Ready-Ed Publications

PHOTOCOPY MASTERS

STEM

Year 6

- Science
- Technology
- Engineering
- Maths

CURRICULUM LINKED

By Fiona Grant

Contents

Teachers' Notes

The concept of this book is for students to engage with the Year 6 Australian Curriculum across each of the STEM subjects: Science, Technology, Engineering and Maths. The book is structured so that students can work both independently and collaboratively to discover how they can contribute to making the Earth's energy production and use, more sustainable. While investigating each of the renewable energy sources and completing several inquiries and experiments, students will use twenty first century thinking and problem solving skills.

Students use digital technologies throughout the activities to develop an understanding of the role individual components of digital systems play in the processing and representation of data. Students will also study the impact of natural forces resulting in natural disasters such as: earthquakes, cyclones and tsunamis. Students will progress from managing the creation of their own ideas and information to sharing work with others. Engineering concepts are disbursed throughout the activities and essential Mathematic skills are interwoven into the inquires to seamlessly demonstrate real life Mathematic applications.

Curriculum Links

DIGITAL TECHNOLOGIES (Years 5 & 6)

Examine the main components of common digital systems and how they may connect together to form networks to transmit data (ACTDIK014)

- investigating how emerging digital systems work, for example using an augmented reality app (or blended reality) and considering how images of real-world objects can be blended with computer-generated information to produce a virtual reality

Define problems in terms of data and functional requirements drawing on previously solved problems(ACTDIP01)

Design a user interface for a digital system (ACTDIP018)

- exploring different features of user interfaces that allow people from different cultures to access information irrespective of language background, for example using icons and consistently placing icons or symbols in game interfaces to reduce the frustrations of game players
- applying the principles and elements of design to a set of requirements in order to produce a user interface for a system that addresses an identified need, for example to emphasise or highlight an area of the screen to draw the viewer's attention to an event or action
- designing the user interface of a solution using different design tools, for example using a storyboard to outline the stages of a game or a mock-up to show the placement of icons

Implement digital solutions as simple visual programs involving branching, iteration (repetition), and user input (ACTDIP020)

- experimenting with different options that involve repeat instructions, for example a continually repeating slideshow, a repeated movement in an animation, a repeated calculation in a spreadsheet
- planning and implementing a solution using a visual programming language, for example designing and creating a simple computer game involving decisions and repetitions, suitable for younger children, that requires user input to make selections, taking into account user responses
- considering opportunities and consequences of decisions for future

applications, for example practices to save energy and other resources when using information systems, such as switching off when not in use, ensuring electronic devices are in energy-saving mode

Plan, create and communicate ideas and information, including collaboratively online, applying agreed ethical, social and technical protocols (ACTDIP022)

SCIENCE (Year 6)
Changes to materials can be reversible or irreversible (ACSSU095)

- describing what happens when materials are mixed
- investigating the solubility of common materials in water
- investigating the change in state caused by heating and cooling of a familiar substance

Sudden geological changes and extreme weather events can affect Earth's surface (ACSSU096)

- describing how people measure significant geological events
- exploring ways that scientific understanding can assist in natural disaster management to minimise both long and short-term effects

Electrical energy can be transferred and transformed in electrical circuits and can be generated from a range of sources (ACSSU097)

- recognising the need for a complete circuit to allow the flow of electricity
- investigating different electrical conductors and insulators
- investigating how moving air and water can turn turbines to generate electricity investigating the use of solar panels
- considering whether an energy source is sustainable

Science involves testing predictions by gathering data and using evidence to develop explanations of events and phenomena and reflects historical and cultural contributions (ACSHE098)

- describing how understanding of the causes and effects of major natural events has changed as new evidence has become available
- investigating the use of electricity, including predicting the effects of changes to electric circuits
- considering how gathering evidence helps scientists to predict the effect of major geological or climatic events
- investigating how people from different cultures have used sustainable sources of energy

Scientific knowledge is used to solve problems and inform personal and community decisions s (ACSHE100)

