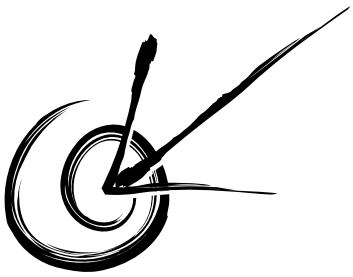
Where Is Your Energy Going?

Lesson aims



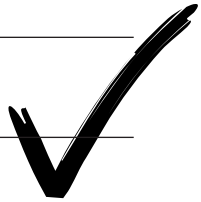
Students will learn about the different ways in which energy is generated, why it is important and how its use effects the environment.

They will conduct an energy audit of their classroom and home, looking at the use of heating, cooling, insulation, lighting and hot water appliances and its impact on the environment. They will be able to list several ways of conserving energy in their school and homes based upon their audit analysis.

Learning outcomes

As outlined in the National Profiles:

Studies of Society and the Environment	Place & Space	Features of places. People and places. Care of places.
	Resources	Use of resources. Management & enterprise.
	Natural & Social Systems	Natural systems. Economic systems.
Science	Life and Living	Living together. Structure and function. Biodiversity, change and continuity.
	Natural & Processed Materials	Materials and their uses. Structure and properties.
Mathematics	Chance & Data	Collecting data. Displaying and summarising data. Interpreting data.



Background information

What is energy?

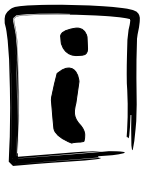
Energy is the ability to do work. When we move something by pushing or pulling, we are doing work. Energy is necessary for anything to move or change.

Energy resources can be described as renewable and non-renewable. Renewable energy sources are those which are continually being replaced such as energy from the sun (solar) and wind. If an energy resource is being used faster than it can be replaced (for example, coal, oil, natural gas and uranium) then it will eventually run out. This is called a non-renewable energy source.

More than 90% of Australia's energy currently comes from coal-fired power stations, with less than 10% coming from clean renewable sources. Energy produced by non-renewable sources, such as coal, produce large amounts of greenhouse gases when burnt to produce electricity. By wasting energy in our daily activities, we contribute unnecessary quantities of greenhouse gases. Any energy you save from non-renewable sources will help to reduce the greenhouse effect.

There are many ways we can conserve energy, some suggestions are listed below:

- Buying the most energy efficient appliances
- Turning off lights when you leave the room
- Turning off the heater/electric blanket at night before you go to bed
- Using microwaves instead of the oven
- Installing insulation and seal draughts
- Using energy efficient lights
- Having short showers instead of baths
- Using cold water for washing clothes
- Turning off heaters when you don't need them
- Remembering to turn off your air-conditioner or cooler
- Using the sun to dry your washing rather than a dryer
- Installing a solar hot water heating system



Sources & further information

Ergon Energy shows students how electricity is made, teaches them about renewable energy and takes them on a virtual tour of a power plant.
www.ergon.com.au/energyed/

Energy Australia – learn about renewable energy and how to cut down your greenhoude gas emissions.
www.energy.com.au

The Australian Greenhouse Office provides information sheets on global warming, a greenhouse calculator and easy ways to reduce greenhouse gases.
www.greenhouse.gov.au

Clean Up Australia – Energy Fact Sheet provides some useful tips for reducing the impacts of energy we use.
www.cleanup.org.au

Energy Smart provides tips and information on making your home Energy Smart.
www.energyrating.gov.au

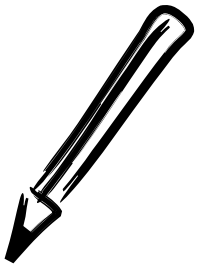
Gould Group designs innovative environmental education and training in sustainability.
www.gould.edu.au

Energy Rating – learn about how you can choose energy efficient appliances.
www.energysmart.com.au

Research Institute for Sustainable Energy (RISE) has a schools activity section which investigates a number of different renewable energy technologies.
www.rise.org.au/EandP/index.html

Sustainable Energy Program site looks at renewable energy and energy saving tips
www.seda.nsw.gov.au/

Classroom activities



1. Introduce the class to the concept of energy. Describe to the class that energy can be produced from non-renewable or renewable sources and give examples of each.

2. Ask students to research how energy is made from the different types of sources. Divide the class into small groups and assign each group an energy source, such as coal, gas, oil, geothermal, hydro, landfill, nuclear, solar, wind and wave-tidal. Each group should look at the advantages and disadvantages of their energy source and present them to the class. The impact on the greenhouse effect should be discussed here. The websites above provide an excellent source of information for this activity.

