



Stage 3

Science and Technology: STEM Energy

Science and Technology outcomes

ST3-1WS-S plans and conducts scientific investigations to answer testable questions, and collects and summarises data to communicate conclusions

ST3-2DP-T plans and uses materials, tools and equipment to develop solutions for a need or opportunity
Physical World:

ST3-8PW-ST explains how energy is transformed from one form to another

ST3-9PW-ST investigates the effects of increasing or decreasing the strength of a specific contact or non-contact force

Material World:

ST3-6MW-S explains the effect of heat on the properties and behaviour of materials

ST3-7MW-T explains how the properties of materials determine their use for a range of purposes

Learning across the curriculum:

Literacy Critical and creative thinking Civics and citizenship Sustainability

Content

Physical World:

Describing and exploring specific forces

Inquiry question: How can we make a force stronger or weaker?

Students:

- explore and describe some common contact or non-contact forces, for example:
 - applied force (eg pushing, kicking)
 - tension and elastic force
- perform a scientific investigation to explore the effects of changing the strength of a single contact or non-contact force, for example: SciT
 - how a stronger or weaker applied force, such as a push or kick, results in objects travelling longer or shorter distances
 - how increasing or decreasing the strength of the force of air resistance by changing the shape of an object results in increases or decreases in speed

Transfer and transformation of energy

Inquiry question: What types of energy transformations can be observed?

Students:





- identify different types of energy transformations, for example: (ACSSU097)
 - heat energy to light energy
- investigate how electrical energy can be transferred and transformed in electrical circuits and can be generated from a range of sources (ACSSU097) SciT SysT

Forces and energy in products and systems

Focus question: How can electricity be used in a product or system?

Students:

- describe examples where light, sound, heat and electrical energy transform from one type of energy to another, for example: ComT SysT
 - a solar panel transforms light energy into electrical energy
- investigate how electrical energy can control movement, sound, or light in a product or system (ACTDEK020) ComT SciT



















- design, test and evaluate a product or system that involves an energy transformation to meet an identified need using electrical energy ComT DesT    

Material World:

Properties of materials determine their use

Focus question: Why are the characteristics of materials important when designing and producing?

Students:

- investigate characteristics and properties of a range of materials and evaluate the impact of their use (ACTDEK023) **DesT SciT**    
- identify and evaluate the functional and structural properties of materials, (ACTDEK023)   
- critique needs or opportunities for designing using sustainable materials DesT    
- design a sustainable product, system or environment individually and/or collaboratively considering the properties of materials SysT DesT    
- select appropriate materials, components, tools, equipment and techniques and apply safe procedures to produce designed solutions DesT   

Program Description

Students will have a brief history of energy before investigating current and future developments in electricity production and sustainability. Students will conduct hands-on investigations into various forms of energy production, building design and sustainable energy sources.

PowerPoint Introduction

- History of energy and how do we use electricity?
- Renewable and non-renewable resources
- Ways of producing electricity (solar, wind, hydro, geothermal, waves, tidal, nuclear)

Practical activities including:

- Model wind turbines to generate electricity
- Kinetic energy and energy transformations (Jumping Cups, Cotton reel cars)
- Hydro Power
- Using solar panels to generate power including cooking using a solar oven
- Using a pushbike to generate power for different types of lights via energy transformations

Thinking and planning activities:

- Testing and planning the optimum house design to minimise resource use
- Decision making activity to determine the best resource to generate power in the future

Students will be using specialised equipment for various activities.

A typical schedule would be as follows:

- Introduction
- Morning tea
- Two Energy investigation activities
- Lunch
- One energy investigation activity
- Conclusion

This program is delivered over 4 hrs and for a maximum of 90 students.

The program is suitable in all weather conditions.

Location

Wetlands Environmental Education Centre (WEEC), located at Hunter Wetlands Centre, 412 Sandgate Rd, Shortland, Newcastle.

Please use School entry.

Site Description

Wetlands EEC have a purpose built education centre including theatre, wet room and classroom.

Wetlands EEC is a NSW Department of Education school and staff are trained DoE teachers specialising in Environmental Education.

Excursion information

What to bring: Printed student workbook, clipboard and pencils, recess and lunch, refillable water bottle, hat, sunscreen, covered walking shoes plus any special requirements of the group. (Wet weather gear when necessary). Non-aerosol insect repellent is advisable.

Wetlands EEC teachers rely on the participation of visiting teachers to meet recommended supervision levels. Visiting teachers are ultimately responsible for behaviour of students, students with existing medical conditions or special needs.