Ground Source Heat Pump Association Webinar Series 2021

Climate Change and Sustainability Schemes of Work

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The Heat is On;
2021 – The Year of the Heat Pump

The heat is on, on the street

Inside your head, on every beat

And it beat's so loud, deep inside

The pressure's high, just to stay alive

'Cause the Heat is On.

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The Heat is On
2021 – The Year of the Heat Pump

Prynhawn da a croeso i weminar heddiw.

‘Cause the Heat is On.

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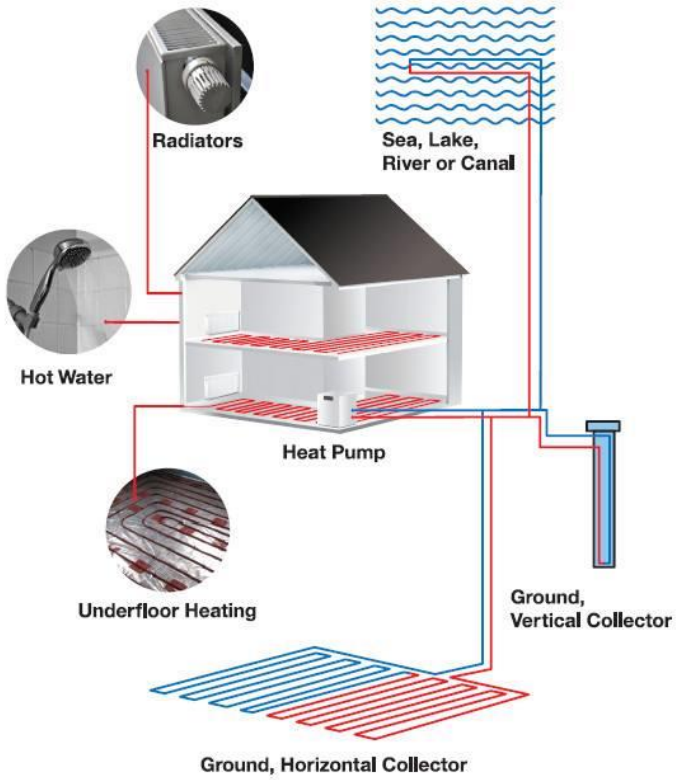
The Heat is On



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2021- The Year of the Heat Pump

Can the ground source heat pump industry be the vehicle to teach climate change, sustainability and planet preservation?

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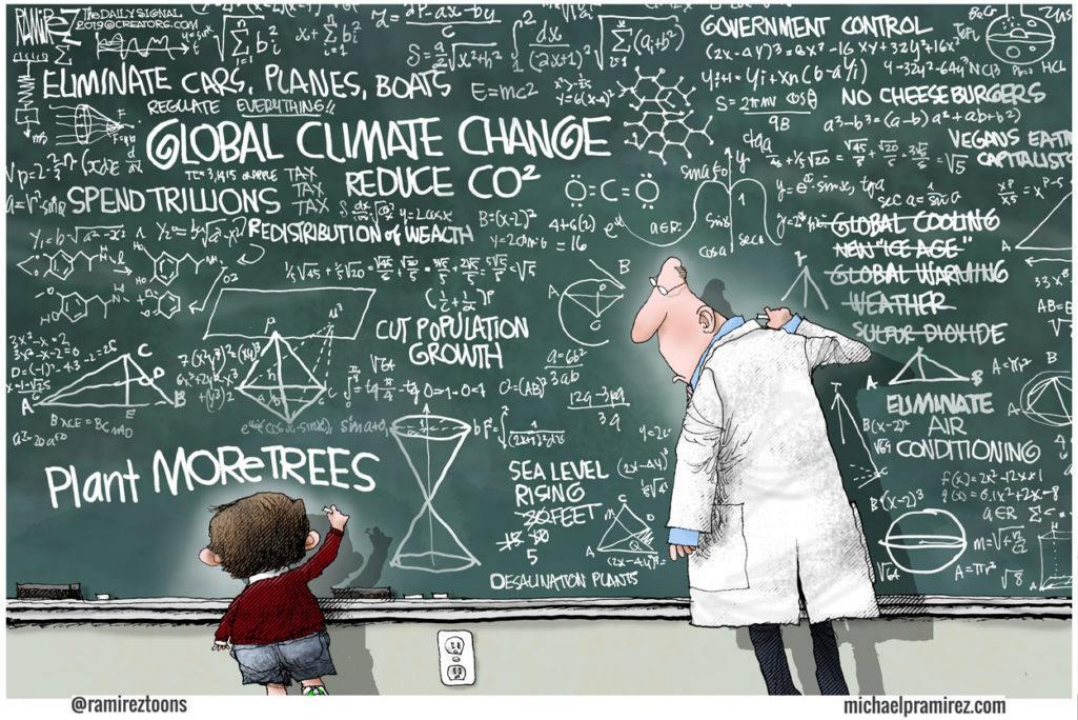
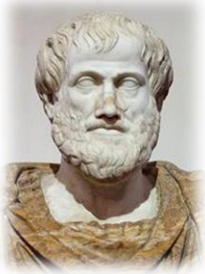