- choices influence our use of sustainable sources of energy
- investigating how understanding of catastrophic natural events helps in planning for their early detection and minimising their impact
- recognising that science can inform choices about where people live and how they manage natural disasters
- discussing the use of electricity and the conservation of sources of energy
- researching the scientific work involved in global disaster alerts and communication, such as cyclone, earthquake and tsunami alerts
- investigating how electrical energy is generated in Australia and around the world

With guidance, pose clarifying questions and make predictions about scientific investigations (ACSIS232)

- refining questions to enable scientific investigation

Identify, plan and apply the elements of scientific investigations to answer questions and solve problems using equipment and materials safely and identifying potential risks (ACSIS103)

- following a procedure to design an experimental or field investigation
- discussing methods chosen with other students, and refining methods accordingly
- considering which investigation methods are most suited to answer a particular question or solve a problem

Decide variables to be changed and measured in fair tests, and observe measure and record data with accuracy using digital technologies as appropriate (ACSIS104)

Construct and use a range of representations, including tables and

ACTIVITY

Electricity

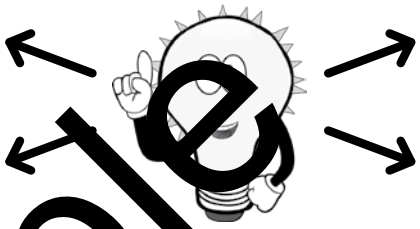
1. List all the appliances you can think of which use electricity in your home below.

Think about all the electricity that is being used in the world, each minute of every day and night; it is pretty mind boggling. Would you know how much electricity the people in your home use each year?

Unless your home has solar panels and is using sustainable energy to create electricity, then you are using a non-sustainable resource, such as coal, to generate the electricity for your home.

If you turn off light switches and appliance power point switches, that is a great start to saving power in the home.

2. Brainstorm other ways in which you can cut down electricity use in the home. Jot down your ideas below.



3. Look at the graph to find out where Australia is placed in the world for usage of household electricity, then complete the brainpower questions in your workbook.

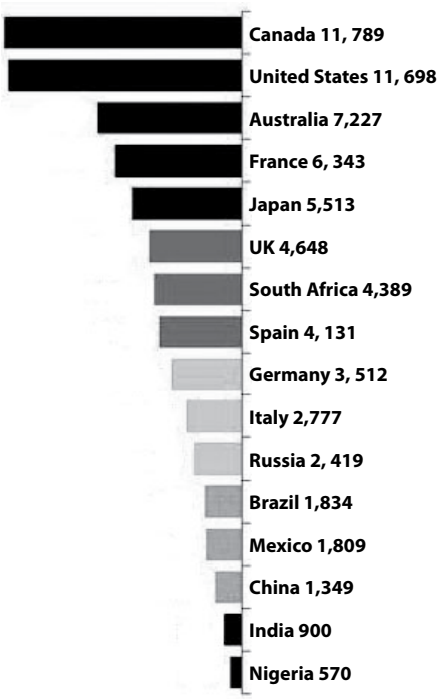
BRAIN POWER QUESTIONS

i. 16 countries are listed. Find out the population of the two countries who use more power than Australia.

ii. Compare the electricity consumption of the 3 top countries and brainstorm with your elbow partner what is interesting about the difference in the population of the three countries and how much electricity each uses. Record your findings and share with the class. (You will need to look up the population of each country on a device.)

iii. Find out the population of India. Compare the amount of electricity used in India to Australia and its population. Participate in a class discussion about your findings.

Household Electricity Consumption (kWh/year)

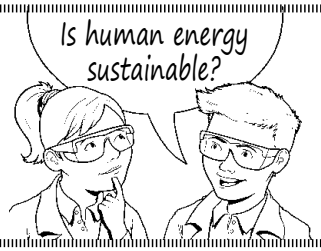


Note: Figures are 2010 averages for electrified households
Source: Enerdata via World Energy Council

ACTIVITY

Human Energy

■ **Think about the concept of human energy. What modifications could be made to humans to make the energy they can produce more sustainable?**



1. Define the problem

2. Identify what is required to solve the problem

3. Brainstorm solutions

4. Make and test the solution you think is best

5. Evaluate the results

6. How could you improve the solution to get better results?

7. Share the results

ACTIVITY

Biomass Debate

One problem with biofuels is that it has encouraged some farmers to grow crops not for people to eat, but to sell for fuel to biomass plants. This requires a lot of land and water.

