



Power up!

Teacher Guide

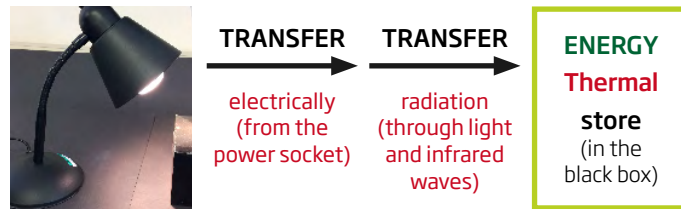
This STEM resource looks at different types of energy, energy in engineering, the importance of electricity and how this is generated. It investigates different types of renewable energy through a number of hands-on and practical activities.

Solutions

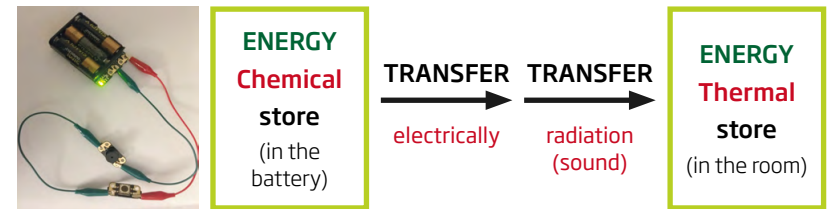
Energy circuit

Solutions are guides. You may have different energy stores and transfers based on discussions with your pupils.

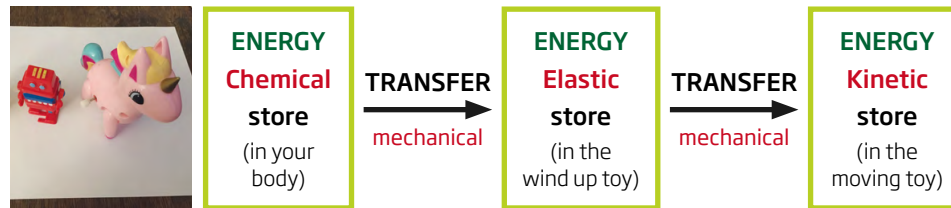
Lamp powered by mains supply and a black box with a thermometer inside



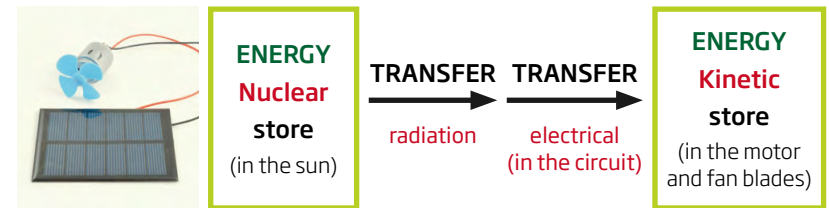
Buzzer connected to a battery pack and a switch



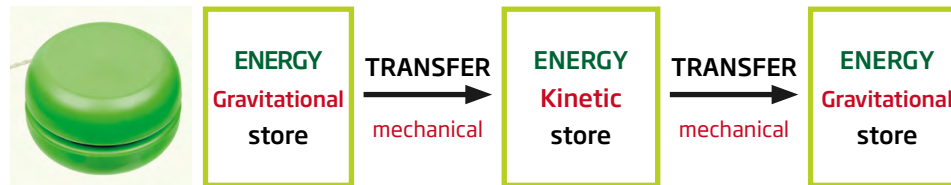
Wind-up toys



Solar-powered fan



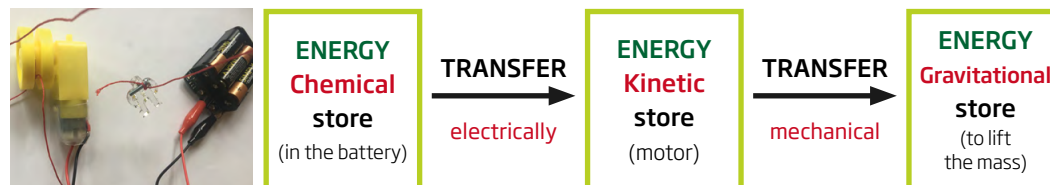
Yo-yo

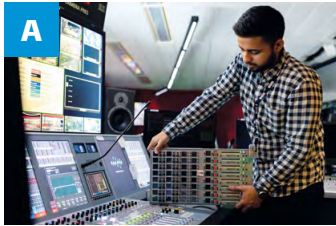


Hour glass



An electric motor is used to raise a small mass attached to a piece of string





Energy in engineering

- A. BBC broadcast engineer manages sound
- B. Flying drone
- C. Energy engineers outside plant
- D. Aerodynamics engineers testing race cars
- E. Mechanical engineer with farming robot
- F. Design engineer for sustainable farming
- G. Sports engineer testing tennis technology
- H. Civil engineer creating theme park rides
- I. Mechanical engineers on a solar farm
- J. Chemical engineer developing clean energy batteries
- K. Orthotics engineer makes personalised leg splint

There are no set solutions here.

Decide on energy stores and transfers based on discussions about what is happening in the images with your students.

How many rowers does it take to power...?

One rower will output 100.8 watts
20 rowers could generate enough electricity to charge your phone.
 Approximately **40,000 rowers** to power the house.

Resources that generate electricity

Solar: 105 kWh	Gas: 1435 kWh
Other: 175 kWh	Wind: 455 kWh
Coal: 245 kWh	Nuclear: 455 kWh
Bioenergy: 315 kWh	

Solar power

190 watts of energy will be generated from a 1 square metre solar panel.
4,750 watts of energy will be generated from 5m x 5m of solar array.
2,280 watts of energy will be generated from 4m x 3m solar array.
2,600 watts of energy will be generated from 7m x 2m solar array.



ROYAL ACADEMY OF ENGINEERING

This resource has been developed for the BAE Systems, Royal Air Force and Royal Navy Schools Roadshow 2020.

Royal Academy of Engineering

As the UK's national academy for engineering and technology, we bring together the most successful and talented engineers from academia and business - our Fellows - to advance and promote excellence in engineering for the benefit of society.

We harness their experience and expertise to provide independent advice to government, to deliver programmes that help exceptional engineering researchers and innovators realise their potential, to engage the public with engineering and to provide leadership for the profession.

We have three strategic priorities:

- Make the UK the leading nation for engineering innovation and businesses
- Address the engineering skills and diversity challenge
- Position engineering at the heart of society

We bring together engineers, policymakers, entrepreneurs, business leaders, academics, educators and the public in pursuit of these goals.

Engineering is a global profession, so we work with partners across the world to advance engineering's contribution to society on an international, as well as a national scale.

Royal Academy of Engineering
Prince Philip House, 3 Carlton House Terrace,
London SW1Y 5DG

Tel: +44 (0)20 7766 0600

www.raeng.org.uk

[@RAEngGlobal](https://twitter.com/RAEngGlobal) [@EduRAEng](https://twitter.com/EduRAEng)

Registered charity number 293074

Cover images: Shutterstock.com

 Please recycle this resource