Is Education Important for the Future of the Planet?

Give me a child until the age of 7, and I will show you the man.

Aristotle 384 – 322BC



“The main hope of a nation lies in the proper education of its youth.”

Erasmus 1466 - 1536

Education is the most powerful weapon which you can use to change the world.”

Nelson Mandela 1918 - 2013

Lessons on the environment are as important as the three Rs.

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Sustainability in the UK National Curriculum Orders

- 1988: The first National Curriculum for England and Wales included Environmental Education.

- 1992: Agenda 21, Chapter 36 required local and national government to “Promote Education, Public Awareness and Training” of sustainable development.

- 1998: The Holland Report proposed ‘key concepts for sustainable development.’

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- 2000: A new National Curriculum for England featured environment, sustainability and global citizenship as strong elements within Science, Geography, Design Technology, Citizenship and PE.

- 2000s: Sustainable Development and Global Citizenship were promoted by QCA (Qualifications & Curriculum Authority) as non-statutory whole school ‘dimensions’.

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2006-10: DEFRA's *(Department for Environment and Rural Affairs)* Sustainable Schools Framework proposed 8 'doorways'.

- Food and drink
- Energy and water
- Travel and traffic
- Purchasing and waste
- Buildings and grounds
- Inclusion and participation
- Local well-being
- Global dimension

2010: The Coalition government came in with a new broom, and swept away the Sustainable Schools Framework.

2014: Another new National Curriculum for England saw Environmental Education weakened and some references (e.g. in Primary Geography) removed whilst the UN document SDG 4.7*, was signed by the UK government, requiring that by 2030 to "*ensure that all learners acquire the knowledge and skills needed to promote sustainable development.*"

* https://indicators.report/targets/4-7

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Where is Sustainability in the UK National Curriculum Orders?

The national curriculum barely mentions the climate crisis. Children deserve better.

Fiona Harvey

https://www.theguardian.com/education/2020/feb/11/the-national-curriculum-barely-mentions-the-climate-crisis-children-deserve-better

https://www.ase.org.uk/system/files/Education%20in%20Science%20274%20-Special%20Supplement%20ESD.pdf

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Despite 14 years of formal education, it fell to me to teach myself the basics of the climate crisis.

Topics like the principles of sustainability need to be woven like a golden thread throughout the curriculum.

https://www.independent.co.uk/climate-change/opinion/climate-change-education-teaching-b1799258.html

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‘Our Earth - Use It; Don’t Abuse It.’

Aimed at teaching about the importance of using the earth as a renewable energy source – and not abusing it using non-renewable energy sources.

Key Stage 1 Year 2	Key Stage 2 Year 5
Key Stage 3 Year 9	Key Stage 4 / GCSE / BTEC
Higher Education / A Level	Specialist Areas

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Long Term Plan Year 2

Making Choices with Energy

Week/Lesson 1 Where does energy come from? Including food

Week/Lesson 2 How we use and mis-use energy – Including food

Week/Lesson 3 Our Sun

Week/Lesson 4 Our Air

Week/Lesson 5 Our Heat

Week/Lesson 6 Making Choices – including who wants to be a Millionaire quiz

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Medium Term Plan

Week/Lesson 1 Where Does Energy Come From? – including food.

