In this lesson, your class will be learning all about energy, using hands-on exercises and mathematical calculations to show how it is transferred. They’ll also be exploring the idea of ‘wasteful’ energy and looking at ways of conserving it instead.

Learning objectives

All must be able to name types of energy.
Most will be able to explain energy conversions and wasteful energy.
Some might be able to compare the energy in different fuels and understand the concept of a joule.

Success criteria

Students can list energy types and name the type of energy in a diagram or picture.
Students can draw energy-change diagrams including those in National Curriculum Level-style questions.
Students can identify what energy is considered waste when given new examples.

Curriculum links

England

3.1 Energy, electricity and forces
Energy can be transferred usefully, stored, or dissipated, but cannot be created or destroyed.

Practical and enquiry skills

Use a range of scientific methods and techniques to develop and test ideas and explanations.
Plan and carry out practical and investigative activities, both individually and in groups.

Scientific thinking

Use scientific ideas and models to explain phenomena and develop them creatively to generate and test theories.
Critically analyse and evaluate evidence from observations and experiments.
The Co-operative’s Green Schools Revolution

LESSON PLAN – KS3: Energy is everywhere!
All about energy and its transfer.

Curriculum links continued

Scotland
SCN 2-04a Consider examples where energy is conserved to identify the energy source, how it is transferred and ways of reducing wasted energy.
SCN 3-04a Use knowledge of the different ways in which heat is transferred between hot and cold objects and the thermal conductivity of materials to improve energy efficiency in buildings or other systems.
SCN 3-10a Help to design simple chemical cells and use them to investigate the factors which affect the voltage produced.
SCN 4-10b Using a variety of sources, explore the latest developments in chemical cells technology and evaluate their impact on society.

Wales
How things work
1. The behaviour of current in electrical circuits.
2. The conservation of energy and ways in which energy can be stored.
3. How familiar devices/machines work by using electricity, light, sound and other energy transfers.
4. The forces in devices and their relationship to work done and power.

Developing
Make sufficient relevant observations and accurate measurements, using ICT as appropriate, to a degree of precision appropriate to the enquiry.

Northern Ireland
Developing pupils' knowledge, understanding and skills
- Forces and energy transfer: using electricity.
- Demonstrate a range of practical skills in undertaking experiments, including the safe use of scientific equipment and appropriate mathematical calculations.
- Demonstrate creativity and initiative when developing ideas and following them through.
- Work effectively with others.

Resources
- Energy is everywhere! PowerPoint (supplied).
- Gather a circus of objects which show energy change e.g. a torch.
- Demo a bulb in a circuit with ammeter and voltmeter – both old-fashioned and energy-efficient bulb.
- More able groups will need demos of burning fuels.
- For examples of energy efficiency, look at http://on.coop/energyefficiencyathome
- Homework – KS3 Energy is all around homework sheet (supplied).
The Co-operative’s Green Schools Revolution

**LESSON PLAN – KS3:** Energy is everywhere!
All about energy and its transfer.

**Teaching activities**

**Introduction (WALT) using appropriate pupil language**
- Explain all the types of energy and that energy can only ever be converted, never made or destroyed.
- Show an example of an energy change and allow your students to investigate more examples.
- Explore the idea of ‘wasteful’ energy and, since we all use so much energy every day, how conserving energy can be very cost-effective.

**Development**

**Independent, paired and group activity**

**Starter:**
- Ask students to name all the types of energy they can.

**Main:**
- In pairs or groups (depending upon school resources), students investigate energy changes.
- Give out trays of objects (use photos of the ones you cannot get hold of) and challenge students to show the energy input and output.
- Give a bulbs demonstration and ask the class to draw the energy transfer. Then talk about wasteful energy changes, relating them to schools and houses.
- Students can then complete a National Curriculum Level-style question on energy transfers.

**Differentiated activities**

**SEN/G&T**
Students should be able to differentiate between the objects you give them during their investigations.

**Higher-ability children:**
- Show pupils a picture of a solar panel, ask them what it is, what the energy changes are and why it’s considered to be eco-friendly.

**Extension:**
- Pupils work out the changes in joules.

**Upper-ability pupils:**
- Teach your class about fuels and what makes electricity, then get them to draw a cartoon of how fossil fuels are made and used.

**Plenary**
- Pair pupils up and give each pair a giant picture of a house. Challenge them to draw all the places they think heat is lost from the house on the picture.
- As an extension, ask them to estimate the percentage of heat that is lost. After a few minutes, they could swap pictures with another pair, look at their ideas and add ways in which they could reduce the amount of heat being lost.
- Circulate to check their ideas and then pull together a class list of the best heat-saving solutions. Add any important solutions the class has missed.
Energy

The Co-operative’s Green Schools Revolution

LESSON PLAN – KS3: **Energy is everywhere!**
**All about energy and its transfer.**

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**AfL assessment opportunities (WILF)**

- Starter activity assesses children’s previous knowledge.
- Main activity of creating a table will show students’ understanding.
- Discussion will assess class understanding.
- Individuals will be assessed by the National Curriculum level-style question.
- Plenary activity assesses pairs.
- Homework activity will assess individuals’ ability to apply their knowledge.

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**Extension/homework**

**Extension:**

- Make a 3D model of an energy-efficient house.

**Homework:**

- Pupils should divide a piece of plain A3 paper in half. One half is their home now and how it wastes energy and money. In the other half, they should design their energy-efficient home, using http://on.coop/energyefficiencyathome as reference.

  - Lower-ability children could write lists of bullet points. Higher-ability groups should create a clear house design.

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**Follow-up lessons**

- Design an energy-efficient school.
- Write and film a TV advert encouraging people to save energy and use it as part of your entry for Green Schools Revolution multimedia competition (see www.greenschools.coop for full information).

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**Whole-school activity**

- Hold a competition to design posters and computer screensavers and wallpapers reminding people not to leave electrical equipment on standby and to turn lights off when they leave the room.
- Allow form time to create leaflets that pupils can take home to encourage their families to become more energy efficient.
- Put together energy-use questionnaires for students, with a rating system and congratulations for those whose scores are low.
- Produce a list of energy-efficient measures that pupils can check around school and at home. Don’t forget to gather evidence of how you’ve been making your school greener for The Green Schools Revolution national multimedia competition at www.greenschools.coop.
- Make up a play about saving energy to perform in assembly or to children at a local primary school.
Energy is everywhere

Draw and label your house with all the places where you are wasting money through energy LOSS. Then, use http://on.coop/energyefficiency to help you design a more energy and cost-efficient home.

<table>
<thead>
<tr>
<th>Current view of my house and all the energy being wasted</th>
<th>My design for an energy-efficient home</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The Co-operative’s Green Schools Revolution

Energy is everywhere!
All about energy and its transfer.
<table>
<thead>
<tr>
<th>Input form of energy</th>
<th>Energy changer</th>
<th>Output form(s) of energy</th>
</tr>
</thead>
<tbody>
<tr>
<td>electrical</td>
<td>light bulb</td>
<td>light and heat</td>
</tr>
<tr>
<td>buzzer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>reacting chemicals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>solar panel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>stopclock</td>
<td></td>
<td></td>
</tr>
<tr>
<td>xylophone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>green plant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>clockwork toy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>candle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>toy car on a ramp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>immersion water heater</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Electricity 100J → Light → Heat → 75J
  
  25J
Extension

What’s all this about?

What’s great about this?

What are the problems?

Find out more [http://on.coop/SaveTheEnvironment](http://on.coop/SaveTheEnvironment)