

Energy Series Ideas

Sessions

- S1 What is energy?
- S2 Renewable vs. non renewable & Fossil Fuels
- S3 Electricity Production Renewable vs. non renewable
- S4 Energy Vampires
- S5 Needs vs. necessities
- S6 Comparing light globes

Curriculum links

Science

Environmental Awareness and Care

Energy & Forces-Magnetism & Electricity

Working Scientifically: All skills are covered in Session 6

Geography

Weather, climate and atmosphere

Environmental awareness: become aware of the importance of the Earth's renewable and non renewable resources



Session 1: What is energy?

What do you think the word energy means?

Can you see energy? Can you hear energy?

How many different types of energy are there? E.g. wind/electrical

Show pictures of different forms of energy and ask students to guess what they are: wave/geothermal/solar/wind/electrical

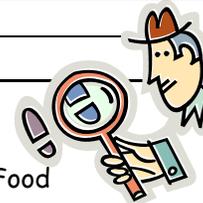
Energy hunt: In teams of 3 you will go on an energy hunt- your aim is to find as many sources of energy as possible. Read the clues for hints

Sample recording sheet

Energy Activity	We know that energy was here because	Source of Energy- sun/wind/electricity/food
A person skipping	Movement was seen	Food
Typing into a Computer	Words appeared on the screen	Electrical
Flag flying	Flag was moving in the wind	Wind

Student Clues for the energy hunt!

- What energy grows our food? Sun
- What energy does a surfer ride? Wave
- How do we get the energy to walk to school? Food
- How does a flag fly? Wind
- How does a river turn a water wheel? wave
- How do we find our way in the dark? Electricity
- How does our food stay cool? Electricity
- How does a boat sail? Wind
- What underground energy source heats homes? Geothermal
- What underground energy source heats thermal springs? Geothermal



Energy Review

1. Share students results and ideas
2. Divide the class into teams. Give each team a chart with a heading Food/ Electrical/Wave/Geothermal/Water/Solar/Biomass
3. In teams students must provide as many examples of their form of energy as possible.
4. Finalise a class definition of energy and then tell students that energy is the ability to do work.

Discuss the sun as a source of energy for all plants which

Note: Refer to infant lesson series session 2 for a simplified student explanation. Sun-Grass-Cow-Human Sun-Flower-Bee-Honey-Human



Session 2: Coin/Paperclip Hunt & Renewable vs. Non Renewable



Teacher Instruction

1. Hide approximately two hundred coins or paperclips around the classroom. Be sure to hide some in places that students won't find them (e.g. inside a book in your desk)
2. Tell students that they are miners hunting for oil, gas, coal and peat.
3. Divide students into 5 teams- you may wish to give the teams a name based on the countries that hold the most resources.
4. Set a one minute timer.
5. Set the timer three times and ask students to tally how many resources they found in each round.

(Students should notice that each round they are finding less resources.)

Extension: Students graph their results

- Explain that the resources they have found are non renewable which means they will run out and can't be replaced.
- Explain that some resources are buried so deep within the earth they will never be found

Options: Acting time/ Drawing time/ Flow chart

Read following extract with students.

Options: -Acting out the information in small groups.

-Turning the information into a flowchart/poster or comic strips

-Future research and discussion on global warming and fossil fuels

1. Millions of years ago the dinosaurs roamed the earth. Huge tropical plants and animals lived happily.
2. The plants used the sun's energy to make their own food and grow. Animals ate the plants to provide them with a source of food energy. Some Dinosaurs ate dinosaurs who ate plants.
3. When the animals and plants died they still had energy left inside them.
4. Their remains became covered in mud and dirt; soon they became part of earth.
5. New layers of soil & mud formed over the dead animals & plants. They were under pressure and heat from the new layers of mud and soil above them. They also experienced volcanoes landslides and earthquakes. They were squeezed together and heated- this changed them!
6. With all the heat and pressure and millions of years passing by the dead plants and animals were turned into fossil fuels: the fossil fuels were coal, oil, gas. Humans release their stored energy by burning them and processing them in big factories. They are burnt in power stations to generate electricity, processed to make petrol and used to heat in our homes.