When farmers swap their food crops for fuel crops, they are growing crops only to produce energy, not food. This creates a second problem – food shortages in some parts of the world.

■ **BRAIN POWER CLASS DEBATE: People are being innovative when they come up with a new idea, but all new inventions have pros and cons. Complete the 'for and against' chart on biomass to use in a class debate or just to hand in. You will need to do some more research.**

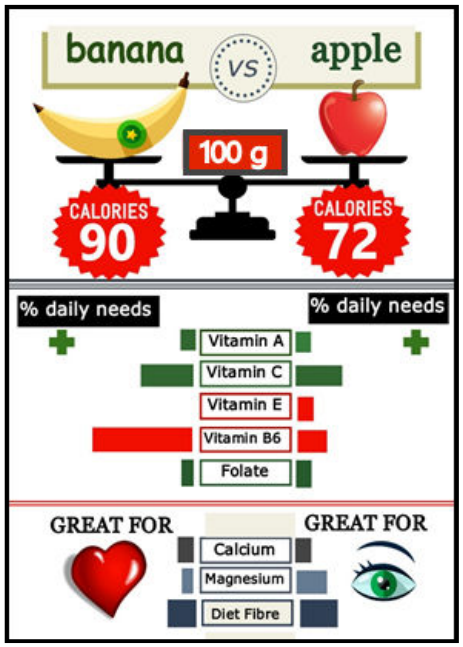
For	Against
1.	1.
2.	2.
3.	3.

■ **RECORD THE OUTCOME OF THE DEBATE AND WHAT YOU HAVE LEARNT. How did the debate enable you to think differently about something you thought you had already made your mind up about?**

ACTIVITY

Infograph

■ **TASK: Design an infographic brochure or poster for the school community about biomass. Suggested apps / online programs are: Pikochart and CANVA.**



10 top features of an infograph:

1. focused
2. simple
3. shows information visually
4. easy to read the information
5. a balance of pictures and words
6. white space for readability
7. noticeable heading
8. includes current facts, figures, data
9. includes references of websites used at the bottom
10. organised and structured

■ **Draft your infograph on biomass here.**

Wind Power 1

HOW IS THE WIND CREATED?

Wind is moving air. It is created because the Sun heats land faster than it heats water. Think of a beach where there is always a lot of wind. The Sun heats the sand faster than it heats the water, creating wind.

This uneven heating of the land and the water creates conflicting air pressure (low pressure over the land and high pressure over the water) which in turn creates wind. The greater the difference in air pressure, the greater the wind.

