Year 8 unit overview — Australian Curriculum: Science

Source: Australian Curriculum, Assessment and Reporting Authority (ACARA), *Australian Curriculum v3.0: Science for Foundation–10* <www.australiancurriculum.edu.au/Science/Curriculum/F-10>.

| School name | Unit title | Duration of unit |
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| Our School | Energy for my lifestyle | One term |

| Unit outline |
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| Students explore how energy, in its many different forms, is an essential part of our daily lives. They investigate how we generate energy, how it is transformed, and how energy generation has changed as our energy requirements have increased over time. Students conduct research on the subsequent impact on industry, agriculture, and marine and terrestrial resource management and analyse the sustainability of the current methods of energy generation. They use this analysis to consider why the future of energy generation must take into account the positive and negative effects on the sustainability of systems. Students consider what the future will hold in terms of energy generation.Questions that shape the inquiry include: * What is energy? What are the different forms of energy?
* How is energy transferred? How is energy transformed?
* What are the sources of energy used by society?
* How is energy generated to meet the requirements of society?
* Are the methods for generating energy sustainable?
* What causes change in systems?
* What will be the long-term impacts (on, for example, industry, agriculture and/or marine and terrestrial resource management) if the methods for generating energy are not sustainable?
* How can our everyday practices promote sustainable systems? Are there ethical issues that need to be considered?
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| Identify curriculum |
| Content descriptions to be taught | General capabilities and cross‑curriculum priorities |
| Science Understanding | Science as a Human Endeavour | Science Inquiry Skills |
| Physical sciences* Energy appears in different forms including movement (kinetic energy), heat and potential energy, and causes change within systems [(ACSSU155)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACSSU155)
 | Use and influence of science* Science and technology contribute to finding solutions to a range of contemporary issues; these solutions may impact on other areas of society and involve ethical considerations [(ACSHE135)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACSHE135)
* Science understandings influence the development of practices in areas of human activity such as industry, agriculture and marine and terrestrial resource management [(ACSHE136)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACSHE136)
 | Questioning and predicting* Identify questions and problems that can be investigated scientifically and make predictions based on scientific knowledge [(ACSIS139)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACSIS139)

Planning and conducting* Collaboratively and individually plan and conduct a range of [investigation](http://www.australiancurriculum.edu.au/Glossary?a=S&t=investigation) types, including fieldwork and experiments, ensuring safety and ethical guidelines are followed [(ACSIS140)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACSIS140)
* In fair tests, measure and control variables, and select equipment to collect [data](http://www.australiancurriculum.edu.au/Glossary?a=S&t=data) with accuracy appropriate to the task [(ACSIS141)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACSIS141)

Processing and analysing data and information* Construct and use a range of representations, including graphs, keys and models to represent and [analyse](http://www.australiancurriculum.edu.au/Glossary?a=S&t=analyse) patterns or relationships, including using [digital technologies](http://www.australiancurriculum.edu.au/Glossary?a=S&t=digital+technologies) as appropriate [(ACSIS144)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACSIS144)
* Summarise [data](http://www.australiancurriculum.edu.au/Glossary?a=S&t=data), from students’ own investigations and secondary sources, and use scientific understanding to identify relationships and draw conclusions [(ACSIS145)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACSIS145)

Evaluating* [Reflect on](http://www.australiancurriculum.edu.au/Glossary?a=S&t=Reflect+on) the method used to investigate a question or solve a problem, including evaluating the quality of the [data](http://www.australiancurriculum.edu.au/Glossary?a=S&t=data) collected, and identify improvements to the method [(ACSIS146)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACSIS146)
* Use scientific knowledge and findings from investigations to [evaluate](http://www.australiancurriculum.edu.au/Glossary?a=S&t=evaluate) claims [(ACSIS234)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACSIS234)

Communicating* Communicate ideas, findings and solutions to problems using [scientific language](http://www.australiancurriculum.edu.au/Glossary?a=S&t=scientific+language) and representations using [digital technologies](http://www.australiancurriculum.edu.au/Glossary?a=S&t=digital+technologies) as appropriate [(ACSIS148)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACSIS148)
 | Description: Description: gc_literacy Literacy* Write reports.
* Communicate using scientific terminology.

