Y3 Ideas, resources and suggestions - Renewable Energy Topic

The resource is designed to allow the content to be seen in context rather than as stand alone lessons. At Year 3 the focus is on the most common types of renewable energy and really understanding the reasons why 'green energy' is so important. This allows for progression in understanding through Y4/5/6 as wider examples, more technologies, aspirations and a deeper link with science are developed. The LEGO video linked to the right, is a great way of structuring a series of lessons in conjunction with the Google Earth Voyage: Renewable Energy - what does it look like?

https://earth.google.com/earth/d/1Tnw7DSyzAszPHAo1SmSwk-x2tG4ocN0j?usp=sharing

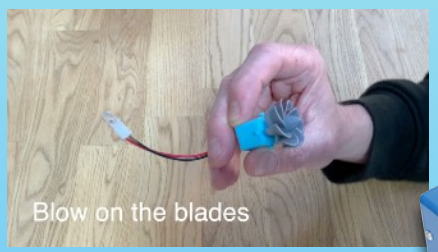
https://www.youtube.com/watch?v=8CwYGKV_3gw

KEY QUESTION: What is 'GREEN ENERGY?'

Class discussion around what green energy is. What is different about it compared to 'fossil fuel' energy? Timings below relate to the LEGO video (above right)

1) HOW IS ELECTRICITY GENERATED FROM FUELS?

Up to 1.57 - **Activity** following the explanation in the video there is an opportunity to demonstrate this using mini turbines connected to LEDs. They can be blown on, spun by hand or even put under a tap. Alternatively, using a hand cranked generator to bring a 'flat' electronic device (such as an iPad) back to life also demonstrates the point nicely. In both cases there needs to be recognition that inside the 'turbine' there is basically a coil of copper wire and some magnets.



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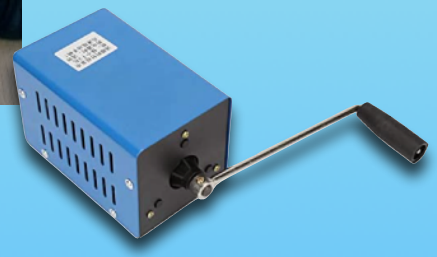

2) WHAT ARE FOSSIL FUELS?

Up to 4.30 - discussion to find out what children know about coal, oil and gas. Video link to right to help explain what coal is. It is not suggested you try the experiments!

Activity: Opportunity for writing a letter to a local MP/power station company to explain why we need to stop using coal, oil and gas.

How will we run our cars? How will we generate electricity to heat our homes and power our devices? Is there an energy source that won't run out?

https://youtu.be/BQ_Ethb6_Wk

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3) RENEWABLE ENERGY

a) Up to 6.20 - Wind energy. Where would the children site a turbine? Why? Showing the mini turbines again might be useful or the hand crank or a toy wind turbine if you have one.

Visit the RWE Galloper Wind Farm on the Google Voyage. Images with videos and links on there for children to get some idea about how big, where and so on. Links below to real time information:

RWE power generation:

https://www.rwe-production-data.com/map/

And a live update of all types of power generation from the national grid in real

time: https://grid.iamkate.com/

Activity: So how big is a Wind Turbine? Explain about a new wind farm being out to sea from the Tees Valley. Website to illustrate is here:

https://sofiawindfarm.com/about/

Facts and figures are under the 'About' tab and video/images under 'Latest'. Children have to mark out on the floor in school grounds the 'height' of a turbine if it was laid down. Opportunities for measuring with trundle wheels, long tapes to get to 252m. This could also/instead be done on a map of the area if going outside is completely impractical (screenshot google maps area and add a grid over it representing a clear scale like 1cm = 10m). Some children may also point out that the base has to be up to 35m longer to reach the sea bed.

Google Voyage mapping the farm is also here:
https://earth.google.com/earth/d/1fzJ2Qw6iLZOJBQir-wmz322halmAURjB?usp=sharing

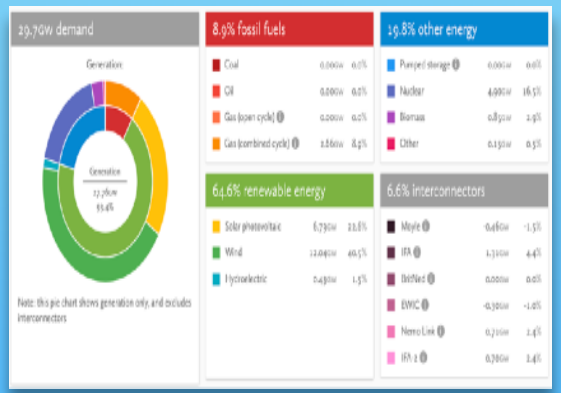
https://youtu.be/yFx9x1hWaTM

This video helps explain what the National Grid is.

