

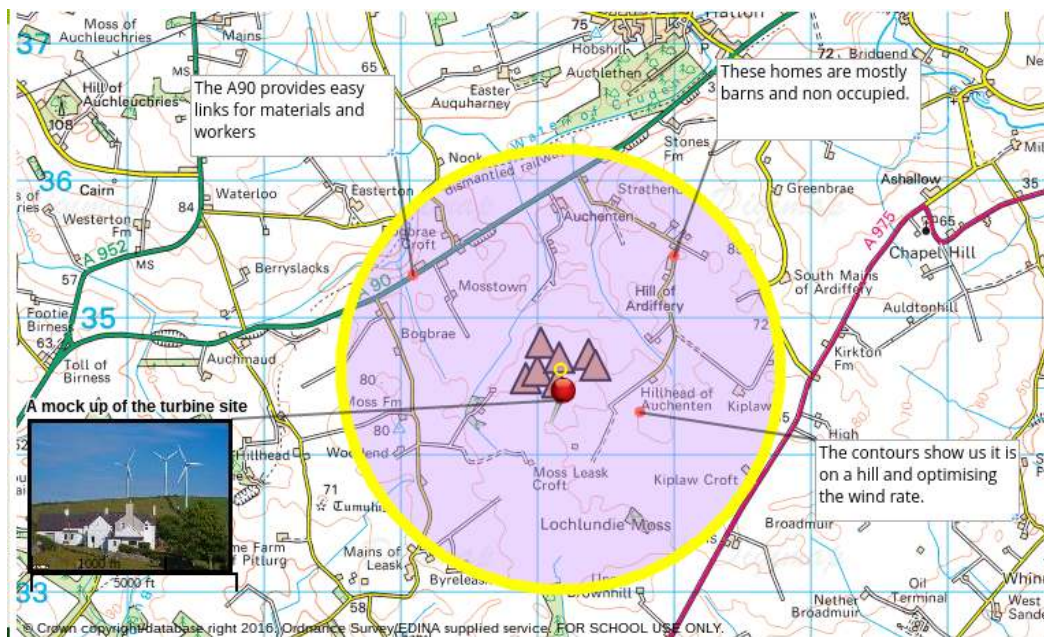


Winds of change

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Decision making mapping

P7-S3 Science and Technology resource





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Learning intention

Where should Scotland's renewable energy come from?

Curriculum for Excellence Experiences and Outcomes:

1. I can investigate the use and development of renewable and sustainable energy to gain an awareness of their growing importance in Scotland or beyond.
TCH 2-02b
2. Through investigation, I can explain the formation and use of fossil fuels and contribute to discussions on the responsible use and conservation of finite resources.
SCN 4-04b
3. By contributing to an investigation on different ways of meeting society's energy needs, I can express an informed view on the risks and benefits of different energy sources, including those produced from plants.
SCN 4-04a
4. Through exploring non-renewable energy sources, I can describe how they are used in Scotland today and express an informed view on the implications for their future use.
SCN 2-04b

Success Criteria

- **All** pupils will learn how to describe renewable energy.
- **Most** pupils will learn how to group the costs and benefits of this energy.
- **Some** pupils will learn how to evaluate the best option for Scotland.

Equipment

Tablets, large paper, presentation materials, internet resources (links attached), straws, split pins, paper.

Time allocated

Up to 3 lessons.





Introduction:

As energy usage in Scotland and knowledge of climate change linked to the burning of fossil fuels increase, there is an enhanced interest in identifying and delivering the most efficient renewable energy resources for the population, something in which Scotland is already ahead of England. One of the most popular is wind energy and these lessons look to take an open and critical approach to the implementation of wind turbines both inland and off the coast of Aberdeenshire. The lessons are ones that combine the Sciences, Technology and Geography and aim to allow pupils to investigate the appropriateness of this method of energy production. The mapping element allows critical investigation of location, visual presentation methods and pupils to engage with a topical issue.

Starter:

1. Before pupils arrive, place a selection of straws, split pins and paper in the middle of each desk.
2. Project the statement 'make a wind turbine' on the board.
3. Allow pupils five- ten minutes to make a simplistic turbine on their desks
http://www.energyclassroom.com/pdfs/EC_PS_EX_Pinwheel.pdf
4. Through directed questioning, establish what pupils know about turbines, how they work, what they look like.
5. Now, display an image of an actual wind turbine on the board, how similar are theirs?
6. Emphasise the size of the actual turbines in comparison to the ones on their desk.
7. Would they be happy with a turbine in their back garden?
8. Does anyone in the class have that problem?
9. An opinion continuum could be utilised to appreciate pupil understanding before the majority of research is undertaken.

Activity:

Why renewable resources?