	Expected Learning Outcome *To develop understanding of:*	Method/activity *Assume 1 hour per lesson*	Suggested Resources *See Week 1 Attachment*	Differentiation *Throughout this module teacher encouragement for pupils to make increasingly independent contributions.*	Assessment Opportunities
Week / Lesson 1	How to take part in discussions. How to listen to, and work with, other people. The basic needs of animals, including humans.	Teacher to brainstorm and ask pupils for their suggestions of where energy comes from and what is does. Ask them for 3 types of energy that they know about. Note the 3 most popular answers given. What does each of the 3 types do? Watch https://www.youtube.com/watch?v=_jwxI8Ucr4M (1m 29s) or similar for ideas of types of energy. ***(15 minutes)*** Pupils to work in two's or small groups to think about and record where the types of energy they use for and by themselves, that animals use and the ones they use to power items at home and in school, comes from. They should include food and some of the following: Wind, Coal, Oil, Sun, Water & Gas ***(30 minutes)***	**https://www.youtube.com/watch?v=_jwxI8Ucr4M** or similar **https://www.twinkl.co.uk/resource/junior-senior-infants-energy-electricity-powerpoint-roi-sc-63** Which is in the **Week 1 Resources Folder**  **Homework Opportunities** Pupils to record the types of energy they use and put them in order of what they consider to be the most to least important. Make energy type dominoes	***Core*** As in method/activity ***Support*** Record pictorially and/or via discussion where staff acts as scribe. Use less types of energy. ***Extension*** Pupils to discuss what they think their world would be like without energy. ***Cross Curricular*** English Maths ICT	Can the pupils explain where energy they use comes from? **National Curriculum** **Citizenship** ***2a*** *How to take part in discussions.* ***4b*** *How to listen to, and work with, other people* **Science** ***SC2/2.3b*** *Pupils find out about and describe the basic needs of animals, including humans, for survival (Water, food & air).*

		Collective discussion and tally chart to collate the information and discuss the most popular and least popular energies used. Ask the pupils whether they think that the statement ***'Energy gives people, animals and appliances the power to work'*** is true. Use Twinkl resource sheets in Week 1 Resources to begin display work. ***(15 minutes)***	**Key Words/Phrases** Energy Food Wind Coal Oil Sun Water Gas		

Week / Lesson 5 Our Heat

Medium Term Plan

	Expected Learning Outcome ***To develop understanding of:***	Method/activity ***Assume 1 hour per lesson***	Suggested Resources ***See Week 5 Attachment***	Differentiation *Throughout this module teacher encouragement for pupils to make increasingly independent contributions.*	Assessment Opportunities
Week/ Lesson 5	How to take part in discussions. How to listen to, and work with, other people. Making simple choices to improve health and wellbeing. Making real choices. The basic needs of animals, including humans including what addressing energy issues.	Recap previous lessons about how we need the sun and clean air to survive. Explain that we also need to stay warm and keep cool and so that is what this lesson is about. Ask pupils to hold up their homework posters showing the types of heating systems used at home. Teacher to draw tally chart on board of all those used, including if pupils have more than one source. Rank them in order of most and least popular. Introduce Renewable Energy definition Energy definition ***Energy whose source never runs out*** and Non-Renewable definition ***Energy which is limited and will run out.*** Pupils to volunteer which heading each type they use goes into and teacher to record. Do pupils think that we should use Non-Renewable or Renewable? ***(15 minutes)*** Whole class watch 4m 52s video https://www.youtube.com/watch?v=1sI_ot8qoXE and teacher to encourage pupils to note that renewable energy comes from wind, water, sun or inside the earth. Look at poster in Week 5 resources folder	https://www.youtube.com/watch?v=1sI_ot8qoXE **Poster** **https://content.twinkl.co.uk/resource/c3/34/T-Sc-109-Renewable-Energy-Poster.pdf? token =exp=1602763960~acl=%2Fresource%2Fc3%2F34%2FT-Sc-109-Renewable-Energy-Poster.pdf%2A~hmac=9dfb63b6bf8beac6f01cef3f849ea52cacae4dc5d4c5444c45b07111e9364fc6** Heat Pumps MP4 file in Week 5 resources (29s) Shows basics of heat pump.	***Core*** As in method/activity. ***Support*** Select a reduced number of energy types. Help with recording information and conclusions. ***Extension*** Pupils to consider whether different geographical areas would be more likely to use certain renewables? Example solar in a sunny climate, tidal near the coast etc.	Can pupils provide appropriate and valid reasons for selecting a renewable energy to replace a fossil fuel in their home. **National Curriculum Citizenship** ***2a*** *How to take part in discussions.* ***3a*** *How to make simple choices to improve their health and wellbeing.* ***4b*** *How to listen to, and work with, other people.* ***5d*** *Making real choices.* ***5g*** *Consider simple environmental issues.* **Science**

