Teacher notes

ENERGY USAGE: Past, Present and Future

Introduction

- Your task is to consider **household appliances that use energy**.
- You will need to interview your parents, grandparents or great-grandparents about the appliances or ‘gadgets’ we have today that were not in use in their day.

How did they do the washing, ironing, cooking and cleaning? How did they keep warm and cool themselves? Did they need energy for their entertainment activities?

*Try to organise for a student’s grandparent or great-grandparent to be interviewed. The aim is to encourage students to start thinking about energy wants versus energy needs and how energy consumption has increased over time. Suggest why this has occurred.*

Start a **blog** (or learning log) to record the development of your project and your research. This will allow ongoing feedback from others to help you. You should also make helpful comments to others. Your teacher will help you set the rules and procedures for conducting a blog.

You first need to understand what **Energy** and **Using Energy Responsibly** mean.

**Activity: Think Pair Share (can be conducted through a blog)**
- Write down what you think **Energy** and **Using Energy Responsibly** mean.
- Discuss your idea with a partner and reach an agreement on what it means.
- Share your understanding with the whole group then modify your understanding if necessary.

*Make an entry in your blog*

What does **Using Energy Responsibly** look, sound and feel like? Write down some descriptive words or phrases in the Y Chart below.

**Activity: Y chart for Using Energy Responsibly**

- **Look?**
  - The visual, obvious and concrete ideas.

- **Sound?**
  - This activity encourages brainstorming with a deeper focus to reach a better understanding of the concept of **Using Energy Responsibly**.

- **Feel?**
  - Tactile, kinaesthetic and emotional responses to **Using Energy Responsibly**.

  **Words, phrases or sentences that people would use to describe Using Energy Responsibly.**
Research Design (KWHL)

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<th>Topic question: What type of energy source would be best for your local area?</th>
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Make an entry in your blog

Research

You need to find out how energy flows through systems on Earth and how we get our energy to run, watch TV, have a hot shower and do all the things each day that require an input of energy. Questions that need to be explored are: What is coal? What is the original source of energy in coal? What does sustainable living mean?

To achieve this you will also need to:


**Task A** involves looking at how things were done in the ‘olden days’. This will provide useful ideas for how our energy usage can be more sustainable.

**Activity 1:** In the Sustainable Living kit you will find some items commonly used in the home during the early 20th century. Investigate the historical objects, compare them with current appliances and practices and evaluate these in terms of how much energy they use and their environmental impact.

**Activity 2:** Complete the Sustainable Living Practices student worksheets.

This first activity requires the OML Sustainable Living kit which can be borrowed from Queensland Museum Loans at [http://www.southbank.qm.qld.gov.au/Learning+Resources/OM+Loans](http://www.southbank.qm.qld.gov.au/Learning+Resources/OM+Loans)

The second activity involves worksheets that appear as a PDF in Section 4 of this web resource. Students should be encouraged to start thinking about ways of reducing their energy consumption.
This unit of work and its sustainability focus, targets the contemporary science topic of ‘energy resources and technology’ in the National Science curriculum. It illustrates the scientific understanding topics of: use, transfer and storage of energy; and earth’s resources and their uses. It emphasises the unifying ideas of:

- **Energy** – Energy is the basis of all activity. There are different forms of energy and energy is transferred between these forms. A guiding principle is that energy is always conserved. A challenge for humans is to use energy wisely.
- **Sustainability** – The idea of sustainability is central to the nature of dynamic systems. A system has inputs, outputs and a variety of internal functions. The interaction of these inputs, functions and outputs determines the degree to which any system can sustain itself. The inputs include resources that may be renewable or non-renewable.

The QML Loans kit can be kept for a more in-depth discussion after students visit the museum.

**Task B** requires you to complete some of the following activities that your teacher will download from the ENERGEX website.

**Activities:**
Your teacher will provide you with a selection of activities to investigate different types of energy.


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**Task C** requires you to visit ENERGEX Playasaurus Place at Queensland Museum South Bank.

