STEAMING STEM PROGRAM

WHAT'S THE SOURCE?

LEVEL

Level 5 – Level 6

ACTIVITY DESCRIPTION

Energy is a part of every aspect of our lives. Students explore one of the ten major energy sources used in Australia. Students learn about energy sources using web-based resources and create a power point presentation and a demonstration to teach other students about an energy source.

THEME

Energy sources

MATERIALS REQUIRED

Access to computers and the internet

INSTRUCTIONS

Working in small groups, assign each group a different energy source. Energy sources include: Coal, Wind, Solar, Petroleum, Biomass, Hydropower, Natural gas, Geothermal, Electricity, Uranium.

1. Allow student groups to have access to school computers to research information about their energy source, using at least three different websites.
2. Students create a power point presentation on their energy source. As an addition they may make a model, prepare a demonstration or a labelled diagram of how their energy source works.

The presentations include eight-to-ten slides that provide the following information about the energy source:

- Title slide
- Description of the energy source, including renewable or non-renewable.
- Where the energy source is found and how it is recovered?
- How the energy is stored and how the energy is released?
- How the energy source is used today?
- Advantages and disadvantages of the energy source?
- Future of the energy source?
- Other interesting facts about the energy source?
- Model or demonstration or labelled diagram of how the energy source works.
- Reference list

Extension Activity: Is Puffing Billy renewable or not renewable? Students discuss what Puffing Billy's primary energy source is. Students investigate alternative, renewable energy sources available to Puffing Billy Railway.

SUGGESTIONS FOR ASSESSMENT

The main form of assessment is an individual or small group presentation. Students could evaluate each group using a 1-to-5 rubric which includes knowledge of the energy source, content of the presentation, level of participation in the research and presentation, and design and creativity of the presentation. Use the Rubric provided below. Students could present this information in different ways (poster or digital). Using the same Rubric, students could undertake a gallery walk to view each groups presentation.

BACKGROUND INFORMATION

Energy is the ability to do work. Energy comes in different forms:

- Heat (thermal)
- Motion (kinetic)
- Chemical
- Gravitational
- Light (radiant)
- Electrical
- Nuclear energy
- People use energy for everything from walking to sending astronauts into space.
- There are two types of energy: Stored (potential) energy, Working (kinetic) energy.

For example, the food a person eats contains chemical energy, and a person's body stores this energy until he or she uses it as kinetic energy during work or play.

When people use electricity in their homes, the electrical power is generated by burning coal or natural gas, by a nuclear reaction, or by a hydroelectric plant on a river. When people fill up their car fuel tank, the energy source is petroleum (gasoline) refined from crude oil and may include fuel ethanol made by growing and processing corn. Coal, natural gas, nuclear, hydropower, petroleum, and ethanol are called energy sources.

Energy sources are divided into two groups:

- Renewable (an energy source that can be easily replenished)
- Non-renewable (an energy source that cannot be easily replenished)

Renewable and non-renewable energy sources can be used as primary energy sources to produce useful energy such as heat or used to produce secondary energy sources such as electricity.

RENEWABLE ENERGY

There are five main renewable energy sources:

- Solar energy from the sun
- Geothermal energy from heat inside the earth
- Wind energy
- Biomass from plants
- Hydropower from flowing water

NON-RENEWABLE ENERGY

- Petroleum products
- Hydrocarbon gas liquids
- Natural gas
- Coal
- Nuclear energy

Crude oil, natural gas, and coal are called fossil fuels because they were formed over millions of years by the action of heat from the earth's core and pressure from rock and soil on the remains (or fossils) of dead plants and creatures such as microscopic diatoms. Most of the petroleum products consumed are made from crude oil, but petroleum liquids can also be made from natural gas and coal. Nuclear energy is produced from uranium, a non-renewable energy source whose atoms are split (through a process called nuclear fission) to create heat and, eventually, electricity.

Puffing Billy is a Steam Engine, using steam energy to move. Steam energy is water heated into steam. Steam is usually converted to motive power by a reciprocating engine or turbine. The pistons are driven by the steam power. The steam engine inside the locomotive relies on the burning of coal in order to work. The woodfire burns in the engine room until its turns into hot coal, which can burn for long periods of time. The coal heats up the connected boiler, which is full of water, creating steam. The steam is then squeezed into a very small space and forced into a metal rod called a piston. The steam is so powerful it moves the pistons, which are connected to the wheels of the train. The wheels start moving, and the pistons keep pumping.

CURRICULUM LINKS

SCIENCE

Energy from a variety of sources can be used to generate electricity; electric circuits enable this energy to be transferred to another place and then to be transformed into another form of energy (VCSSU081)

PRESENTATION RUBRIC

Students could evaluate each group using the below 1-to - 5 rubric:

CATEGORY	EVALUATION				
	1 NOT THERE YET!	2 GETTING THERE!	3 ALMOST GOT IT!	4 WELL DONE! YOU'VE GOT IT!	5 WOW! SIMPLY AMAZING!
KNOWLEDGE OF ENERGY SOURCE	Presentation is lacking any knowledge of energy source.	Presentation and language show a Low level knowledge of energy source.	Some use of language and some of the presentation show some understanding of the energy source.	Language and presentation shows an understanding of energy source.	Language and presentation shows a thorough understanding of energy source.
CONTENT	Content lacks purpose and does not show an understanding of the topic	Content is not clear, accurate or presented in a logical order, but shows some understanding of the topic.	Some content is clear, accurate, presented in a logical order and shows some understanding of the topic.	Most content is clear, accurate, presented in a logical order and shows some understanding of the topic.	Content is clear, accurate, presented in a logical order and shows a thorough understanding of the topic.
LEVEL OF PARTICIPATION IN RESEARCH AND PRESENTATION	Students did not research and did not take part in delivering the presentation.	Very few students participated in research and delivering their presentation.	Some students participated in research and delivering their presentation.	Most students participated in research and delivering their presentation.	All students participated in research and delivering their presentation.
DESIGN AND CREATIVITY OF PRESENTATION	The images, text and design of the presentation do not support knowledge of the energy source. Presentation was not creative.	Very few images support knowledge of the energy source. The design of the presentation is lacking in creativity.	Some images support the knowledge of the energy source. Some of the design of the presentation is creative.	Most images and some of the design of the presentation support knowledge of energy source and are presented in a creative design.	Images and design of presentation support knowledge of energy source and are well presented and creative in design.