		or at https://content.twinkl.co.uk/resource/c3/34/T-Sc-109-Renewable-Energy-Poster.pdf? token =exp=1602763960~acl=%2Fresource%2Fc3%2F34%2FT-Sc-109-Renewable-Energy-Poster.pdf%2A~hmac=9dfb63b6bf8beac6f01cef3f849ea52cacae4dc5d4c5444c45b07111e9364fc6 Heat can be taken from the earth in many ways – biomass where trees are cut down but need to be replaced and geothermal where the hot water from deep underneath the earth is used to heat homes and water in Iceland but not many other places on earth. Many people now use heat pumps where the heat from the air, water or ground is taken out and put into a machine that looks like a fridge and that sends the heat into properties. Watch Heat Pumps MP4 file in Week 5 resources (29s) Lots of people use solar energy, wind energy and/or heat pumps to heat their homes and take out coal, gas and oil. Not many use manure or wind turbines for their homes. Pupils to make a poster to record which type of renewable is the one they would be most likely to use to replace a fossil fuel at home, and their reasons why. Some may already have renewable. Discourage manure! ***(40 minutes)*** Discussions about whether pupils think that renewable heating is a good idea or not and whether they think renewable energy is good for the planet. Display posters. ***(10 minutes)***	**Homework Opportunities** Which renewable/s do pupils think would work on their homes and what would they replace – example gas or oil for a heat pump and solar panels? **Key Words & Phrases** Biomass Geothermal Heat Pumps Hydroelectric Solar Tidal Wind		***SC2/2.3b*** *Pupils find out about and describe the basic needs of animals, including humans, for survival (Water, food & air).*

Place cursor within red box, then click to start illustration!

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A Great Big Change is a great environmental anthem that helps us remember all the ways we can work together to change our world for the better.

https://www.outoftheark.co.uk/sing-together.html

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Long Term Plan Year 5

Natural Resources, Renewable and Non-Renewable Energy, Sustainability

Week/Lesson 1 What is energy used for?

Week/Lesson 2 Where does energy come from?

Week/Lesson 3 Introduction to carbon footprint

Week/Lesson 4 Introduction to air quality, climate change and global warming

Week/Lesson 5 What are green technologies?

Week/Lesson 6 Are renewable energies one of the solutions to climate change and global warming?