**Activity:**

1. **Examine** samples of peat, lignite and coal and how each formed. Note that our main current electrical energy source is coal and gas, and these fossil fuels have origins in our prehistoric past.

2. **Read** about fossil fuel energy sources and find examples of why this energy consumption is not sustainable.

3. **Define** greenhouse gases, find out how they are made, and predict their impacts on climate change, our planet and our lives.

4. **Compare** past, present and predicted future electricity generation, and discuss the pros and cons of cleaner and greener energy sources.


6. **Note** the Green spot tips. How many do you already do? Do up a checklist and compare your results with other students. Discuss how small changes can make a big difference for a sustainable future.
**Task D** involves building and testing some devices that use different types of renewable energy. Take the Greener and Cleaner survey to see how your household rates with using energy responsibly.

**Activity:**

In groups of four complete the Student worksheets to build (and/or use) a:

1. Windmill
2. Solar hot water system
3. Water wheel
4. Energy Efficient Torch

By yourself complete the:

5. Greener and Cleaner survey

**Task E** requires you to search reference books and websites for more information about the different types of energy (coal, oil, natural gas, nuclear, wind, solar, tidal, hydro, geothermal, biomass); and investigate the advantages and the disadvantages of each. What do you recommend for your local area? Each group may be assigned a different energy type to investigate.

**Solution proposal (Group Presentation)**

You should now have considered the issues that allow you to draw some conclusions.

**Activity:**

In groups of four:

1. Create your own summary of the pros and cons of your group’s allocated type of energy on A4 paper.
2. Share your views with the other three in your group and compile a group summary report.
3. Create a combined report with illustrations and written explanations on A3 paper.
4. Post the report on the wall and nominate a group presenter.
5. The remaining group of three circulates and asks questions about other groups’ reports.
6. Return to your home group and discuss findings. Give your presenter time to go around and view the reports of other groups. Make changes to your report as necessary.
7. In your group, decide what energy type you think would be best for your local area.
Task F involves some extension activities. Your teacher may allocate one to your group. Prepare it and then present it to the rest of the class.

Activity:

In groups of four:
1. Debate the topic: ‘Nuclear energy is the energy of the future.’
2. Discuss one of the following Hypotheticals, that is, ‘what if….’ What if the sun were to use up all its fuel? What if our coal supplies run out? What if we don’t lower our carbon emissions?
3. Consider improved or alternate domestic practices that could better meet future sustainability goals by re-examining the items that were in the Sustainable Living kit from QML. What are some ways we can lower our energy wants and be cleaner and greener?
4. Plan a 6.5 week project to reduce the electricity consumption in your home. Record how much energy your household used during the period of your last electricity bill (13 weeks generally). Divide this by 2 to estimate the usage over a 6.5 week period. This is your upper target. Now record the reading on your electricity meter and for the next 6.5 weeks (45 days approx), try to use less electricity. At the end of the 45 days record the reading again on the meter. How did your household fare? Were there any factors you need to consider in making this a valid comparison? i.e. a fair test.


These activities should foster the aims of the science curriculum: to develop a willingness to speculate about and explore the world. Students should be able to identify and investigate scientific questions, draw evidence-based conclusions and make informed decisions about applications of science that apply to their daily life.

In some of the downloadable activities, students are asked to hypothesise, perform investigations, measure and repeat trials, gather and organise data, analyse and test models, and explain and summarise patterns in data.

The activities that require construction of models address some design aspects of the technology syllabus. Another useful website with some project work is [http://www.sustainableliving.com.au/](http://www.sustainableliving.com.au/) and there is a Sustainable House Design Challenge PDF in Section 4 of this web resource.

[Make an entry in your blog]

Evaluation and feedback

What have you learned about Energy and Using Energy Responsibly?

How well do you think you answered your question?

Look back at your report and all your blog entries that you have made and the comments that you have received. Make some final entries summarising what you have learned and how you might improve your solution.

[Make an entry in your blog]