Description: Description: gc_numeracy Numeracy* Make measurements.
* Analyse data to identify trends.
* Construct graphs to represent and analyse data.

Description: Description: gc_ict ICT capability* Use data loggers to gather experimental data and spreadsheets as a tool to perform calculations.

Description: Description: gc_critical Critical and creative thinking* Use thinking skills to complete group activities and open-ended tasks.

Description: Description: gc_ethical Ethical behaviour* Consider how the actions of people impact on the sustainability of systems.

Description: Description: gc_personal_social Personal and social capability* Work together to participate in science investigations and learning experiences.

Description: Description: cc_asia Asia and Australia’sengagement with Asia* Investigate the development of sustainable energy sources and technologies in the Asia–Pacific region.

Description: Description: cc_sust Sustainability* Debate how emerging energy technologies improve the sustainability of resources.
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| Achievement standard |
| By the end of Year 8, students compare physical and chemical changes and use the particle [model](http://www.australiancurriculum.edu.au/Glossary?a=S&t=model) to explain and predict the [properties](http://www.australiancurriculum.edu.au/Glossary?a=S&t=properties) and behaviours of substances. They identify different forms of energy and describe how energy transfers and transformations cause change in simple [systems](http://www.australiancurriculum.edu.au/Glossary?a=S&t=systems). They compare processes of rock formation, including the time scales involved. They [analyse](http://www.australiancurriculum.edu.au/Glossary?a=S&t=analyse) the [relationship](http://www.australiancurriculum.edu.au/Glossary?a=S&t=relationship) between structure and function at cell, organ and body [system](http://www.australiancurriculum.edu.au/Glossary?a=S&t=system) levels. Students examine the different science knowledge used in occupations. They explain how [evidence](http://www.australiancurriculum.edu.au/Glossary?a=S&t=evidence) has led to an improved understanding of a scientific idea and describe situations in which [scientists](http://www.australiancurriculum.edu.au/Glossary?a=S&t=scientists) collaborated to generate solutions to contemporary problems.Students identify and construct questions and problems that they can investigate scientifically. They consider safety and ethics when planning [investigations](http://www.australiancurriculum.edu.au/Glossary?a=S&t=investigations), including [designing](http://www.australiancurriculum.edu.au/Glossary?a=S&t=designing) field or experimental methods. They identify [variables](http://www.australiancurriculum.edu.au/Glossary?a=S&t=variables) to be changed, measured and controlled. Students construct representations of their [data](http://www.australiancurriculum.edu.au/Glossary?a=S&t=data) to reveal and [analyse](http://www.australiancurriculum.edu.au/Glossary?a=S&t=analyse) [patterns](http://www.australiancurriculum.edu.au/Glossary?a=S&t=patterns) and [trends](http://www.australiancurriculum.edu.au/Glossary?a=S&t=trends), and use these when justifying their [conclusions](http://www.australiancurriculum.edu.au/Glossary?a=S&t=conclusions). They explain how modifications to methods could improve the quality of their [data](http://www.australiancurriculum.edu.au/Glossary?a=S&t=data) and apply their own scientific knowledge and [investigation](http://www.australiancurriculum.edu.au/Glossary?a=S&t=investigation) findings to [evaluate](http://www.australiancurriculum.edu.au/Glossary?a=S&t=evaluate) claims made by others. They use appropriate language and representations to communicate science ideas, methods and findings in a range of text types. |

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| Relevant prior curriculum | Curriculum working towards |
| In the Australian Curriculum: Science at Year 7Science understandingEarth and space sciences* Some of Earth’s resources are renewable, but others are non-renewable.

Science as a Human Endeavour* The content descriptions for Science as a Human Endeavour are the same for Year 7 and Year 8.

Science Inquiry Skills* The content descriptions for Science Inquiry Skills are the same for Year 7 and Year 8.
 | In the Australian Curriculum: Science at Year 9Science understandingPhysical sciences* Energy transfer through different mediums can be explained using wave and particle models.