7. Today these fuels are mined out from the earth (remember they were buried deep under layers of soil and mud)
8. The problem is when these fossil fuels are burnt they let off carbon dioxide CO_2 which is hurting earth.
9. Too much carbon dioxide in our atmosphere traps too much of the sun's heat. This is contributing to global warming- which means earth's temperature is getting hotter. It is called the enhanced Greenhouse effect.
 - (Recommended you explain greenhouse effect- CO_2 is a greenhouse gas- in the right amounts it is a good gas to have an earth as it keeps earth warm by trapping sunlight. Earth is like a big greenhouse but instead of having glass to keep earth warm, earth uses greenhouse gases. CO_2 is a major one. (Others include methane, water vapour and ozone) Without the greenhouse effect (gases to trap sunlight and heat earth) earth would be covered in ice and freezing! The problem is humans are putting too many cars on the road, airplane use and electricity consumption has increased this is the cause of too much carbon dioxide in the atmosphere. Too much CO_2 means more sunlight is trapped = Global warming & Climate change
10. You may have noticed changes in the weather and seen pictures of glaciers melting scientists believe this is due to earth heating up.
11. Earth is heating up because humans are burning too many fossil fuels. Let's find out how we can help!
 - **Discuss & list ways humans can reduce their fossil fuel consumption- create a class goal!**

<https://www.youtube.com/watch?v=PqxMzKLYrZ4> - provides a great animation which explains global warming. There are many more videos and info online.

Can Ireland use renewable energy?

- Place the following words under the correct heading renewable or non renewable Sun, wind, wave, geothermal (hot springs), biomass, oil, gas, coal & peat.
- As a class discuss Ireland's potential for wind farms and non renewable energy resources.
- Visit the Green home website and map Ireland wind farms.
- In teams research one form of renewable energy and its potential in Ireland. Create an informative chart and educate the class on your findings (e.g. Type of energy, location, costs, % used in Ireland, negatives etc.).

Session 3: Electricity Production Renewable vs. Non Renewable

What is electricity? Key questions: How is it made? Does it cause any damage to earth when it is being made? Can electricity be made with less pollution?

- 1: Use the online teacher information (flowcharts of electricity production) to create a flow diagram of how electricity is made from coal
- 2: Turn the flowchart into a student drama with the class (it is important for students to have a basic understanding of how electricity is made from coal.) Emphasise the fact that coal is non renewable and will not last forever! Identify the wind as a renewable source of energy that causes pollution.

Create a Venn diagram to compare both sources of electricity production (You can create pinwheels to model the turbine powering the power station-see website links)

Session 4: Energy Vampires!

(Act) What's wrong with leaving appliance plugged in or turning the TV off with the remote control?



Explain the concept of energy vampires: refer to Green Home householder challenge 'energy vampires' for detailed information (all families in your school are participating in this challenge).

Energy vampires love energy- they drain energy even when you think they're not & they drain more energy than they will ever need! **What are they?** They live in the electrical appliances that make human life easier. (Your phone & i-pod charger, TV, cordless phone, washing machine even your kettle) They act as vampires draining energy. **How do they do this?** When appliances are on standby mode (e.g. when a red display light is present) (When you're not using them but they are still plugged in) they still consume electricity. Up to 20%

Stop them! The only way to stop them is to unplug or turn appliances off at the direct source of power. You can save 20% off your power bill by stopping 'e' vampires!

