

Year 6: Science, Technologies and HASS

Teacher Guide: What is renewable energy?

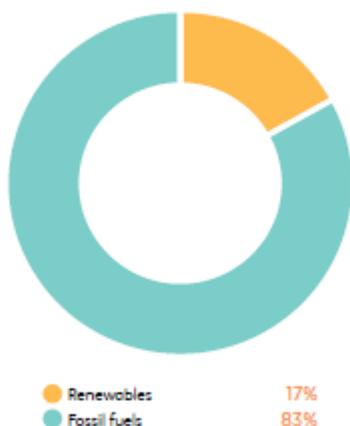
Renewable energy is energy that is here forever, such as the sun, wind and water. Renewable energy also includes burning or fermentation of organic materials. The focus on renewable energy increases as it is recognised that non-renewables such as coal, oil, gas and uranium are not finite.

The use of renewable energy means better use of the Earth's resources, improved standards of living and a sustainable future.

Renewable energy sources are recognised as producing fewer greenhouse gas emissions and less impact on the environment.

However, while Australia is progressing with incorporating renewables into the energy mix, the majority of Australia's energy is produced from non-renewable sources.

**ANNUAL ELECTRICITY
GENERATION IN 2017²**



Source: *Clean Energy Council Report 2018*

There are disadvantages and advantages to using renewable energy options and this is detailed in *REF-Advantages and Disadvantages of Renewables*.

Renewable energy options include:

- **Hydropower** – uses the energy of moving water to spin turbines connected to generators.
- **Solar energy** – solar panels (photovoltaic cells) convert light from solar energy directly into electricity.
- **Wind power** – wind turbines connected to generators convert kinetic energy of wind into electricity.
- **Biomass** – source of energy that comes from plants and animals. Energy is produced mainly from methane gas to produce steam to power turbines.
- **Geothermal energy** – uses the natural heat of the earth to heat underground water (typically from the heat of the earth's core) released as steam or hot water used as forms of energy.
- **Wave and Tidal power** – *incoming tides fills estuaries and is stored behind dams, the outgoing tide runs the turbines. Wave energy moves heavy floats which can be used to drive electrical generators.*

In Tasmania, renewable energy features significantly through 30 hydropower stations that were constructed last century over a period of 70 years. Wind farms are now also part of the renewable energy mix in Tasmania and more will be added over time.

Tasmania's geomorphology and location in the path of the Roaring 40's and consequently abundant rainfall on Tasmania's west coast meant that hydropower and wind power was an obvious choice.

However, hydropower wasn't an option for Tasmania's Bass Strait Islands, King and Flinders and instead they relied on diesel generators to provide their energy needs.

The innovation and development of technologies resulted in a hybrid system of diesel, wind, solar and battery storage for both islands.

Australian Curriculum

Learning Area	Content Descriptions
Science	
ACSSU097	Electrical energy can be transferred and transformed in electrical circuits and can be generated from a range of sources
ACSHE098	Science involves testing predictions by gathering data and using evidence to develop explanations of events and phenomena and reflects historical and cultural contributions
ACSHE100	Scientific knowledge is used to solve problems and inform personal and community decisions
Technologies: Design and Technologies	
ACTDEK019	Examine how people in design and technologies occupations address competing considerations, including sustainability in the design of products, services and environments for current and future use.
HASS	
ACHASSI122	Questioning: Develop appropriate questions to guide an enquiry about people, events, developments, places, systems and challenges.
Cross Curriculum Priority	Sustainability
General Capabilities	Literacy, Numeracy, Critical and Creative Thinking.

Learning goals

Know:

- Renewable energy sources are not depleted when they are used
- The advantages and disadvantages of renewable energy
- The emerging renewable energy projects within Australia.

Understand:

- Australia and Tasmania have current and future planned renewable energy sources
- That advances in science and technology innovation contribute to increased take-up of renewable energy.

Do:

- Engage in informed discussion about renewable energy
- Research material for activities.
- Compare renewable energy generation in each state.
- Identify new renewable projects.

Achievement standard

Science

By the end of Year 6 ... students compare and classify different types of observable changes to materials ... They analyse requirements for the transfer of electricity and describe how energy can be transformed from one form to another when generating electricity... Students explain how scientific knowledge helps us to solve problems and inform decisions and identify historical and cultural contributions.

Technologies: Design and Technologies

By the end of Year 6 ... students describe competing considerations in the design of products, services and environments; taking into account sustainability ... They describe how design and technologies contribute to meeting present and future needs

HASS

By the end of Year 6 ... students explain the significance of an event/development, an individual and/or group ... They identify and describe continuities and changes for different groups in the past and present ... They describe the causes and effects of change on society.

Teaching and learning resources

- Clean Energy Council
- Hydro Tasmania website www.hydro.com.au
- King Island renewable energy integration project (KIREIP) www.kingislandrenewableenergy.com.au
- [ABC News](http://www.abc.net.au/news/2017-11-05/flinders-island-is-moving-to-renewable-energies/9112898), Flinders Island is moving to renewable energies, <http://www.abc.net.au/news/2017-11-05/flinders-island-is-moving-to-renewable-energies/9112898>
- Australian Renewable Energy Agency <https://arena.gov.au/projects/flinders-island-hybrid-energy-hub/>
- The Clean Energy Australia Report 2018 <https://www.cleanenergycouncil.org.au/policy-advocacy/reports/clean-energy-australia-report.html>

Materials	Number
Smart board or projector	1
Internet connection	1
Watch the YouTube clip from Hydro Tasmania: Flinders Island, Hydro Tasmania: Flinders Island, https://www.hydro.com.au/clean-energy/hybrid-energy-solutions/success-stories/flinders-island	
Activity – Advantages and Disadvantages of Renewable Energy	1 each
Activity – Monitor KI energy consumption	1 each

Adjustments / strategies to include all students

	Enabling	Extending
Content:	Provide students with modified information from selected websites.	Compare and contrast another organisations sustainability projects
Process:	Assist students one-to-one with their glossary	Ask students to email Hydro Tasmania’s Education Coordinator as part of research for a newsletter article they will write on Bass Strait Islands Renewable Energy projects.
Product:	Invite students to create a photo or pictorial journal.	Have students create a storyboard for a BTN <i>Behind the News</i> presentation about Tasmania’s renewable energy journey.

Learning Sequence

Introduction/pre-assessment activities:

Review video and website links. Students to select one form of renewable energy, inquire into its various facets and be prepared to share their learning with the class.

As a class view the ABC News video and the Flinders Island video on the Hydro Tasmania website. Have students compose a ‘significant’ question from each video and invite students to ask the class to respond to their ‘significant’ question.

- ABC News: Flinders Island is moving to renewable energies, <http://www.abc.net.au/news/2017-11-05/flinders-island-is-moving-to-renewable-energies/9112898>
- Tasmania: Flinders Island, <https://www.hydro.com.au/clean-energy/hybrid-energy-solutions/success-stories/flinders-island>

Engage in Lesson Plan activities.

Assessment

Refer to *Options for assessment and extension* in each Lesson Plan

Evidence of student learning

- Describe the circumstances where renewable energy sources can provide energy solutions.
- Describe what changes have occurred in technology (batteries) to enable broader application of renewable energy solutions.

Group reflection

Refer to *Elaborate and Review* in each Lesson Plan

Teacher reflection

- What went well?
- What could be improved?
- How might you deliver this lesson differently next time?

Feedback

If you would like more information or to provide feedback please contact our Education Coordinator at education@hydro.com.au