Science as a Human EndeavourUse and influence of science* People can use scientific knowledge to evaluate whether they should accept claims, explanations or predictions.
* The values and needs of contemporary society can influence the focus of scientific research.

Science Inquiry SkillsQuestioning and predicting* Formulate questions or hypotheses that can be investigated scientifically.

Planning and conducting* Plan, select and use appropriate investigation methods, including field work and laboratory experimentation, to collect reliable data; assess risk and address ethical issues associated with these methods.
* Select and use appropriate equipment, including digital technologies, to systematically and accurately collect and record data.

Processing and analysing data and information* Analyse patterns and trends in data, including describing relationships between variables and identifying inconsistencies.
* Use knowledge of scientific concepts to draw conclusions that are consistent with evidence.

Evaluating* Evaluate conclusions, including identifying sources of uncertainty and possible alternative explanations, and describe specific ways to improve the quality of the data.
* Critically analyse the validity of information in secondary sources and evaluate the approaches used to solve problems.

Communicating* Communicate scientific ideas and information for a particular purpose, including constructing evidence-based arguments and using appropriate scientific language, conventions and representations.
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| Bridging content |
| The **Australian Curriculum: Science** prior to Year 8 focuses on specific types of energy, i.e. heat (Year 3) and electricity (Year 6). The **Year 7 Essential Learnings: Energy and change** address different forms of energy and the changes that they cause in a system (by being transferred and transformed). |
| Links to other learning areas |
| **In the Australian Curriculum: Mathematics at Year 8*** Choose appropriate units of measurement.

**In the Australian Curriculum: English at Year 8*** Use comprehension strategies to interpret and evaluate texts by reflecting on the validity of content and the credibility of sources, including finding evidence in the text for the author’s point of view.
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| Assessment | Make judgments |
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| Describe the assessment | Assessment date | Teachers gather evidence to make judgments about the following characteristics of student work:**Understanding*** description and identification of scientific facts, ideas, concepts, and phenomena
* use of science knowledge to generate solutions and explanations
* description of the application of science knowledge to solve real-world and contemporary problems

**Skills*** construction of questions and problems that can be investigated scientifically
* planning of investigations that take into account the need for fair testing and safety
* summary of data and information to identify and describe patterns and trends and to draw conclusions
* description of how methods and modifications to methods could improve the quality of data
* evaluation of claims with links to science knowledge
* communication using appropriate scientific language and representations.

For further advice and guidelines on constructing guides to making judgments refer to the Learning area standard descriptors: [www.qsa.qld.edu.au](http://www.qsa.qld.edu.au) |
| Students are given opportunities to demonstrate their knowledge, skills and understanding through both formative and summative assessment. The assessment is collated in student folios and allows for ongoing feedback to students on their learning.Year 8 teachers make decisions about the length of time required to complete the tasks and the conditions under which the assessment is to be conducted.The teaching and learning experiences throughout the term provide opportunities for students to develop the understanding and skills required to complete these assessments. As students engage with these learning experiences the teacher can provide feedback on specific skills.**Assessment task** Students respond to the following statement: Discovering new fossil fuel resources and developing new technologies to exploit current sources of fossil fuels are short-term solutions to the energy crisis. A long-term solution is to develop sustainable energy sources and technologies. **Part A: Experimental investigation — Scientific report (Written)**Collaboratively design a fair investigation to collect quantitative data to determine the effect on energy production of, for example: * clouds and solid pollutants on a solar cell
* angle or direction of a solar cell
* number of blades or length of blade on a wind turbine
* colour of a solar oven.

Suggested conditions:* 100–400 words
* open.

**Part B: Research — Report (Written)**Undertake an individual research task to investigate sustainable energy sources and technologies. Choose a sustainable energy technology, for example: * biodiesel
* geothermal power
* windmills
* rechargeable batteries
* solar ovens
* hybrid cars
* fuel cells.