Lesson Ideas

- Hunt & record the 'e' vampires in the classroom/school
- Students create scenarios and enact them: to educate others how to stop 'e' vampires!
- Create a poster to educate others



Session 5: Electricity Needs vs. Necessities

In small teams name as many appliances you can think of under the following headings

1. **Entertainment:** (computer, DVD, play station)

2. **Cooking:** (bread maker, electric can opener)
 3. **Cooling:** (fan, air conditioner)
 4. **Heating:** (radiator, space heater)
 5. **Lighting:** (night light, lamp)
 6. **Food storage:** (refrigerator, deep freezer)
 7. **Cleaning/washing:** (electric toothbrush, dishwasher, vacuum)
 8. **Grooming:** (curling wand, blow dryer, clothes iron)
1. As a team list 5 electrical appliances you could not live without
 2. Can you categories the appliances as needs and wants? (define need and wants first)
 3. Can you think of an electrical alternative from your 'want' list

Wants	Energy free alternative
Entertainment: Play station	Board game

Extension Interview grandparents and community members to find out what electrical free games/items they used in the past. As a class or in small teams can you develop a series of questions to ask categories your list of appliances as follows:

Present Day Electrical appliance	What was used in the past
Computer	Encyclopaedia
Night light	Candle

Reducing Energy Consumption Conclusion

1. Look at your wants list and energy free alternatives: devise a class action plan to reduce electrical energy consumption (you may choose a class reward session of electrical energy free time.)
2. Devise a class action/ school action plan to reduce energy vampires
3. Educate local business and family members: create a series of tips or a brochure to reduce fossil fuel consumption

Session 6: 'comparing light globes'

Today we are going to become scientists and find out which light globe wastes the most energy in the form of heat.

Revision: most of the electricity we use at home comes from burning fossil fuels. What is wrong with burning fossil fuels? They let out CO₂ which contributes to global warming. Excessive CO₂ emissions trap too much heat on earth.

More electricity wastage= more CO₂ emissions

Pre-questioning: has anyone heard the term energy efficient lightglobe? Do you know how they work? Do you think they provide the same amount of light as an ordinary light globe?

Teacher Information

Normal light globes are called incandescent new CFL compact fluorescent light bulbs use less energy and last about ten times longer. Only 10% of the electricity used by an incandescent bulb is used for light the other 90% escapes as heat

- CFLs (Compact Fluorescent Lights) last up to ten times longer than ordinary bulbs and use 80% less electricity.
- Only 10% of the energy used by an incandescent bulb is used for light- the other 90% escapes as heat.
- CFLs emit far less greenhouse gases.
- Using CFLs for security and general garden lighting is a very cost effective choice. Find out how much you can save by changing the type of lightbulb.

Equipment CFL bulb (13 watt CFL) that produces equivalent light levels to a 60 watt incandescent bulb, thermometer, lamp, measuring tape & timer

Initial Planning -Questioning:

Do you think both light bulbs will produce the same amount of light?
Write down your prediction don't forget to give a reason why!
Do you think both bulbs will produce the same amount of heat? Why?



How can we make this a fair test?

- Ensure the temperature is reading is taken the same distance from each bulb, Same indoor weather conditions,
- Bulbs are measured(tested) from the same lamp,
- Ensure each bulb has been on for the same time period before measurements are taken.

Teacher/Student Instructions

1. Place the CFL bulb in the lamp and turn it on. Observe/Record the amount of light produced (e.g. strong, medium, low light).
2. Wait the designated time period hold a thermometer 6' or 15cm above the globe (you can measure this distance with string or tape) hold the thermometer for approximately 1 minute.
3. Record the temperature and let the bulb cool.
4. Replace with the CFL globe and repeat the procedure.
5. Repeat 3 times and average results.

Conclusion

Did the bulbs produce the same amount of light? How could you tell?
Did the bulbs produce the same amount of heat?
Why do you think the incandescent globe produced more heat?
Which bulb is more energy efficient why?
Which bulb will produce the least amount of greenhouse gases?

Extension Activities

Review and compare different online energy efficient homes

Design your own energy efficient home

Visit www.electricireland.ie to download their energy app and learn more! It's fun!
<https://www.electricireland.ie/residential/help/efficiency/my-energy-pal>

Thanks for all your hard work!