3. As a class, have students brainstorm a list of as many items as they are able to think of in the classroom that use energy.

4. Write the list so that students are able to think of new examples. After they have had 5-10 minutes to come up with a list, help students think about how each item gets its energy and if the energy is coming from a renewable or non-renewable source.

5. Have students complete the *Worksheet: Just Turn It Off* which depicts a classroom with many appliances.

6. Students should be encouraged to explain their answers in a classroom discussion. Have students share their different items and reasons for choosing them.

7. Allow students to voice differing opinions. Remember that it is not as important for students to find all the things that use energy as it is for them to have valid explanations of their choices.

Home Energy Quiz

Ask students to list activities in their home that would use energy.

Discuss each of the suggested activities as listed on the *Worksheet: Home Energy Audit.* i.e. heating and cooling, cooking, lighting and appliances.

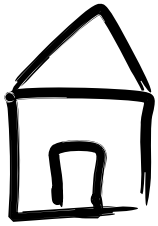
Ask students to complete the *Worksheet: Home Energy Audit* for homework. Students should be warned in advance that they should not check settings or move appliances without adult supervision.

Record the results of the Home Energy Audit by adding up the number of students who were:

- High energy users
- Moderate energy users
- Low energy users

Ask students to look at the activities and what was the most common energy source. Discuss if these sources of energy were renewable or non-renewable sources and what effect this has on the environment.

Ask students what they could do to reduce the amount and type of energy used in their home. We have suggested some tips in the background information.



Extension / Home-based activities

Organise a school excursion so that students can learn more about energy. A number of Discovery Centres provide hands-on activities and exhibitions that promote the benefits of renewable energy.

Discovery Centres

Hydro Tasmania Energy Discovery Centre (Hobart, TAS)
www.hydro.com.au/

CSIRO Science Education Centres (Throughout Australia)
www.csiro.com.au/education

World of Energy Museum (Fremantle, WA)
www.wpcorp.com.au/html/home/whats_happening/world_of_energy.html

Snowy Mountains Hydro Electric Information Centre (Cooma, NSW)
www.snowyhydro.com.au

Teachers can also contact the Department of Education in their state or territory for a list of school excursions relating to environmental education.

Lower Primary

Develop energy information through the arts and present to an audience.

Create an educational display for your school on energy efficiency.

Middle Primary

Develop energy saving tips for the school newspaper, weekly bulletin or PA system.

Have students make signs and stickers to remind people to turn off the lights when they leave a room.

