

YEARS 7-9

Solar Powered Cars

OVERVIEW

Learn more about the technology behind cars and how different types of cars work. Discover how solar power contributes to vehicle technology and think deeply about what transport will look like in future.



NZ CURRICULUM LINKS

LEARNING AREAS:

ACHIEVEMENT OBJECTIVES:

LEVELS: YEARS:

Technology:
Nature of technology:
characteristics of technology.
Technological knowledge:
technological modelling.

Understand how different forms of functional modelling are used to explore possibilities and to justify decisions and how prototypes can be used to justify refinement of technological outcomes.

4-5

7-9

English:

Listening, reading and viewing.

4-5

7-9

Science:
Nature of science: understanding about science, communicating in science.

Appreciate that science is a way of explaining the world and that science knowledge changes over time.

4-5

7-9

TEACHER INFORMATION:

Learning sequence



INTRODUCING
KNOWLEDGE



EXPLORE AND
INVESTIGATE



CREATE AND
SHARE



REFLECT AND
EXTEND



MAKE A
DIFFERENCE

Learning intentions

Students are learning to:

- explore energy sources, such as fossil fuels, electricity and solar panels, used to power cars.
- compare the advantages and disadvantages of different energy sources for cars.
- consider past and future transportation methods, their technology and development and consider their sustainability and environmental impacts.

Success criteria

Students can:

- describe how energy sources such as fossil fuels, electricity and solar panels can be used to provide power for cars.
- complete the timeline about car technologies and compare petrol and electric car technology.

Guiding questions for activity

- how has car technology changed over the last 200 years?
- what impacts do cars have on the environment?
- what will the future of car travel look like?

Resources needed

- Devices, internet access. **Fact Sheet:** Car Technology over time. **Student worksheet:** Car Technology over time. **Answer Sheet:** Car Technology over time.

Vocabulary

Petrol, diesel, electric, solar, technology, transportation, renewable, sustainability, development, environmental, carbon dioxide, climate change, hydrogen, emissions.

Any text highlighted in orange represents a link to further material. If you have printed this resource, please return to schoolgen.co.nz/for-teachers/resources to access the linked material.

Additional support:

[GE and the electric car by the Museum of Innovation and Science; Google Arts and Culture online exhibit](#)

[Science Learning Hub's \(SLH's\) electric car history interactive timeline](#)

[SLH solar car article](#)

[Toyota hydrogen projects](#)

[Ministry for the environment New Zealand transport goals](#)

LEARNING EXPERIENCE

Note: These are suggestions only and teachers are encouraged to adjust the activity to suit the needs and interests of their students.



INTRODUCING KNOWLEDGE

Allow approximately 20 minutes

- Share prior knowledge of types of cars and their technology.
- View the video [How do electric vehicles work?](#) by Tech Vision (5m:06s)
- Students can then read the [Fact Sheet: Car Technology over time](#).
- Discuss how a car works and record any questions students have about electric, petrol or other types of cars.

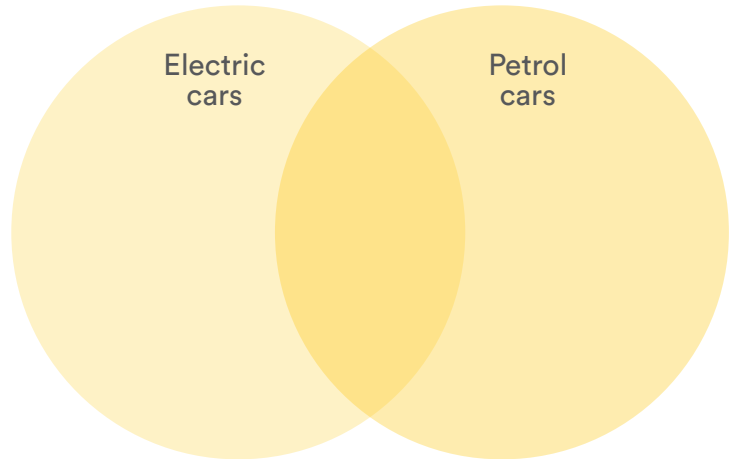




EXPLORE AND INVESTIGATE

Allow approximately 20 minutes

- Students can view the **How cars work** interactive by Google Arts and Culture/ Google Expeditions
- After viewing, share learning about the technology associated with petrol vs electric cars.
- Create a venn diagram or table to compare the features of electric cars vs petrol cars.



