Teachers Guide: Energy generation challenge

Year 8: Science

Key understandings and learning intentions

Learners will create a renewable energy generation plan for a town based on the town's energy requirements, budget constraints, and environmental factors to consider. They will explore a combination of renewable resources and assess which best fit using an Excel spreadsheet calculator and various maps of the town.

Fast facts

Lesson Plans: One (Part A and Part B)

Duration: 180 minutes (plus student's own time to finish project)

Resources: Materials list refer to Lesson Plan.

Achievement standards

For the Earth systems studied, students will:

- analyse how human activities and Earth processes affect components of, and interactions between, Earth systems across a range of temporal and spatial scales
- analyse how interactions between Earth systems change, and how these changes are monitored and managed across a range of temporal and spatial scales

For the Earth and environmental context studied, students will:

- evaluate how Earth and environmental science has been used in concert with other sciences to meet diverse needs and inform decision making; and how these applications are influenced by interacting social, economic and ethical factors.

Guiding questions

1) Why would we phase out our energy reliance on fossil fuels to power our future with renewable resources?
2) What are the key factors that need to be considered when taking into account the different renewable energy options?

Learning Area	Content Description
Year 8 Science	
ACSHE135	Solutions to contemporary issues that are found using science and technology, may impact on other areas of society and may involve ethical considerations
ACSSU155	Energy appears in different forms, including movement (kinetic energy), heat and potential energy, and energy transformations and transfers cause change within systems

General capabilities

Critical and creative thinking, literacy, numeracy, and information and communication.

Cross curriculum priorities

Sustainability.

Adjustments/strategies to include all students

	Enabling	Extending
Content	Introduce students to vocabulary before lesson and allow more time to finish. Use videos and other materials in extension section	Research and describe how the National Energy Market functions in Australia and Tasmania's role in providing renewable energy to the country
Process	Use peer assistance to work through maps and use energy resource cut-outs to create energy generation plan.	Research the electricity grid and add transmission lines to the map, connecting the energy generating infrastructure to the grid. How might these change the landscape and decisions for where you locate generating plants?

Evidence of student learning

Students are able to:

- Analyse the requirements for the transfer of energy
- Describe how energy transforms from one form to another when generating electricity
- Identify variables
- Explain energy transfer simply and creatively.

Cleangreenton assessment rubric

Expectation Rating	Descriptor
Exceeds	All parameters are met in the map design. The energy needs are satisfied and it has stayed within the budget. The map is impeccably drawn, labelled and to scale. Justifies and clearly articulates, using science vocabulary and evidence to support the argument, the reasons why energy sources were chosen. Demonstrates a detailed understanding of the advantages and disadvantages of the various renewable energy sources and the challenges that face decision-makers around energy generation choices.
Meets	All parameters are met in the map design. The energy needs are satisfied and it has stayed within the budget. The map is neatly drawn, labelled and to scale. Justifies, using science vocabulary and evidence to support the argument, the reasons why energy sources were chosen. Demonstrates an understanding of the advantages and disadvantages of the various renewable energy sources and the challenges that face decision-makers around energy generation choices.
Approaching	Almost all parameters are met in the map design. The energy needs are close to being satisfied and it has stayed close to the budget. The map is sparsely labelled and nearly to scale. Attempts to justify the reasons why energy sources were chosen. Demonstrates a limited understanding of the advantages and disadvantages of the various renewable energy sources and the challenges that face decision-makers around energy generation choices.
Below	Parameters are not met in the map design. The energy needs are not satisfied and it has not stayed close to the budget. The map is not labelled and/or not to scale. Narrow to no attempts to justify the reasons why energy sources were chosen. Does not demonstrate an understanding of the advantages and disadvantages of the various renewable energy sources and the challenges that face decision-makers around energy generation choices.

Assessment Type	Options for Assessment
Collaborative	• Evaluating and challenging views through group discussions • Cooperative group work in completing the activity and folio • Group-prepared presentations of their final, most successful wind turbine
Peer	Students provide feedback to peers about: • What steps were taken in the activity? • What aspects worked well in the activity? • Suggestions to improve their work?
Teacher Observations	Informal observations: • Strategic questioning, asking how and why • Evaluate the questions and answers in the student folios • Evaluate the map (see assessment rubric)