

SCIENCE YEARS 4-8

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ARE WE ELECTRICALLY AWARE?

A science/language unit designed to make students aware of the enormous importance of electricity in the everyday lives of New Zealanders - something we often take for granted!

CURRICULUM

Science:	<i>Making Sense of the Nature of Science and its Relationship with Technology</i>
Social Studies:	Resources and Economic Activities
Links to:	<i>English, Visual and Performing Arts, Technology</i>

LEARNING INTENTIONS

- Understanding why and how people manage resources
- Investigating the ways in which Science and Technology have affected our lives - particularly electricity and appliances

SKILLS USED AND DEVELOPED

- Communication: including presentation and displaying information
- Self Management Skills

SUCCESS CRITERIA

- Investigate the ranges and use of electrical appliances at home and school
- Classifying appliances according to the work they do
- Research how life was like before electricity and compare with life today
- Investigate energy saving techniques, especially those relating to hot water, lighting, space heating and cooking
- Display competence and confidence in using a wide range of electrical appliances

MAORI VOCABULARY

- electrical Energy/pungao hiko
- Solar Panel/papa komaru
- Power Supply/puniko
- Generator/whakahiko
- Appliance/purere

GETTING STARTED

BECOMING AWARE OF ELECTRICITY

- Divide into groups and have the pupils conduct a school survey to find and list the number of 'things' in their assigned area that run on electricity. (Staff room, classroom, caretakers shed, school office).
- Have groups report back and make a master class list of all appliances found.
- Have groups prepare a chart of school appliances/tools under the following headings:
Name • Use • Who Uses It • Alternative without electricity.
- Present to class and then have groups rate each appliance as essential/non essential on a 1-5 scale. Pupils will have to justify ratings.

ELECTRICITY IN THE HOME

- Set the children a home assignment to find out what runs on electricity in their home. Discuss suitable classifications for these to better focus students' identification. These could be: *entertainment* (T.V, radio, video, stereo); *clothing* (washing machines, sewing machines,

driers); *heating; lighting; food preparation; house and garden maintenance; communication technology* (computers, faxes, answer machines)

- Have pupils present results in a variety of ways e.g. charts or tables, graphs, pictures and captions, cartoons....
- Find group and class totals in all categories and have groups/individuals and the whole class prepare a large visual mural of electricity use in the home. Divide the mural into categories and display the information in a variety of ways. Have pupils discuss and plan this before starting.
- Just for fun, have individuals and groups plan mimes of machines/appliances and present to the class. Class to guess what the machine/appliance is.

ACTIVITY TWO: LIFE WITHOUT ELECTRICITY

- Have each pupil select their favourite electric appliance/invention/tool. Get them to imagine what life was like without it. How has it made a difference to people's lives? Compare the convenience of using electricity to not using electricity. List advantages and disadvantages. Write a short paragraph and share with the class.
- Have pupils interview their parents/grandparents about their memories of what it was like before certain electrical appliances were used in the home. Find out 'how they coped' without these electrical appliances. Find out how it 'changed their lives'. If possible, invite them to talk to the class about this. Prepare questions beforehand.
- Propose the scenario that '*all electricity generation was suddenly banned*' by a group of extremists who took over the country. Write a short story on the ways that life would change.
- Research and find how people lit their homes before the electric light.
- The electric light has just been invented. Have pupils prepare an advertising poster to sell the benefits of the '*new electric light*'.
- Prepare a drama of a salesperson talking to a meeting of local people to demonstrate and sell the benefits of electric lighting or any other 'new' electrical invention.

ACTIVITY THREE:

ENERGY EFFICIENCY INVESTIGATIONS

The following investigations can be assigned to separate groups or used in series by the whole class.

INSULATION

- Invite a builder to the classroom or arrange to visit a building site to see the use and range of insulation in houses.
- Find out about benefits and installation procedures for fibreglass bats and blankets, wool bats, loose fill, underfloor; draught strips, drapes, double-glazing. How much energy saving can be made? Compare various costs and types.
- Have students write a report on the results.

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- Write advertising slogans or produce a taped radio advertisement and jingle to promote house insulation.

