**teacher guide**

**Energy transformations 2:**

**Investigating energy**

# Components

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|  | NAME | DESCRIPTION | AUDIENCE |
|  | *Investigating energy*teacher guide | This guide explains how students can explore concepts of energy types and transformations through practical activities. | teachers |
|  | *Junk cars*procedure sheet | Students use recycled material to make a car that rolls as far as possible down a slope. They investigate a variety of ways to provide their car with energy, including: wind energy, solar energy and chemical energy. | students |
|  | *Waste energy*procedure sheet | A series of short activities demonstrates that waste energy is released as heat during various energy transformations. | students |

Purpose

Students **Explore** ways energy can be converted to kinetic energy to make a car move. They also explore how energy is wasted, as heat, during energy transformations.

# Activity summary

Outcomes

Students:

* understand that energy is required to bring about change or make things happen;
* list some types of energy and give examples of their sources;
* explain that energy can be transformed from one type to another;
* understand that energy transformations are not always efficient, and that energy is often wasted as heat; and
* design and carry out an investigation to solve a problem.

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| ACTIVITY POSSIBLE STRATEGY |
| Students perform an investigation described in the procedure, *Junk cars*. Suggestions and possible examples are included below in **Teacher notes**. | small groups |
| Students use the procedure sheet, *Waste energy*, to explore where wasted energy goes. | small groups |

# Technical requirements

The teacher guide and procedure sheets require Adobe Reader (version 5 or later), which is a free download from [www.adobe.com.](http://www.adobe.com/) The procedure sheets are also provided in Microsoft Word format.

# Acknowledgements

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## Elastic band powered

Equipment:

* basic junk car with rotating rear axle
* 2 elastic bands


## Chemical reaction powered

Equipment:

* basic junk car
* film canister
* sodium bicarbonate
* vinegar and tape
* or you could use antacid tablet and water for reaction



## Alternative activity

Small solar cars may be used as an alternative to this activity. Students can plan and execute an open investigation into factors that affect the performance of a solar car.

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# Associated SPICE resources

*Energy transformations 2: Investigating energy* may be used in conjunction with related SPICE resources to address the broader topic of energy transfer, transformation and conservation.

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| DESCRIPTION | LEARNING PURPOSE |
| *Energy transformations (overview)* |  |
| *Energy transformations 1: Comparing cars*A video compares conventional internal combustion powered cars to REV vehicles and introduces some associated energy transformations. | **Engage** |
| *Energy transformations 2: Investigating energy*Students make model vehicles that use different energy sources to investigate energy transformations. | **Explore** |
| *Energy transformations 3: Analysing energy*Students develop explanations of energy transformations by analysing data from a simulated electric vehicle journey. | **Explain** |
| *Energy transformations 4: Car choices*Students use data about a range of conventional, electric and hybrid vehicles to decide and communicate which car is suited to specific purposes. | **Elaborate** |