For the chosen energy technology:* identify the energy source
* identify the use of the produced energy
* describe how the technology uses its energy source to achieve its purpose
* draw a Sankey diagram to identify the energy transfers and transformations and where energy is wasted
* give the advantages and disadvantages of using this technology
* compare your energy source to existing technology that has the same purpose. Does your energy source present a better option? Why or why not? Justify your position.

Suggested conditions:* 100–200 words
* open.
 | Weeks 6–7 (approximately) |

| Teaching and learning | Supportive learning environment |
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| Teaching strategies and learning experiences | Adjustments for needs of learners | Resources |
| Throughout the term students complete investigations to explore energy transfers and transformations. In preparation for the assessment, they write scientific reports to communicate the results of investigations.* The skills learnt while completing these introductory investigations will be used to:
* identify problems and make predictions
* design and conduct their own fair investigation based on research
* conduct a risk assessment of the investigation
* collect and display data using a range of formats
* process and analyse data collected
* link the theory to explain results obtained from investigation
* justify conclusions.
* Compile a glossary of terms, including: energy, kinetic energy, gravitational potential energy, chemical potential energy, elastic potential energy, solar energy, heat energy, electrical energy.
* Explore with the goal of answering the question: What is energy?
* Conduct investigations to build an understanding of the different forms of energy and how energy is measured.
* Conduct investigations to explore the idea that energy changes, transfers and transforms to make things happen, e.g. What happens if … ? What effect does … ?
* Identify and explain energy transfers and transformations in everyday activities and contexts such as:
* household appliances
* electrical circuits
* toys
* playground equipment
* solar cells
* wind turbines.
* Represent the flow of energy transfers and transformations using Sankey diagrams.
* Understand where the energy required for our lifestyle comes from and the technologies used to change it into the form needed to use it.
* Conduct a scan of news media to identify current issues and debates about energy at a local, national and global scale.
* Appreciate the impact of an energy-dependent lifestyle (on, for example, industry, agriculture, and marine and terrestrial resource management).
* Explore sustainable sources of energy in a variety of contexts.
* Explore to answer the questions:
* Why do alternative energy sources and technologies need to be researched and developed?
* Are these alternative energy technologies more sustainable?
* What are the limits of the energy technologies?
* What does the future hold? Where are we going? Where have we come from?
* What are the ethical issues that need to be considered when deciding how to use or source energy?
 | Section 6 of the *Disability Standards for Education* (The Standards for Curriculum Development, Accreditation and Delivery) state that education providers, including class teachers, must take reasonable steps to ensure a course/program is designed to allow any student to participate and experience success in learning. The *Disability Standards for Education 2005* (Cwlth) is available from: <www.ag.gov.au> select Human rights and anti-discrimination > Disability standards for education. | **Web*** websites for factsheets
* YouTube clips

**Print*** textbooks
* worksheets

**Equipment*** solar panels
* wind turbines
* toys operated by battery, springs and/or gravity
* household appliances such as toaster, kettle, iPod

**Safety equipment*** teacher-completed risk assessment for experimental learning experiences
* student-completed risk assessment for assessment
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| Use feedback |
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| Ways to monitor learning and assessment | Teachers collaboratively plan the teaching, learning and assessment to meet the needs of all learners.Teachers mark a small random sample of the research task and investigation design report, moderate the samples to ensure consistency of judgments, then mark their own class. |
| Feedback to students | Teachers plan opportunities through the teaching strategies and learning experiences of the unit. Teachers provide ongoing feedback and encouragement to students on their strengths and areas for improvement. Through particular learning experiences students can reflect on and discuss with their teachers and peers what they are able to do well and what they need to do to improve, e.g. identifying patterns and trends in experimental data, analysing the sources of error in the data collected. |
| Reflection on the unit plan | At the conclusion of the unit all teachers who have been involved in planning, teaching, learning and assessment come together to reflect on the successes and challenges of the unit. They come with their personal reflections through answers to the following questions:* What worked well in this unit?
* What was a stumbling block?
* How would you refine it?
* What trends and gaps in learning have you identified?
* How will you build on these learning experiences next term and beyond?
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