tubes and are commonly found in pack houses, supplying light to grading lines, offices and cool stores. T5 tubes consume around 28W and are 16mm in diameter and are the most energy efficient fluorescent type tube.

**High Intensity Discharge bulbs**—includes Mercury Vapour, Metal Halide and High-Pressure Sodium bulbs that are often found in high ceiling spaces of pack houses. These bulbs generally consume 250-400W.

**Lighting ballasts**—are the ‘control gear’ for fluorescent tubes and there are two types: magnetic and electronic. Electronic ballasts are more energy efficient and on average use 10-21% less energy than the magnetic type and do not tend to flicker or make a humming sound when the tube is illuminated.

## Identify magnetic and electronic ballasts

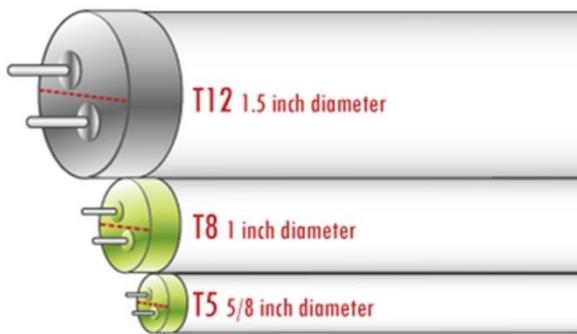
Aim a smartphone camera directly under the illuminated fixture. If the images appear to move or pulse – it's a magnetic ballast. If the image is stable – it's an electronic ballast.



**Magnetic ballast** on an illuminated T8 fluorescent tube fixture.



**Electronic ballast** on an illuminated T8 fluorescent



*Replacing old fluorescent tubes (T12 and T8) with more efficient T5 tubes can save energy. (Image source: [www.retrofitcompanies.com](http://www.retrofitcompanies.com))*

### ***Lighting controls / switches***

**Manual**—the most common control found in pack houses. They allow the operator to turn lights on and off depending on the demand and level of light required for the tasks.

**Timers**—control lights based on a defined (adjustable) on and off activation schedule. They are typically used where there are set working hours and defined times for lighting requirements.

**Sensors**—such as motion and daylight types, can ensure optimum lighting conditions and turn lights off when not in use. Sensors are commonly used in areas of the packhouse where minimum lighting levels are essential for workers' safety and where product quality assessment is undertaken.

### ***Dispose of light fixtures carefully!***

Fluorescent tubes and High Intensity Discharge lamps contain mercury – a hazardous material.

Safe handling and disposal of perished fixtures is essential for the protection of packing shed workers and the environment.

**Costs and savings of different lighting options from audited businesses:**

	Range (per site)	National Average
<b>T5 tubes</b>		
Electricity Savings (kWh)	48 – 10,000	1,030
Capital Costs	\$88 - \$8,000	\$1,022
Annual Cost Savings	\$13 - \$1,430	\$219
Simple payback (years)	2.3 – 10.0	4.7
<b>LED tubes</b>		
Electricity Savings (kWh)	72 – 4,950	1,207
Capital Costs	\$200 - \$6,000	\$1,777
Annual Cost Savings	\$20 - \$1,120	\$285
Simple payback (years)	3.5 – 15.2	6.2
<b>LED highbay</b>		
Electricity Savings (kWh)	268 – 22,542	7,766
Capital Costs	\$800 - \$44,800	\$10,478
Annual Cost Savings	\$72 - \$4,200	\$1,533
Simple payback (years)	1.7 – 30.1	6.8



<b>LED halogen replacement</b>		
Electricity Savings (kWh)	117 – 37,740	9,759
Capital Costs	\$300 - \$41,440	\$11,435
Annual Cost Savings	\$43 - \$5,661	\$1,495
Simple payback (years)	7.0 – 14.5	7.6

## *Solutions and opportunities*

### **Use T5 fluorescent tubes**

By replacing a T8 with a T5 retrofit kit a site will reduce each T8's lights consumption by 33%. By replacing a T8 with a T5 whole fitting replacement each replacement will reduce consumption by 68% (NSW OEH, Energy Saver Energy Efficient lighting Technology report).

To replace old fluorescent tubes with the T5 tubes you can replace the fitting or use a T5 retrofit kit. The retrofit kit allows the shorter, thinner T5 tube to fit into the existing T8 and T12 type fitting and also allows for the removal of the old magnetic ballast and replacement with the new electronic ballast. The retrofit kit does not qualify for lighting rebates.

### **Use LED tubes**

LED tubes are normally more expensive than fluorescent tubes. LED tubes have a number of advantages when compared to the traditional fluorescent tube types including increased lifespan, reduced maintenance, reduced energy use and associated energy costs, and easier disposal of perished tubes as they do not contain mercury.

For an LED tube to be retrofitted into a T8 or T12 fitting the existing starter and ballast must be removed. T5 sized LED tubes can also be retrofitted into existing T5 fittings.

### **Use LED highbay bulbs**

LED highbay bulbs are an alternative for some High Intensity Discharge bulbs including Metal Halide, Mercury Vapour and Sodium High Pressure bulbs. They represent a relatively large capital investment however they do offer a number of advantages when compared to other HIDs including:

- Comparable light output with around 70% less power consumption.
- Extended lifespan of 50,000 to 60,000 hours compared to HIDs at around 8,000 hours.
- Reduced maintenance costs due to a service life that is on average 5 times longer than HID bulbs.
- Instantaneous strike, eliminating the need for lights to warm up before they are fully illuminated.
- Reduced energy costs due to lower wattages. The typical HID bulb demand in a pack house is 400W. This, can be reduced to 200W or less depending on current light levels by an LED bulb resulting in a 50% reduction in operating costs.

### **Replace halogen bulbs with LED bulbs**

LEDs are a cost effective replacement for halogen type bulbs. Halogens and incandescent bulbs are frequently found in cold storage rooms and small storage areas. There are a range of halogens available with the most common using 20W to 50W. Equivalent lighting levels can be achieved.



Metal Halide lights are often used in high ceiling spaces of packhouses and can be replaced with LED highbay lights that last a lot longer.

### **Install lighting controls**

Daylight sensors are photoelectric cells which are essentially a type of resistor. The resistance of the cell decreases with increasing intensity (lux) of light. This can achieve reduced power consumption by lighting fixtures as the sensor only enables lights to be activated when lower than required light levels are detected resulting in a need for additional light. Lighting controls can be fitted to all existing and new lighting types