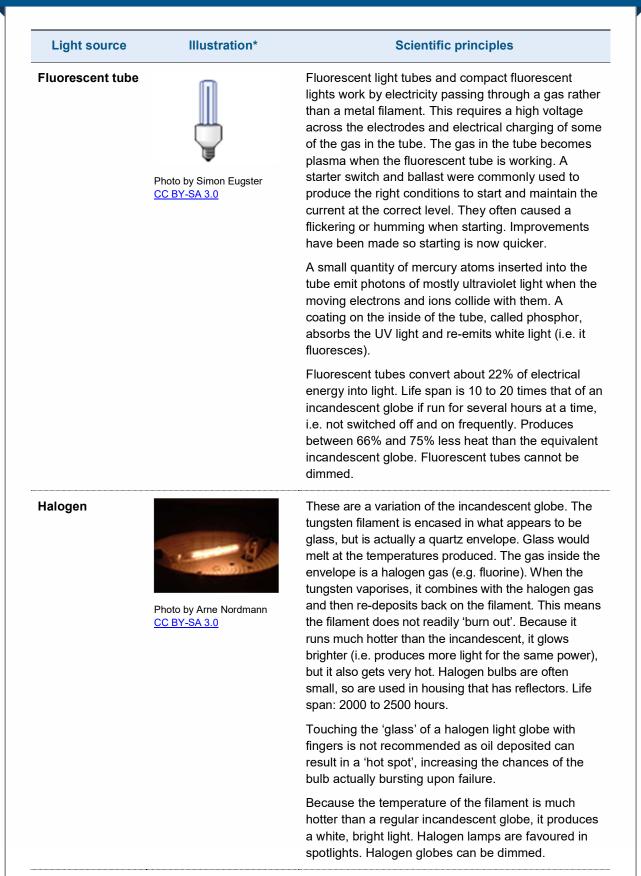
#### Resource 1: Understanding light sources

#### Resources









## Resource 1: Understanding light sources (cont)

## Resources

Light source	Illustration*	Scientific principles
Incandescent globe		The filament is a thin piece of tungsten wire that has high resistance to electricity, so it becomes very hot when turned on. It becomes so hot that it glows or incandesces. The globe itself contains an inert gas, such as argon, or a vacuum (i.e. it has had the air pumped out) so that the hot wire does not burn.
		The frequent heating of the filament causes some of the metal to vaporise. Eventually it becomes so thin that the filament 'burns out'.
		Incandescent globes are cheap to manufacture but convert only 5% of the electricity to light and can convert 90% of the energy to heat.
		Life span: 750 to 1250 hours. Incandescent globes can be dimmed.
Light emitting diode (LED) or other	Photo by Alan J Goulet CC BY-SA 3.0	LEDs work because of the movement of electrons in a semiconductor. So they do not have a filament, do not get hot and have a life span of about 50000 hours. The movement of electrons in the material causes the release of photons. The electrons flow in one direction only so LEDs work using direct current. The type of light (visible, invisible or particular colours) depends on the materials making up the semiconductor in the diode. The light from the diode is 'focused' because of the curved shape of the tiny plastic bulb. LEDs are used in displays, traffic lights, televisions, torches and strip lights but are generally not used as globes in domestic use. Cost and problems of managing current and heat precisely have prevented LED lighting replacing other sources in the home. LEDs are more efficient at lower temperatures. Semiconductor materials have previously been very expensive, but have been becoming cheaper and more readily available since 2000. LED lights can be dimmed.







Use the resources listed below to assist in completing the research activity in **Worksheet 5: Group research task**.

Students consider the question: 'Is what is good for individuals always what is good for society?' This should lead to a discussion in greater depth of the environmental issues involved in choosing a light globe.

### Legal considerations

Students explore the legislation that was brought in to change the types of light globes available for purchase in Australia. When the new legislation was proposed, there was much debate about the dangers of mercury in fluorescent lighting.

Visit the Australian Government website at <u>energyrating.gov.au/products-</u> <u>themes/lighting/lighting-and-phase-out-general-information/incandescent-light-bulbs-</u> <u>phase-out</u> to learn more about the change in legislation.

# Resources relating to environmental considerations for disposal of used light globes

- Royal Society of Chemistry article, 'Q and A: Mercury in energy-saving light bulbs' at <u>rsc.org/chemistryworld/news/2008/january/07010803</u>
- Scientific American article, 'Are compact fluorescent light bulbs dangerous?' at scientificamerican.com/article.cfm?id=are-compact-fluorescent-lightbulbsdangerous
- Transcript of an interview conducted by Kerry O'Brien on the 7.30 Report at abc.net.au/7.30/content/2008/s2291366
- The solution to the issue of mercury in landfill is the recycling of fluorescent tubes. Students could be given the task of finding how they could recycle fluorescent tubes. See the Australian Government article, 'Disposal of mercurycontaining lamps' at <u>environment.gov.au/protection/national-waste-</u> <u>policy/mercury-containing-lamps</u> and follow links to the appropriate state, e.g. <u>epa.nsw.gov.au/managewaste/house-chemicals</u>
- This site informs consumers about chemical collections of fluorescent light bulbs and a range of other materials that should be disposed of responsibly. Visit <u>fluorocycle.org.au</u> to learn about the benefits and costs to organisations of recycling fluorescent tubes.