THINKING LIKE A SCIENTIST:

What technology would be required to invent and build a working car? Brainstorm what a car needs to be able to do to work well, for example: propel itself, be able to carry people and a load, be light but strong, be safe to operate and have an affordable source of energy.



CREATE AND SHARE

Allow approximately 25 minutes

Share the **Student worksheet**: Car Technology over time with students. Students can complete the timeline using information from the resources above.

Car technology over time - Student worksheet

Read the car technology fact sheet and fill in the missing information in the timeline to describe car technology through the last few centuries.

 <small>Fig 1: Leonardo Da Vinci's design for a vehicle that propels itself. It provided inspiration for the invention of the car.</small>		 <small>Fig 2: Early electric car</small>		 <small>Fig 3: Electric car 1910</small>		 <small>Fig 4: 1900-1909</small>		 <small>Fig 5: 1960's electrovan</small>		 <small>2008-2013</small>		 <small>The first hydrogen powered cars are now available to the public.</small>		 <small>2023</small>

1400's 1700 1800 1900 2000 2023

The future...
What could be the next car technology? Describe your ideas

Record ideas about future car technology at the end of the timeline. An example completed version can be found here. Also consider the sustainable development goals (SDGs) in your design for the car of the future. Target 11.2 is 'safe, affordable, accessible and sustainable transport'.

New Zealand's average fleet carbon emissions have fallen from over 185g CO₂/km to just over 160g CO₂/km in just five years. Consumers and the transport industry are expected to switch to vehicles powered by electricity, biofuels and/or hydrogen fuel cells by 2035 to meet international obligations.

Examples of UN sustainable development goals (SDGs) are:



Ensure access to affordable, reliable, sustainable and modern energy for all.



Make cities and human settlements inclusive, safe, resilient and sustainable.



Take urgent action to combat climate change and its impacts.



REFLECT AND EXTEND

Allow approximately 10 minutes

Share ideas for future cars and transport, then discuss the following:

- How can our car travel in the present meet the obligations we have for future generations? What infrastructure such as charging stations and changes in the way we produce or use vehicles will we need to meet our obligations for climate action and SDGs?
- What are solar cars and do you think they will play a part in future transport? How are they different from other types of cars?
- Given what you know about the different types of cars, which car would you choose to buy? Use the information in the **fact sheet** and other resources above to help guide and justify your decision.



MAKE A DIFFERENCE

Allow approximately 5 minutes





Looking at the sustainable development goals on page 5, how can students make a contribution to an SDG goal this year? This may be reducing the number of car trips to get to and from school by walking, cycling or taking public transport, or committing to walk or ride a bike instead of making short car journeys. Choose a simple commitment and try it for a month. Identify the barriers to completing these actions and how we might overcome them.

Extending learning: comparing different fuel types and vehicles

Students can then research some specific cars of their choice, for example: one electric, one hybrid and one petrol/diesel vehicle.

Summarise the research to create a mini presentation about which car they prefer, using the table below as a guide.

Example comparison of car types

Type of car		Electric cars			Fuel cars	
		Fully electric	Non plug in hybrid	Plug in hybrid	Petrol	Diesel
	Emissions and carbon to run	Very low	Low	Low	High	High
	Cost to buy	\$\$\$\$	\$\$\$	\$	\$	\$
	Cost to run	\$	\$\$	\$\$\$	\$\$\$	\$\$\$
	Range (distance before needing charge/refuel)	Low	Medium	Medium	High	High

*The information above is generalised and therefore not always accurate when comparing individual cars of each fuel type. Sources of information:

<https://www.transport.govt.nz/statistics-and-insights/household-travel/how/>

<https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockkey=P100U8YT.pdf>

<https://www.climate.gov/news-features/understanding-climate/climate-change-atmospheric-carbon-dioxide>

Model T ford image: https://openclipart.org/image/2400px/svg_to_png/196201/Model-T-Ford.png

We hope you have enjoyed this educational STEM resource.

School-gen is a Genesis community initiative to get kaiako, tamariki and whānau enthused about STEM.

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