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| **National Grid jigsaw** | | |
| Making a jigsaw that shows the main elements in power generation and transmission | | |
| **Subject(s):** Design and Technology, Science, Engineering  **Approx time:** 25-40 minutes |  | **Key words / Topics:**   * electricity * national grid * power lines * power station * pylons * step down transformer * step up transformer * voltage |
| **Stay safe**  Whether you are a scientist researching a new medicine or an engineer solving climate change, safety always comes first. An adult must always be around and supervising when doing this activity. You are responsible for:    • ensuring that any equipment used for this activity is in good working condition  • behaving sensibly and following any safety instructions so as not to hurt or injure yourself or others    Please note that in the absence of any negligence or other breach of duty by us, this activity is carried out at your own risk. It is important to take extra care at the stages marked with this symbol: ⚠ | | |
| **Suggested Learning Outcomes** |  |  |
| * To be able to assemble a jigsaw of the National Grid * To be able to identify the main parts of the National Grid * To describe the purpose of each stage of the National Grid network | | |
| **Introduction** |  |  |
| This is one of a set of resources designed to allow learners to use practical methods to support the delivery of key topics within Design & Technology, Science, and Engineering. This resource, developed with the support of National Grid ESO, focusses on learners developing knowledge of the different parts of the National Grid by completing a jigsaw of it. National Grid ESO ensure that Great Britain has the essential energy it needs by ensuring supply meets demand every second of every day. | | |
| **Purpose of this activity**  In this activity learners will make use of the theme of the National Grid to complete a labelled jigsaw of the main parts of the electricity distribution network. They will assemble the different pieces into an image of the National Grid network and use labelled cards to identify each part.  This activity could be used as a starter or main lesson activity to teach about the different parts of the national Grid network. It could also be used as part of a wider scheme of learning on power generation and electricity. | | |

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| **Activity** |  | **Teacher notes** |
| **Introduction and task (10-15 minutes)**  Class to list the electrical devices used at home. Where does the electricity to power these come from? How does this get to their homes?  Teacher to use slide 3 of the presentation the explain the purpose of the National Grid and how it works.  **Completing and labelling the jigsaw (10-15 minutes)**  Learners complete the National Grid jigsaw by assembling the different pieces into the correct image, then placing the labelled cards on the right parts of the picture.  **Review (5-10 minutes)**  Review responses and discuss outcomes with learners. What is the purpose of each part of the National Grid network? Why is each stage needed/important? What would happen if any part of the network stopped working? |  | This activity could be done in small groups.  Slide 3 of the presentation is for higher ability learners. It could be used to introduce electricity or to recap for learners who have covered the key concepts prior to this lesson. The analogy of a water pipe could be used – in this instance the current is analogous to the amount of water that flows through the pipe each second and the voltage is the force/pressure pushing the water through the pipe.  **Images for the jigsaw**  The handout includes two versions of the jigsaw to facilitate differentiation: one with labels already on the image and one with labels separate to the image (which can be placed on the jigsaw once assembled). Ideally the image used should be printed on card. If it is intended to reuse the image with other groups of learners it could be laminated before cutting.  The jigsaws need to be cut out in advance. Alternatively if additional time is available learners could be provided with safety scissors to cut out the jigsaw pieces themselves ⚠. |
| **Differentiation** |  |  |
| **Basic** |  | **Extension** |
| * Use the jigsaw template with the labels already added. |  | * Using the internet, identify the different methods used to generate electricity. What are the advantages and disadvantages of each method? * Investigate what a transformer is used for. Why is it needed? |

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| **Resources** |  | | **Required files** icon-docicon-pdficon-ppt |
| * Card for the jigsaw image and labels. * Laminating facilities (if the jigsaws are to be re-used with different classes). |  | | icon-ppt Primary Presentation - National Grid Jigsaw  icon-pdf Activity Sheet - National Grid Jigsaw |
| **Additional websites** |  | |  |
| * **National Grid website:** Homepage for the National Grid with lots of information about the network. <https://www.nationalgrid.co.uk/> * **National Grid map:** A map showing the different transmission lines across the UK. <https://www.nationalgrid.com/electricity-transmission/network-and-infrastructure/network-route-maps> * **BBC Bitesize – National Grid and electricity:** notes on the topic, however aimed at secondary school level. <https://www.bbc.co.uk/bitesize/guides/zcfm8mn/revision/1> * **FunKids:** Top 10 facts about electricity pylons. <https://www.funkidslive.com/learn/top-10-facts/top-10-facts-about-electricity-pylons/> | | | |
| **Related activities (to build a full lesson)** |  | |  |
| **Starters** (Options)   * Class to list the electrical devices used at home. Where does the electricity to power these come from? How does this get to their homes? | | **Plenary**   * Review responses and discuss outcomes with learners. What is the purpose of each part of the National Grid network? Why is each stage needed/important? | |

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| **The Engineering Context** |
| * It is important that all engineers understand how products and systems are powered. This includes how electricity is generated, transmitted and made available for us to use in our homes and businesses. * Power engineering is a very important field which focusses on how energy is generated and transmitted. There are lots of well-paid and rewarding careers available in this area. |

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| **Curriculum links** | |
| **England: National Curriculum**  Design & Technology   * KS2 3c, 4c | **Northern Ireland Curriculum**  The World Around us   * KS2 – Movement and Energy - sources of energy in the world. |
| **Scotland: Curriculum for Excellence**  Technologies   * TCH 2-12a | **Wales: National Curriculum**  Primary – Science and Technology   * Design thinking and engineering offer technical and creative ways to meet society’s needs and wants. |

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| **Assessment opportunities** | | |
| * Formal summative teacher assessment of completed jigsaws and labelling. * Informal feedback on knowledge and understanding shown throughout the activity. | | |
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