E IS FOR ENERGY

a science, technology and maths unit on an energy efficiency theme sponsored by:

Genesis

Curriculum:

Technology:	**Knowledge & Understanding, Capability, Technology and Society**
Science:	**Physical World**
Maths:	**Number, Statistics**
Links to:	**English, The Arts, Environment Education**
Levels 2-4+	**(Easily adapted for junior classes)**

Teacher Notes

In this unit students explore energy concepts and conduct energy audits and surveys to find out just how efficient the use of energy sources are both at school and at home. Once this information has been collected, collated and understood, students are challenged to develop and implement strategies for more efficient energy use and energy conservation.

tuning into energy

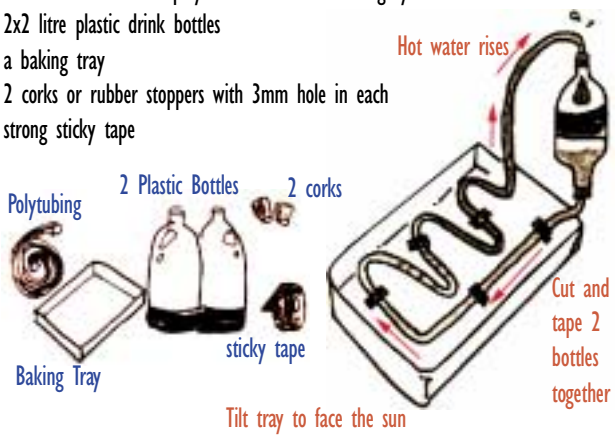
- Talk about different forms of energy, ***eg***
  - *where do plants and trees get their energy from?*
  - *what does our body convert into energy?*
- Tell students that hydro electricity is the major source of energy used in New Zealand. Develop the idea that it is 'clean' and 'renewable'.
- Challenge the class to a 1 minute brainstorm where they write a list of all appliances at home and school which are powered by electricity.

LEARNING CENTRE ACTIVITY

BUILD YOUR OWN SOLAR HOT WATER HEATER

You will need:

150cm of black 3mm polytube - used for watering systems
2x2 litre plastic drink bottles
a baking tray
2 corks or rubber stoppers with 3mm hole in each
strong sticky tape



a school survey

- Divide into groups and assign each a room of the school to conduct a survey of the number of appliances/machines powered by electricity, **eg**
  - *the school office*
  - *each classroom*
  - *the caretaker's shed*
  - *the school staffroom*
- What is the total number of electrical appliances at school? Make a wall chart master list of all appliances and what they are used for (work we do with them). Rate appliances on a 1-5 scale - 1 being absolutely essential and 5 is not really needed.
- What other appliances/machines are there at school which are not powered by electricity? ***eg***
  - *a petrol driven motor mower*
  - *a gas heater*
- What is the ratio of electrical powered appliances to non electrical powered appliances?

a home survey

- As a homework assignment, have each student conduct a room by room survey of electrical appliances/machines at home. Transfer all results on to a class room by room master sheet.

a little energy mathematics

- **A WATT (W) is how we measure the flow of electricity**
- **A KILOWATT (kW) is 1000 Watts**
- **A MEGAWATT (MW) is 1,000,000 Watts or 1000 kWs**
- **A KILOWATT-HOUR is a quantity of energy. If one kilowatt of electricity is used for an hour, one kilowatt-hour would be used.**
- **Unit Rate:This is the amount a Power Company charges. ie, Genesis charges in cents per unit and one unit is charged for every kilowatt-hour of electricity used.**

- Use the example of a 100 WATT light bulb to introduce the above energy maths, ***eg***
  - *it uses 100 Watts per hour*
  - *therefore it will take 10 hours to use 1Kw of electricity*
- Ask students to count the number of light bulbs in their house. Assume that they are 100W bulbs.
- Calculate the number of watts and kilowatts they would use per hour if they were all on at the same time.

E IS FOR EFFICIENCY

THINKING ABOUT ENERGY EFFICIENCY

what do they use?

- Ask the Principal/BOT if the class can see an example of a school power account for summer and for winter. Some students may be able to bring kilowatt-hour summaries from home power accounts during the same periods.
  - *how many kilowatt-hours were used?*
  - *what was the difference between the summer and the winter account?*
  - *speculate on reasons for this - were there school holidays during any of these account times?*
- Do the students know which appliances at home use the most electricity? (Electric heaters, water heaters and refrigerators use the most.)
- Invite a electrician/home appliance store owner to talk to the class and explain the usage of common domestic appliances. (information available in free GENESIS booklet … see bottom right of this page)
- List these in order from most usage to least usage.

the building/home we live in?

- Tell the students that the house or building we live in can have a very big effect on our heating bills. Discuss 'Where Does All the Heat Go ' information with the class.
- What action could be taken to prevent heat loss through ceilings, walls, windows, chimneys, doors and floors? eg
  - *ceiling insulation is the most important*
  - *curtains on windows to stop heat loss*
  - *no cracks around door and windows - draught stoppers*

WHERE DOES ALL THE HEAT GO?

42% through the ceiling

12% through windows

24% through walls

12% through unblocked chimneys and draughts around doors and windows

10% through the floor

conducting a home audit

- Introduce the idea that if we wish to reduce our electrical energy usage at home or at school we should first conduct an audit to see just how much energy we use.
- Have students follow the following steps to prepare for their home energy audit. If time is limited, restrict the audit to one or two rooms.

1. **Do the audit on a room by room basis - 1 sheet for each room.**
2. **Write down all electrical appliances in that room.**
3. **Find out the wattage of each appliance. Each one should have a label on it listing this information.**

- Construct a table for each room as in sample below.

Room: My Bedroom

Appliance	Watts	x	Hours per day	=	Watt Hours
Computer	350	x	3 hours	=	1050
Colour TV	350	x	5 hours	=	1750

- Total up all watt hours and convert to kilowatt-hours.
- Have students present their audit results to the class and publish them on a large wall chart for examination.

using the information collected

- Involve the students in brainstorming sessions to suggest ways that electrical usage could be cut down and energy bills reduced. Ask a representative of your local power company to talk to the class about this. eg
  - *lights turned out when not in the room*
  - *turn down hot water cylinder to 55 degrees*
  - *hot water cylinder has a wrap*
  - *use cold water for clothes washing …*
- Have students plan home strategies to reduce usage, put into action and then re-audit their home. Have savings been made?
- Publish an information sheet for parents on energy efficiency.

Contact GENESIS for your free copy of this excellent Energy Audit and Efficiency Booklet for dozens of energy saving tips and information on how to go about conducting your own or school energy audit. Contact the Customer Info Line on …
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