1. Display/Hand out a graph that details how energy is produced in Scotland:
http://www.euanmearns.com/wp-content/uploads/2015/01/scotland_electric_capacity2.png
2. Ask pupils to identify three patterns they can see.
3. Then, build up directed questioning to look at why renewable energy is needed (this also tests prior knowledge and can guide the rest of the lesson). Alternatively, this could be done with three, multiple choice hinge questions:





- a. E.g. What is one negative of burning fossil fuels? a) they release no harmful gases b) they release gas into the atmosphere c) it provides jobs at landfills.
4. Either lead pupils to look this up online or provide them with a positives and negatives of wind farms worksheet to identify the theory of the energy.
http://www.bbc.co.uk/schools/gcsebitesize/science/ocr_gateway/energy_resources/energy_from_the_sunrev3.shtml
5. If time allows, set up an opinion continuum (wind power-for or against), asking pupils to place themselves along it. This can be referred back to after the presentations.

Task

Introduce the task at hand, where to locate Scotland's latest wind energy resources. Project a map of Aberdeenshire (use the area to the South East of **Cruden Bay**) and state that our task, as groups, is to decide where to place a wind farm on the map (locations can be preselected for weaker pupils). Inform pupils they will be presenting the information back to the class at the end of the task.

Article links

Provide the pupils with a list of articles that balance the issue of wind farms in Aberdeenshire, these can be used as a starting point.

1. <http://www.bbc.co.uk/news/uk-scotland-north-east-orkney-shetland-35106581>
2. <http://www.dailyrecord.co.uk/news/scottish-news/green-light-scotlands-largest-300m-8462585>
3. <https://corporate.vattenfall.co.uk/projects/operational-wind-farms/clashindarroch-aberdeenshire/>
4. http://www.heraldscotland.com/news/14257306.British_Gas_parent_Centrica_to_sell_Aberdeenshire_wind_farm/

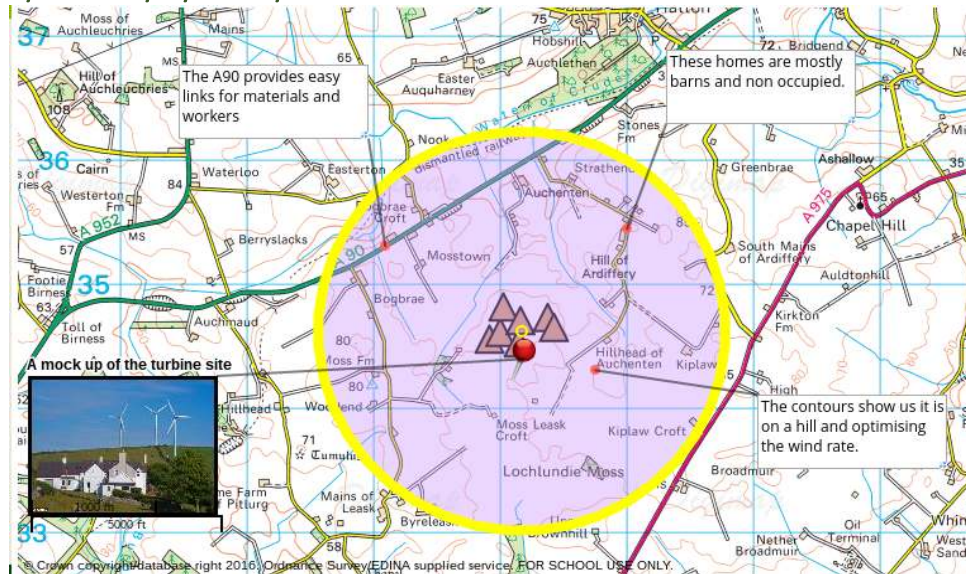




Mapping element

- The mapping element of the task could include the compulsory inclusion of a map into the presentation, the map being the only visual cue, the map showing a mockup of what their site may look like on Google sketch up or all of these, embedded with the photos tool.

An example of a pupil map



- There is also the opportunity for home learning, the use of collaborative social media and extended reading to enhance the presentations. Sharing the maps and resources across a platform like Yammer or Edmodo could help the process along and enable drafting to take place.
- I would suggest a requirement to include the use of certain Digimap for Schools tools to allow pupils to experiment/enhance their usage.

For example:

- the use of the buffering tool:



- the measurement tools:





- draw polygon tools:



- geo-located photos (Image Search menu):



The use of these should form a key element of any peer/self or teacher assessment. The example of the area is alongside this file entitled 'Winds of change'.

Ideally, there would be a peer assessment sheet to identify the strengths and possible improvements of each group alongside the verbal feedback from the teacher.

Team name	Location	Strengths	Improvements

This would act as an appropriate structure for the peer assessment.

Extension:

Dependent on the ability/age of the class, extension could be achieved by removing the scaffolding of pre-determined locations, determining more high level mapping skills in the compulsory elements, identifying a different location with local interest, including a golden word in the presentations, giving clear time allocations, having an audience made up of stakeholders, booking a conference room and encouraging pupils to pitch the idea to the attendees/council.

Plenary:

Using the same continuum as earlier, engage pupil's empathy by getting them to imagine they are different groups involved in the conflict. For example, 'imagine you are a local villager in rural Aberdeenshire, the wind turbines will be 500m from your house, where will you be on the continuum and why?' Encourage pupils to offer real life reasons from the presentations as support.





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