HOT WATER HEATING

- If possible, visit a plumber to find out how electric water heating can be made more efficient. Points to investigate include: open vertical pipes, relief valves, temperature controls, hot water cylinder wraps, cylinder size, mixing valves, solar heating, hot water pipe wraps, fixing dripping taps, energy efficient showers and taps.
- Prepare an oral report to the class on their investigation and supplement this with diagrams or 'real examples' of on-loan products.

LIGHTING EFFICIENCY

- Invite an electrician or visit your local power centre to investigate energy efficient lighting. Points to investigate should include: energy efficient bulbs, lamp shades, fluorescent compact bulbs, life of bulbs, types of lighting most suitable for different areas, appropriate wattage of bulbs, dimmer switches, solar cell lighting for outside.
- Present findings to the class in visual and written form. Arrange a display and demonstration of different light bulbs.
- Have group prepare a plan and recommendations for more efficient lighting energy use in the school and or home. Present the plan to the principal/Board of Trustees.

SPACE HEATING

- Visit your local Power Company and/or electrician to find out efficient space heating. Investigating points include: personal heaters, reflectors, safety, wall mounts, siting, fan heaters, convention heaters, oil filled radiators, storage heaters, heat pumps, under-carpet heating, ceiling heat, ceiling fans, comparisons with solid fuel heaters and open fires, costs, radiant convector heaters.
- Present findings to class with pictures or better still, real examples of heaters. A local energy centre may be prepared to do this for you.
- Prepare a bulletin board with captions, short statements and pictures to illustrate the points discovered during your investigations.

ACTIVITY FOUR: A DISPLAY OF POWER

- Groups prepare working displays in the hall or classroom of electrical appliances. Display them in suitable categories such as heating, lighting or even rooms of a house.
- Invite other classes and parents to the display.
- Pupils demonstrate the correct working of at least one of the appliances. The demonstration must include care of the appliance and safety aspects.
- Invite visitors to use the appliances and award them a certificate of competence if they correctly use it.
- On tables, and display boards, have presentations demonstrating and emphasising energy efficiency in the sectors the class investigated.

FURTHER DIRECTIONS: SCIENCE/SOCIAL STUDIES

- Plan further investigations into the unique New Zealand energy

generation system. Find out about: *types of station; fuels; output; locations; recreational opportunities that dams and rivers provide.*

INVESTIGATE

Wind Turbine generation and find out about the Genesis Wind Energy Programmes. Design and make your own windmills.

HEALTH

- Investigate safety with power, including use of transformers for outside tools. Involve an electrician or local Power Company.
- Find out about how to handle and treat a person who has had an electric shock. Involve a nurse.

SOCIAL STUDIES

- Trace the journey of a major electricity generating river from source to the sea. Where does it go? Find out about towns and cities along its route. Locate their Power Stations. Put all this information in label form on a large bulletin board display.

MUSIC

- A fun sound picture can be composed using electrical appliances and tools. It can be a **Symphony of Power**. e.g. Kitchen appliances are one by one, brought on to the stage, switched on and left going. The conductor, by pointing to individuals, indicates which appliance is to be switched on or off. Aim for contrast in volume, texture and sounds.

ART & CRAFT

- Draw, paint or construct a new electrical appliance that has never been seen before. What will it do? How will it work? Use junk material.

ICT

- Create a data base of all the electrical appliances/tools/facilities in the school. Database fields could be: Where found, Age, Use, Wattage, Safety Features, How Used
- Design computer generated brochures on energy efficiency from the information you have collected.

USEFUL WEBSITES

- Electrical energy saving tips at: www.energywise.org.nz
- Two sites explaining how electricity is generated:
www.genesisenergy.co.nz/education/f_genesis.htm
www.meridianenergy.co.nz/education/generating.html
- An excellent site explaining how household appliances work
www.howstuffworks.com/category.htm?cat=Appl

ASSESSMENT CRITERIA

- Understanding the advantages of electrical cooking by writing two paragraphs or making a comparison chart titled 'Preparing Dinner 100 years ago and today'.
- Showing an understanding of new methods of insulation by preparing questions for a building expert.
- Ability to demonstrate and explain five methods of saving electrical energy in the home.