

WEEK: 5

Week Beginning: (18/01/2021)

Subject: SCIENCE

Year: 9

Lesson Objective:

- Homework Answers
- Energy and their uses
- Renewable energy: wind, solar, geothermal and hydroelectric

Keywords/ Concepts

- Non-renewable and renewable
- Energy, environment

Class Worksheets

- Questions below

Homework

- Notes below

Additional Notes

- Attach all the classroom worksheets and homework worksheets to this lesson plan and email together.
- Assume the students don't have revision guides and workbooks. Attach all the pages you want them to have.

Classwork

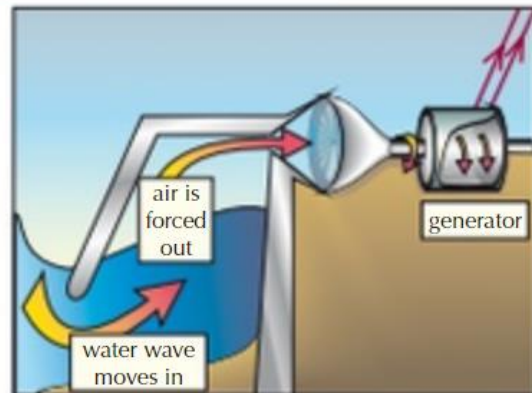
1. Name four renewable resources.
2. What is the difference between renewable and non-renewable?
3. Explain why solar power is considered to be a fairly reliable source.

Wave Power and Tidal Barrages

Good ol' water. Not only can we drink it, we can also use it to generate electricity. It's easy to get confused between wave and tidal power as they both involve the seaside — but don't. They are completely different.

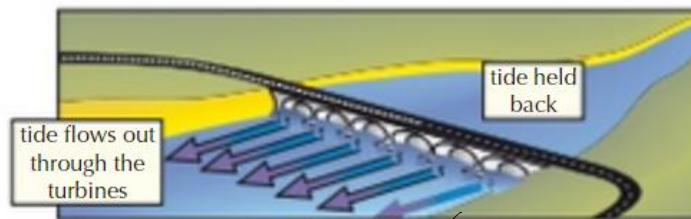
Wave Power — Lots of Little Wave-Powered Turbines

- 1) You need lots of small wave-powered turbines located around the coast. Like with wind power (p.32) the moving turbines are connected to a generator.
- 2) There is no pollution. The main problems are disturbing the seabed and the habitats of marine animals, spoiling the view and being a hazard to boats.
- 3) They are fairly unreliable, since waves tend to die out when the wind drops.
- 4) Initial costs are high, but there are no fuel costs and minimal running costs. Wave power is never likely to provide energy on a large scale, but it can be very useful on small islands.



Tidal Barrages — Using the Sun and Moon's Gravity

- 1) Tides are used in lots of ways to generate electricity. The most common method is building a tidal barrage.
- 2) Tidal barrages are big dams built across river estuaries, with turbines in them. As the tide comes in it fills up the estuary. The water is then allowed out through turbines at a controlled speed.



- 3) Tides are produced by the gravitational pull of the Sun and Moon.
- 4) There is no pollution. The main problems are preventing free access by boats, spoiling the view and altering the habitat of the wildlife, e.g. wading birds and sea creatures who live in the sand.
- 5) Tides are pretty reliable in the sense that they happen twice a day without fail, and always near to the predicted height. The only drawback is that the height of the tide is variable so lower (neap) tides will provide significantly less energy than the bigger (spring) tides. They also don't work when the water level is the same either side of the barrage — this happens four times a day because of the tides.
- 6) Initial costs are moderately high, but there are no fuel costs and minimal running costs. Even though it can only be used in some of the most suitable estuaries tidal power has the potential for generating a significant amount of energy.

Wave and tidal — power from the motion of the ocean...

The first large-scale tidal barrages started being built in the 1960s, so tidal power isn't a new thing. Wave power is still pretty experimental though. Make sure you know the differences in how they work.

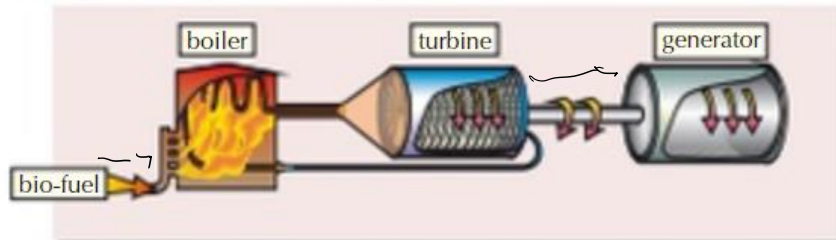
Homework:

Bio-fuels

And the energy resources just keep on coming. It's over soon, I promise. Just a few more to go.

Bio-fuels are Made from Plants and Waste

Bio-fuels are renewable energy resources created from either plant products or animal dung. They can be solid, liquid or gas and can be burnt to produce electricity or run cars in the same way as fossil fuels.



They have Pros...

- 1) They are supposedly carbon neutral, although there is some debate about this as it's only really true if you keep growing plants at the rate that you're burning things.
- 2) Bio-fuels are fairly reliable, as crops take a relatively short time to grow and different crops can be grown all year round. However, they cannot respond to immediate energy demands. To combat this, bio-fuels are continuously produced and stored for when they are needed.

... and Cons

- 1) The cost to refine bio-fuels so they are suitable for use is very high.
- 2) Some people worry that growing crops specifically for bio-fuels will mean there isn't enough space or water to meet the demands for crops that are grown for food.
- 3) In some regions, large areas of forest have been cleared to make room to grow bio-fuels, resulting in lots of species losing their natural habitats. The decay and burning of this vegetation also increases carbon dioxide (CO₂) and methane emissions.

9

The image shows a man using a leaf blower to move some leaves.



The leaf blower is powered by an electric motor connected to a battery.

(a) Energy transfers take place when the leaf blower is being used.

Use the correct answer from the box to complete each sentence.

chemical

electrical

kinetic

nuclear

sound

The battery stores _____ energy which is transferred into electrical energy.

The electric motor transfers electrical energy usefully into _____ energy.

The motor wastes energy as _____ energy and as energy that heats the surroundings.

(3)