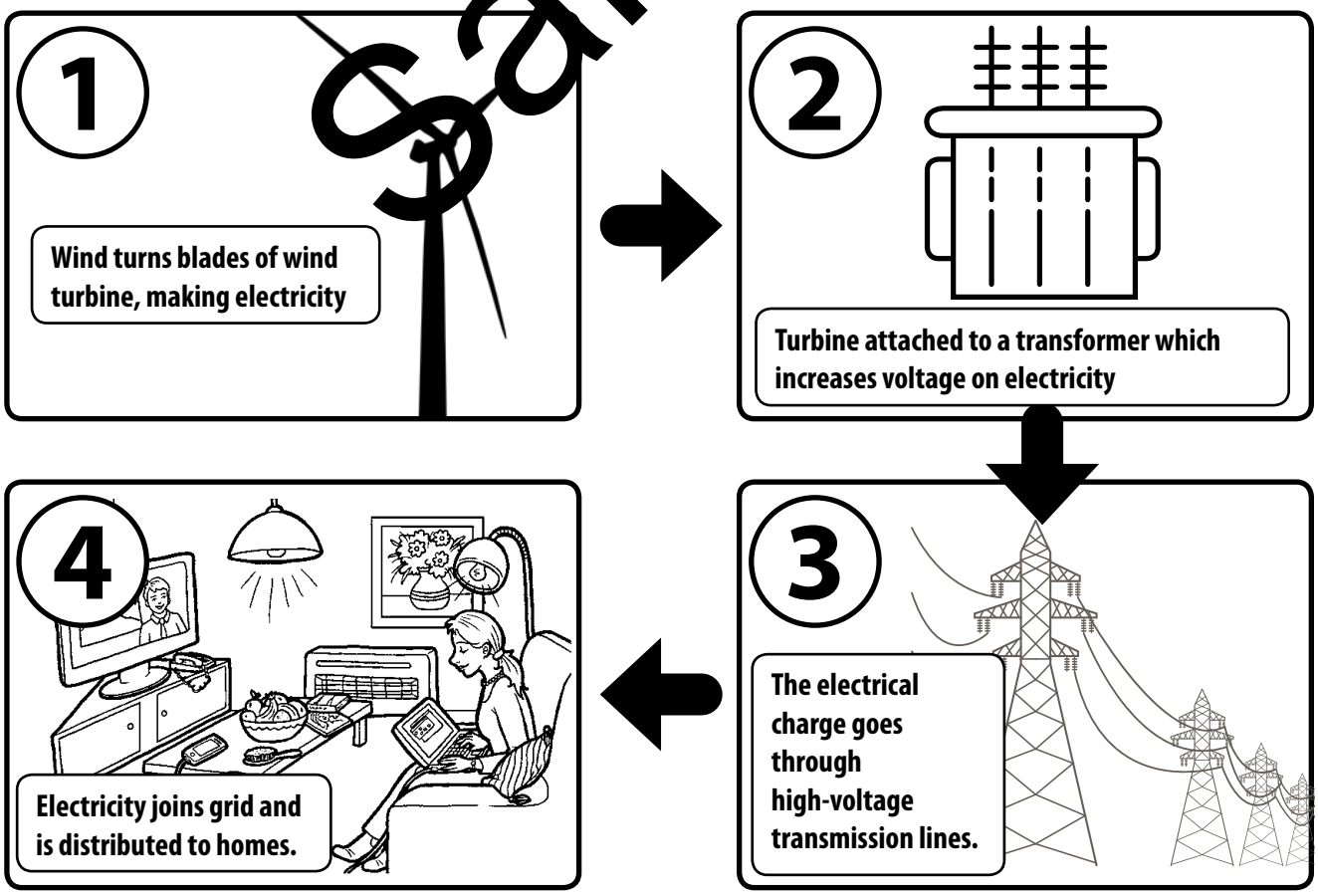
Low pressure (warm) air rises, and as it does higher pressure (cool) air takes its place. This movement creates wind.

Wind Power

Wind is a source of energy that is renewable and does not pollute the Earth. Wind power is a cleaner alternative to burning fossil fuels. Other advantages of wind power is that it uses no water and uses little land.

Wind power means using the wind to turn wind turbines. Wind turbines are like pinwheels; they collect the wind's kinetic energy (motion). The giant blades are connected to a drive shaft that turns an electric generator to produce electricity. There are two types of wind turbines: vertical and horizontal.

Study the diagram to see how wind turbines work.



ACTIVITY

Earthquake Management Plan

■ **IN THE EVENT OF A REAL EARTHQUAKE, YOU COULD FOLLOW THE EMERGENCY ACTION STEPS BELOW.**

- » Stay calm
- » Activate the radio function on your phone
- » Locate torches and emergency supplies
- » Locate medications needed
- » Wear any available suitable protective clothing
- » Duck and cover head with hands
- » Move away from windows and moveable furniture
- » Check for injuries, call 000 if needed
- » Shut off electricity and utilities if possible
- » Locate pets and try to keep them with you
- » Prepare for after-shocks
- » If you have time, leave a note so people know where you have evacuated to

■ **If there ever was an earthquake, the information below would come in handy. Complete it as best you can.**

▸ **EMERGENCY CONTACTS**
Carry contacts on a post-it in your wallet or purse or phone holder

Name	Number

▸ **FAMILY PLAN**
I have authorised the following people to pick up my children from school:

Name	Number

▸ **STAY TUNED**
Tune into the following radio stations or websites to receive updates:

_____

▸ **Clothing list:**

_____

▸ **Emergency supplies list and location:**
(e.g. medicines, food and water radio, phone, vital documents, pets, computer)

_____

■ **EXTRA: Research what to do in the event of a tsunami.**

Section 6:
Apps For STEM