



Energy Engineering: People Power

Year 8 – PHYSICS: ENERGY



QGC

FUTUREMAKERS



**QUEENSLAND
MUSEUM NETWORK**



**Queensland
Government**

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Glossary



Writing exercise



Group activity



Hands on exercise



Watch a video



Need to know information

Future Makers is an innovative partnership between Queensland Museum Network and Shell's QGC project aiming to increase awareness and understanding of the value of science, technology, engineering and maths (STEM) education and skills in Queensland.

This partnership aims to engage and inspire people with the wonder of science, and increase the participation and performance of students in STEM-related subjects and careers — creating a highly capable workforce for the future.

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Australian Curriculum Links

YEAR 8

While this resource has been developed to support the delivery of the Year 8 Science Curriculum, it is possible to connect learning with other year levels. You are encouraged to adapt the resource to meet your individual needs and learning context.

Science Understanding

Physical sciences

Energy appears in different forms, including movement (kinetic energy), heat and potential energy, and energy transformations and transfers cause change within systems (ACSSU155)

Science as a Human Endeavour

Use and influence of science

Solutions to contemporary issues that are found using science and technology, may impact on other areas of society and may involve ethical considerations (ACSHE135)

Science Inquiry Skills

Communicating

Communicate ideas, findings and evidence based solutions to problems using scientific language, and representations, using digital technologies as appropriate (AC SIS148)

Design and Technologies: Knowledge and Understanding

Engineering principles and systems

Analyse how motion, force and energy are used to manipulate and control electromechanical systems when designing simple, engineered solutions (ACTDEK031)

Technologies and society

Investigate the ways in which products, services and environments evolve locally, regionally and globally and how competing factors including social, ethical and sustainability considerations are prioritised in the development of technologies and designed solutions for preferred futures (ACTDEK029)

Design and Technologies: Processes and Production Skills

Investigating and defining

Critique needs or opportunities for designing and investigate, analyse and select from a range of materials, components, tools, equipment and processes to develop design ideas (*ACTDEP035*)

Generating and designing

Generate, develop, test and communicate design ideas, plans and processes for various audiences using appropriate technical terms and technologies including graphical representation techniques (*ACTDEP036*)

Producing and implementing

Select and justify choices of materials, components, tools, equipment and techniques to effectively and safely make designed solutions (*ACTDEP037*)

Introduction

Physics in the Museum

This learning resource has been developed to utilise real objects to explore energy transfers and transformations in the past and present, and is intended as an example of cross-disciplinary learning.

Queensland Museum collections provide valuable primary and secondary sources of information that can be used to analyse the way in which physics principles are a part of our everyday lives and the history and development of technology.

Engineering Energy: People Power stimulates investigation into energy transfers, transformations and sustainable energy engineering using a Queensland Museum collection object: the Supernova solar-powered four rider bicycle. Using this example of harnessing solar energy to power a vehicle, learners are inspired to think outside the box and consider energy efficiency, energy limitations and even social dynamics when engaging in design engineering.

As this resource has been designed to complement teaching and learning experiences within your classroom, students are assumed to have developed knowledge about the following concepts:

- Energy appears in different forms including kinetic energy, potential energy, and energy transformations and transfers cause change within systems.
- Energy transfers involve the movement of the same energy type between two mediums.
- Energy transformations are changes from one energy type to another.

Engineering Energy: People Power



MUSEUM PERSPECTIVES

Queensland has a long history of research and innovation in the field of science and technology, and this is a focus for the state collection. The collection has a large number of items relating to the research, preservation and exploitation of Queensland's unique landscape.

People Power: Investigating Energy Transformations of the Supernova

The Supernova is an object in the Queensland Museum collection that is a great example of local Queensland innovation exploring the use of renewable energy forms. It is a four rider bicycle that was constructed in 1984 by the University of Queensland's Solar Energy Research Centre (SERC). It was donated to Queensland Museum in 2015.



Read about the Supernova online:

[Solar-powered Four Rider Bicycle - Supernova](#). Registration Number: H48798



Investigate the following questions:

- What forms of energy does the Supernova use?
- Explain the energy transformations and energy transfers that would take place while the bike is in motion.
- Draw a flow diagram that shows the changes in energy that occur when the bike is in use.
- Note the materials that were used to construct the Supernova. Why do you think these materials were chosen?
- Look closely at the rear view image of the Supernova (see overpage). Can you determine what the different parts are and which parts would be involved in energy collection, energy storage, energy transfer and energy transformation?
- What else would you like to know about the Supernova?



Solar-powered Four Rider Bicycle - Supernova, rear view. Taken when on display at Queensland Museum in 2015 as part of the exhibition 'Freewheeling: Cycling in Australia'; a touring exhibition from the National Museum of Australia. Source: Queensland Museum, Peter Waddington.

Energy to Win!

Queensland Museum collects not only objects, but the stories that go with them. Find out more about the Supernova or Solar Tandem Bicycle by reading about its story on The Queensland Museum Network Blog.

Read the blog post online: [A Day in the Sun](#)



Watch the video towards the bottom of the blog post.



Investigate the following questions:

- What was the new energy innovation that was explored in the development of the bicycle?
- Identify some limitations of the design.
- Think about the trouble shooting process of developing or prototyping a new invention.
- Consider the riders' stories – remember that invention and innovation has a human component.
- Reflect on how you would feel if you were part of a team that designed and built an energy efficient invention that became a world champion in its field. What is your dream energy efficient invention? How would it make your life easier?



Use Energy to Make Your Mark!

Consider whether your class would like to undertake a design challenge as an extension learning activity, applying your knowledge and understanding of energy transfers and transformations to a real world scenario.

For example:

- Brainstorm ideas for finding solutions for problems in your local community.
 - Talk to local community groups and work together to develop a way that you can make a difference using physics and engineering concepts.
 - Consider how you can let the broader community know about your new initiative.



- There are a number of competitions across Australia that provide an opportunity for teams to participate in a design engineering challenge. Search online to find a suitable competition that is local to your school.