

## Key Stage 3

### Electric Avenue

#### Pupil worksheet

Electricity is something we take for granted but did you ever stop to think about where it actually comes from?

#### Using electricity

At the moment the UK gets most of its electricity from gas power stations. They can produce a lot of electricity but release polluting gases into the air. To reduce this problem we are trying to use other greener ways of generating electricity.



Wind turbines don't pollute but they can't be relied on when the wind is not blowing.

#### Supply and demand

The amount of electricity we need changes throughout the year and the day. People use more electricity on a cold, dark winter evening than they do in the middle of the day in the summer.

As we move into the future and more people rely on technology powered by electricity, key questions we need to consider are: What

should we use to generate electricity? And, are we going to be able to supply enough electricity to our homes when demand is high?

#### How can scientists help?



Scientists like Dr Philipp Grünewald at the University of Oxford can help answer these questions by investigating what electrical appliances households are using and when. He is researching what people are using electricity for and if persuading people to change the way they use certain appliances will help avoid possible power cuts in the future.

#### Your task

Play the game 'Electric avenue'.



Each group will play as one family.

- Calculate the total amount of electricity spent during one day in November.
- Make changes to help save electricity.
- Which family will save the most money on their electricity bill and win the game?



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#### Family cards

<p><b>Number 1: The Faradays</b> Mum, Emily (15), Jordan (8). Mum works during the day. In the evening they spend time watching TV and using their laptops. Emily is a keen cook.</p>	<p><b>Number 2: The Teslas</b> Peter (68) and Rose (66) are both retired. They enjoy sky diving and surfing. On the days they spend at home they like to listen to the radio or watch TV.</p>
<p><b>Number 3: The Galvanis</b> Young couple Mauro (25) and Elisabetta (27) both work from home as journalists. They spend most of the day writing and researching on the internet.</p>	<p><b>Number 4: The Voltas</b> Mum, Dad, Dipesh (18). Mum works part time. When at home she enjoys housework. Dipesh's hobby is making skateboarding videos.</p>
<p><b>Number 5: The Ampères</b> Vanessa (32) lives here with her pet cat Mimi. Vanessa has a busy career as an international spy. When she is at home she likes relaxing by shopping for spy equipment on the internet.</p>	<p><b>Number 6: The Oersteds</b> Mum, Dad, Theo (3) and Annie (9 months). Mum stays at home to look after the children whilst Dad works. The children like to make a mess. so the washing machine gets used a lot.</p>
<p><b>Number 7: The Ohms</b> Tom (42) and James (38) live here with Alan the dog. They both work full time as brain surgeons and in the evening enjoy watching box sets of medical drama DVDs.</p>	



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#### Change cards

<p><b>Change tariff</b> You switch to an economy 7 tariff. Electricity used is now cheaper at night, but more expensive in the day. <b>What to do:</b> Reduce the cost of running storage heaters and immersion heaters to 5p per kWh. Fridges/freezers should now run for 7 hours at this reduced rate. Increase the cost of everything else to 12p per kWh (including the other 17 hours of fridge/freezer).</p>	<p><b>Goodbye to standby</b> You decide to turn off all appliances when not in use (and not use standby mode). <b>What to do:</b> Reduce the cost of all TVs, games consoles, desktop computers and laptops by 15%.</p>
<p><b>Ban the baths</b> Swap all baths for showers. <b>What to do:</b> For every hour of immersion heater, swap to 0.25 hours of electric shower.</p>	<p><b>Desktop for laptop</b> Swap your old desktop computer for a shiny new laptop. They have a much lower power rating. <b>What do do:</b> Change the power of your desktop computer to 0.05 kW.</p>
<p><b>Turn off the lights</b> Turn off all lights when leaving a room. <b>What to do:</b> Reduce the cost of lighting by 10%.</p>	<p><b>New fridge</b> Your old appliance is wasting electricity. Swap it for new A+ energy rated one. <b>What to do:</b> Reduce the cost of running your fridge, or fridge/freezer by 15%.</p>

<p><b>New freezer</b> Your old appliance is wasting electricity. Swap it for new A+ energy rated one. <b>What to do:</b> Reduce the cost of running your freezer or fridge/freezer by 15%.</p>	<p><b>New washing machine</b> Your old appliance is wasting electricity. Swap it for new A+ energy rated one. <b>What to do:</b> Reduce the cost of running your washing machine by 20%.</p>
<p><b>New tumble dryer</b> Your old appliance is wasting electricity. Swap it for new A+ energy rated one. <b>What to do:</b> Reduce the cost of running your tumble dryer by 20%.</p>	<p><b>Improve insulation</b> Add better insulation to your house and reduce the loss of heat energy. <b>What to do:</b> Reduce the cost of any radiator or heater used by 25%.</p>
<p><b>Use a timer</b> Use the timers on your appliances so your washing machine, tumble dryer and dishwasher all run at night. <b>What to do:</b> If you are on an economy 7 tariff change the cost of running these appliances to 5p per kWh. If you are not, don't change anything.</p>	<p><b>Family time</b> Have more quality family time in the evenings. <b>What to do:</b> Half the number of hours spent on any TVs, desktop computers, laptops and games consoles.</p>
<p><b>Swap bulbs</b> Change halogen or filament bulbs to LED ones. <b>What to do:</b> Reduce the power of any halogen and filament bulbs to 0.01kW.</p>	<p><b>Turn it off!</b> Do you really need your broadband router and satellite box on all day? <b>What to do:</b> Change the satellite/freeview/cable box so it is only on when a TV is. Change the broadband router so it is on for 12 hours.</p>