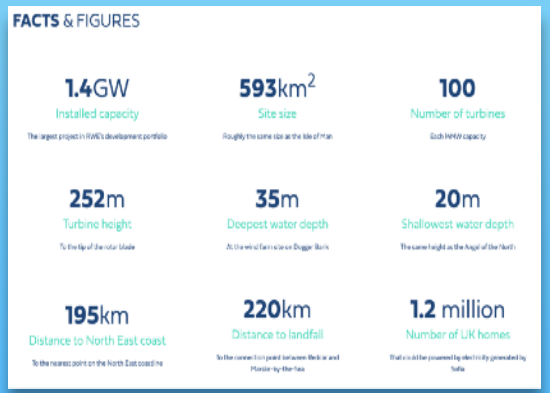
https://youtu.be/KXTbQ1XuFPw

This video shows a water turbine in action (see below).

https://www.rwe-production-data.com/map/



https://grid.iamkate.com/



https://sofiawindfarm.com/about/

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b) Up to 7.45 - Solar Energy. The Voyage contains two different types of solar park. Limondale in Australia is barely built yet but there are videos embedded to show it in progress. It uses what people usually think of as solar cells that turn sunlight directly into electricity. Can the children think of solar powered devices that they know about? Ideally using some solar lights or a solar powered calculator would be useful to demonstrate.

Activity: design an experiment to see how much light solar powered lights need to work. Very similar to the traditional 'grow plants in the dark, in the warm, in the sunlight' type experiment, place solar lights in a dark cupboard, in the classroom but out of the sun, in a sunny place. Ensure the lights are fully 'flat' before the experiment by having them on all day until flat (cover the cell and sensor so it is in the dark). Then place all of them in their respective positions at exactly the same time making sure they are switched 'off' so they don't use up any power when it gets dark. Leave for the rest of the day/overnight then reveal the next morning but cover the cell and sensor with something so it thinks it is night, then switch 'on'. Record how long each set of lights stays on for during the rest of the day. This activity is a brilliant opportunity to introduce a simple graph to show a trend. Are there any other factors that need to be considered. Can the children think of any so they could also be tested at the same time? Resource required, a solar powered light of some kind.

There are also lots of solar cell powered toys and little cars that could be used to do a similar type of test (how far can a car go with different amounts of sunlight having charged it etc), just type 'solar power car' into Amazon! There is a video embedded in the Voyage about how Solar Cells work at a very simple level.

c) The second site in the Voyage about solar energy is focussed on thermal energy. The Andasol Plant in Spain directs sunlight using mirrors to heat up a tube of liquid (salt infused or oil) which then heats up water to turn a turbine.

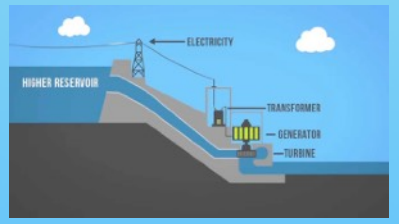
Activity: Using small mirrors to direct heat is an easy experiment to do, just position a thermometer (ideally out of the direct light) and take a reading. Ask children to hold small mirrors and direct sunlight at the temperature sensor/bottom of the thermometer. In normal Summer sunshine the temp will rise on the thermometer almost instantly. Can the children design a mirror array to keep something like a glass of water warmer than one without the array? Easy to set up with two glasses of water side by side but one with mirrors arranged to direct the sun towards it. Children can make their own mirrors using foil wrapped smoothly on card although it may not be quite as effective (especially if it is an any way creased). Great data collection and handling activity.

d) Up to 6.42 - Water power. The mini turbines can be shown to turn easily under a tap running and will light an LED if connected (see video above)

Activity: The children must build a structure that has a light embedded in it. They must embed the turbine in the structure so that the tide will turn the turbine (simulated by pouring water over the turbine). Task can be application of using 'nets' to create a 'house' type structure or a challenge like 'make a lighthouse as tall as you can that will hold the light using 20 paper straws and some sticky tape.

OR

They design a device that can be fitted into existing places where water is moving to generate electricity (e.g., in a drainpipe). They may also/instead draw a side view of a house that shows all the places where such a device could be fitted to maximise power output (sinks, drains etc - not the toilet!!). How could the flow be made more constant? Demonstrate how a storage tank (bottle) could collect the water so it could be released in a more controlled and timed way. The Cym Dyli Hydro-electric plant shows this on the Google Voyage including an explanatory video (see below).



https://youtu.be/q8HmRLCgDAI

This video helps explain how hydro electric storage works.

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