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Medium Term Plan

Week / Lesson 3 **Introduction to Carbon Footprint**

	Expected Learning Outcome ***To develop understanding of:***	Method/activity ***Assume 1 hour per lesson***	Suggested Resources ***See Week 3 Attachment***	Differentiation *Throughout this module teacher encouragement for pupils to make increasingly independent contributions.*	Assessment Opportunities
Week / Lesson 3	The meaning of Carbon Footprint. *The amount of CO2 released into the atmosphere because of your own energy needs is called 'your "carbon footprint'.* How to Reduce their Carbon Footprint.	Recap last lesson focusing on renewable and non-renewable forms of energy and introduce Carbon Footprints using https://www.youtube.com/watch?v=8q7_aV8eLUE *(2 minutes)* Re-watch and pause where there can be discussion about the areas that their own carbon footprints could be reduced. Examples are: Can pupils walk or cycle instead of using the car or bus? Could they grow food at home rather than going to the supermarket and buying food from abroad? ***(15minutes)*** Issue large and smaller footprints. Pupils to consider and record their own current carbon footprints using 3 items from each heading within https://www.smead.com/hot-topics/reducing-your-carbon-footprint-1846.asp	https://www.youtube.com/watch?v=8q7_aV8eLUE https://www.smead.com/hot-topics/reducing-your-carbon-footprint-1846.asp https://www.twinkl.co.uk/teaching-wiki/carbon-footprint Matching Pairs in Week 3 attachment. Online calculator: https://www.carbonfootprint.com/calculator.aspx https://www.gokid.mobi/carbon-footprint-for-kids-some-facts-a-quiz-and-also-a-worksheet Choose from variety of online footprint templates.	***Core*** As in method/activity. ***Support*** Playing Matching Pairs Card Game where pupils place the cards on the relevant footprint pile. ***Extension*** Calculate carbon footprint https://www.carbonfootprint.com/calculator.aspx or find out more about carbon footprints at https://www.gokid.mobi/carbon-footprint-for-kids-some-facts-a-quiz-and-also-a-worksheet	Can the pupils show understanding of what Carbon Footprint Means? **Geography** ***Pupils describe and understand key aspects of the distribution of natural energy resources.*** **National Curriculum Level Descriptions** **Level 3** Pupils recognise that people seek to improve and sustain environments. **Level 4** Pupils understand that people can both improve and damage the environment. They offer reasons for their own views about environmental change and

		On the larger foot template note what they do now, e.g. use the car to get to school, and on the smaller templates note what they can do to reduce their footprint, e.g. walk to school. **USE FOR DISPLAY** (***25 minutes)*** Teacher led whole class plenary listing 4 ways pupils found they could reduce their carbon footprints. Briefly explain that food miles are ones which could be reduced if we grew our own food in UK or in their own homes. Introduce homework. ***(15 minutes)***	Homework Opportunities *Pupils could:* Examine the packaging of 5 -10 items of fruit or vegetables items in their homes or in the supermarket and record the countries they have travelled from. **Key Words/Phrases** Coal Electricity Environment Food Miles Gas Non-Renewable Oil Renewable Solar Tidal Turbine Wind	Cross Curricular English Science Maths 1 -Using & Applying Maths 4 - Statistics Key Skills Citizenship PSE Developing Thinking Developing Communication Developing ICT Developing Number	recognise that other people might hold different views. **Level 5** Pupils understand some ways that human activities cause environments to change. Pupils demonstrate an awareness of sustainable development and recognise the range of views help about environmental interaction and change. **Science** ***Pupils describe and understand key aspects of sustainability and the use of fossil fuels.*** **National Curriculum Level Descriptions** **Level 3** – Pupils recognise and explain the purpose of a variety of scientific and technological developments in everyday lives. **Level 4** – Pupils recognise that reversible and irreversible changes affect sustainability in their everyday lives. **Level 5** – Pupils describe the benefits and drawbacks of using fossil fuels.

Medium Term Plan

Week / Lesson 4 Introduction to Air Quality, Climate Change and Global Warming.

	Expected Learning Outcome ***To develop understanding of:***	Method/activity ***Assume 1 hour per lesson***	Suggested Resources ***See Week 4 Attachment***	Differentiation *Throughout this module teacher encouragement for pupils to make increasingly independent contributions.*	Assessment Opportunities
Week / Lesson 4	What Air Quality means and how we can improve it. What Climate Change means and how we can control it. What Global warming means and how we can control it.	Teacher to use a board tally chart to discuss and record the countries the pupils found the fruit and vegetables were coming from in their homework exercise. Ask pupils how they think it gets to the local shops and then to their homes. Ask pupils what they think that delivering it from great distances via road, ship and aeroplanes would do to the air quality / atmosphere of the world? Ensure that pollution, air quality and atmosphere are introduced here. Pupils to volunteer other ways they think the air quality could be damaged. Pupils to write one sentence 'How I think air pollution affects humans.' Pupils to write one sentence 'How I think air pollution affects the planet.' ***(15-20 minutes)*** Watch https://www.youtube.com/watch?v=sAKyhfxxr7s (4m 57s) and pupils to record each type of pollution and how the animators have suggested we can make improvements – e.g. lots of traffic is replaced by a cyclist. At the end he suggests we move our factories to remote areas. Pose the question of whether the pupils think that is sensible? Wouldn't the problem still be in the atmosphere?	https://www.youtube.com/watch?v=sAKyhfxxr7s https://www.youtube.com/watch?v=v8unGCTWUWI White boards and pens Prompt cards in week 4 folder Homework Opportunity How do cows and / or aerosols contribute to global warming?	***Core*** As in method/activity ***Support*** Help with writing their ideas in sentences quickly in introduction. Encourage pupils to volunteer their responses ***Extension*** How do cows and aerosols contribute to global warming?	Can the pupils explain how we can improve air quality? Take the quiz https://study.com/academy/lesson/air-pollution-lesson-for-kids-definition-facts.html#lesson Can pupils explain how air quality contributes to climate change and global warming?

