Turbine

Teacher Resource Sheet

science and engineering challenge

ON THE EVENT DAY

Half-day activity

Students will use commonly available materials to build a water turbine that can harness the power of water as it flows over it. The turbine needs to be simple, robust and efficient.

(Please remember that students cannot bring notes, models or other paperwork on the event day)

ACARA LINKS (Year 9/10)

- Energy transfer through different mediums can be explained using wave and particle models **(ACSSU182)**
- Energy conservation in a system can be explained by describing energy transfers and transformations **(ACSSU190)**
- The motion of objects can be described and predicted using the laws of physics **(ACSSU229)**
- Values and needs of contemporary society can influence the focus of scientific research **(ACSHE228, ACSHE230)**
- Critique needs or opportunities to develop design briefs and investigate and select an increasingly sophisticated range of materials, systems, components, tools and equipment to develop design ideas **(ACTDEP048)**

Visit the ACARA website…

BACKGROUND

Turbines work by capturing the kinetic energy of a moving liquid or gas, such as water or air. The kinetic energy moves the turbine, which is connected to a generator that creates electricity. The blades of a turbine are specifically designed to capture the kinetic energy most efficiently and will vary depending on its purpose.

REAL-LIFE EXAMPLES

Using turbines to harness energy is not a new idea. Greeks were using water wheels to grind wheat into flour over 2,000 years ago! In Australia, the most famous turbines are part of the Snowy Mountains Hydro-Electric Scheme. Taking 25 years and 100,000 people to build, the Snowy Mountains Scheme provides 32% of the renewable energy for the eastern mainland of Australia.

RELATED CAREERS

- Mechanical Engineer
- Risk Analyst
- Chemical Engineer
- Electrical Engineer

RELATED DEGREES (UON)

- Bachelor of Engineering (Mechanical, Mechatronics, Electrical, Electronic or Chemical)
- Bachelor of Science (Physics)
- Bachelor of Mathematics

Find out more…

Watch VIDEO – "What is Engineering"?

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The Science and Engineering Challenge

THE UNIVERSITY OF NEWCASTLE AUSTRALIA

VOCABULARY

Axle	A rod or spindle that passes through the centre of a circular object
Blade	Flat or wide section of a device
Efficiency	The ability to produce something with little waste
Energy	The ability to do work
Hydroelectricity	Production of electricity from the force of falling or flowing water
Kinetic	Relating to motion
Power	The amount of energy produced or work done in a given time
Revolution	Movement of an object in a circular course around another object
Turbine	A machine that uses air or water to turn a wheel and produce electricity

RESOURCES/LINKS

Turbines (Explain that stuff) – An article that takes a closer look at turbines (what they are, the different types and turbines in action).

Snowy Hydro – In-depth website on the Snowy Mountains Hydroelectric Scheme. Includes information about the history, engineering and people as well as classroom resources.

How a wind turbine works – Animation with interactive labels and descriptive information demonstrating how a wind turbine works.

Lego Hydro Turbine – Note: you will need access to the appropriate kits

Ready to Go Lessons: Power your house with water – a practical lesson from TeachEngineering

Ready to Go Lessons: Wind Power Challenge – Includes teacher notes, learning guides, fact sheets and certificates

YouTube Playlist of helpful videos

EXAMPLES OF LEARNING ACTIVITIES

- Have students look up the definitions of the words in the 'Vocabulary' section above.
- Brainstorm examples of renewable and non-renewable resources.
- Research the Snowy Mountains Hydro-Electric Scheme.
- Build a model wind turbine.
- Draw sketches of the two main types of water wheels (horizontal and vertical).
- Water wheels have blades that are equally spaced around a circle. Use a protractor and compass to practice ways of dividing various-sizes circles into equal sections.
- Find out how much water is used in the household or goes into stormwater drains. Consider whether it would be efficient to capture this water for hydroelectricity.
- Research the positive and negative effects a hydroelectricity system can have on a community, its infrastructure and environment. Does proximity to the power plant change the severity of impacts felt?