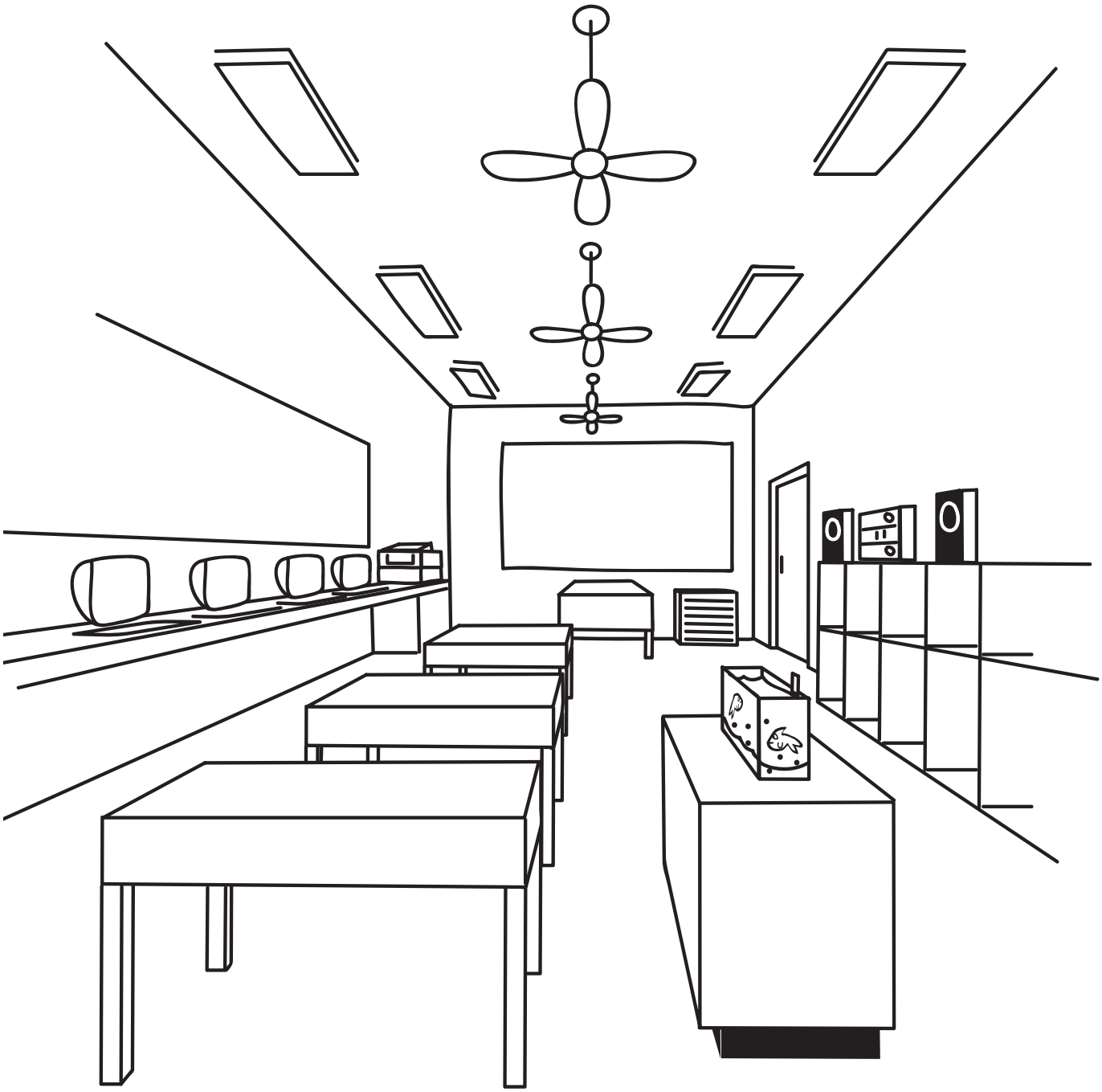
Upper Primary

Track monthly energy savings or classroom behaviour changes. Post them in a common area at school.

Conduct 'The Great Energy Debate' on non-renewable versus renewable energy which could be held at a school assembly or open day.

Worksheet: Just Turn It Off

- Colour all of the things in the picture that use energy.
- Work out what is the source of the energy (e.g. gas, coal, solar) and write it down next to the energy user.
- Circle the things that you could turn off or could change from a non-renewable to renewable source of energy.



Worksheet: Home Energy Quiz

Instructions. Go through each of the energy use questions and colour in the box to the right which best describes your home. You may need to ask an adult to assist you in answering some of the questions. Add up the number of coloured boxes at the end of each column.

Energy use question	A. High energy user	B. Moderate energy user	C. Low energy user
Do you turn off lights if you are not in the room?	Lights left on all the time	Lights turned off sometimes	Lights always turned off when no one in room
Do you heat your beds?	Electric blanket used all night	Electric blanket used just before bed	No heating
What are your main forms of cooking?	Electric stove and oven	Occasional microwave	Microwave and/or gas stove
Do you have a second fridge or freezer?	Always running	Only when needed	No second fridge or freezer
Where is your fridge located?	In a hot spot	A sometimes warm spot	In a cool spot
How do you turn off your appliances?	Turn on and off with the remote control	Turn off at the wall sometimes	Turn off at the wall all of the time
Do you have a computer and how do you turn it off?	Left on for long periods	Use energy star sleep features	Computer turned off (when not in use) / do not have a computer
What type of water heater do you have?	Electric storage	Gas	Solar, 5-star gas or heat pump
Do you shower or bathe?	Long showers and deep baths	Showers only or shallow bath	Short showers (3 minutes or less)
What water temperature do you use for clothes washing?	Always hot or warm	Sometimes warm	Always cold
How do you dry clothes?	Always use the dryer	Sometimes use the dryer	Always dry on the line or clothes airer
How much of your home do you heat and cool?	Whole house	All living spaces	Only rooms that people are in
What do you use for heating?	Whole of house heating	Single room heater	Warm clothes and occasional heater
What do you use for cooling?	Whole of house cooling	Single room air conditioner	Ceiling fans
Total number of coloured boxes			

How did your household score?

The column with the highest number of coloured boxes best describes the way your household uses energy. Read the results below and find out what you can do to improve your home's energy efficiency.

Column A: High Energy User. Unfortunately you are using too much energy. Look for ways to improve areas where you were a high energy user. Remember by using less energy, you can save money on your energy bill, and help the environment too.

Column B: Moderate Energy User. Your home is getting closer however there are steps you can take to improve energy efficiency in your home. Review the quiz and see what changes you can make to become a low energy user.

Column C: Low Energy User. Congratulations. Your home is very energy efficient! Keep up the good work and educate your friends to follow your example.