Week / Lesson 6 Are Renewable Energies one of the Solutions to Climate Change and Global Warming?

	Expected Learning Outcome ***To develop understanding of:***	Method/activity ***Assume 1 hour per lesson***	Suggested Resources ***See Week 5 Attachment***	Differentiation *Throughout this module teacher encouragement for pupils to make increasingly independent contributions.*	Assessment Opportunities
Week / Lesson 6	The benefits of using Renewable Energy Sources when addressing Global warming and Climate change. Consider the advantages and disadvantages within all energy types. How to gather information to present a point of view.	Recap previous lesson and discuss what pupils decided within their homework. Explain how the government are now having to include renewables in their building programmes. Ask pupils to consider whether they think different geographical areas would be more likely to use certain renewables? Example solar in a sunny climate, tidal near the coast etc. Associate with where pupils live and whether world-wide considerations could made. Would solar work in most places including the Arctic? *(Yes as it's sun and not temperature).* Would heat pumps work in all areas? *(Yes as they need ground, air or water and at least 2 are available everywhere).* ***(15 minutes)*** Pupils to work individually, in pairs or groups to use their learning of the last 5 lessons to write a letter which can be sent to parents, governors, local education office, national officials & Ministers etc providing an argument for replacing fossil fuels used in heating systems in schools for renewable energy. Pupils need to include why fossil fuels and non-renewable energy should be replaced and include what has happened over the last 200 years in their argument. They must include the advantages of fossil fuels in as many terms as they can to include air quality, greenhouse gas emissions, climate change and health. They could also include that it would be cheaper to use free resources such as the	**Work of past 5 weeks including display** **Prompt cards in Week 6 Folder plus previous ones in weekly folders.** **GSHPA Produced sheet on heat pumps** **Who wants to be a Millionaire PowerPoint in Week 6** **(Certificates in Week 6 folder or teacher can make their own).** Homework Opportunities Pupils could make a poster which reflects the content of their letter.	***Core*** As in method/activity. ***Support*** Grouping of pupils. Encouragement to offer answers in Millionaire Quiz. ***Extension*** Pupils to include what types of employment opportunities they think working in the renewable industry could bring such as the manufacturers of the equipment, installers of the equipment, the drillers and ground workers for heat pumps etc.	Content of letter. Are pupils able to provide correct answers to the **Who wants to be a Millionaire Quiz?** Can pupils provide evidence which allows the teacher to level them against the Level Descriptors shown below?

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Long Term Plan Year Upper Key Stage 2

Week 1 What is ground source heating? What and where are Britain's natural resources?

Week 2 How are natural resources used to produce electricity?

Week 3 Identify how clean and natural resources produce the energy we use in everyday life

Week 4 Identify what ground source heating is, where the heat can be sourced and how heat pumps work

Week 5 Compare the global effects of using oil v's ground source heat pumps

Week 6 Visit to Centre for Alternative Technology, Machynlleth, or another facility.

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Long Term Plan Year 9

Natural Resources, Renewable and Non-Renewable Energy, Sustainability

Week/Lesson 1	Types of energy, how energy use effects air quality and human health
Week/Lesson 2	Carbon Zero – what does it mean?
Week/Lesson 3	Carbon Zero and Me – My Carbon Footprint
Week/Lesson 4	Decarbonisation of heat
Week/Lesson 5	Heat pumps as the future for providing heating & cooling
Week/Lesson 6	Renewable energy and industry

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Medium Term Plan

Week 1/ Lesson Types of Energy, How Energy Use Effects Air Quality and Human Health.

	Expected Learning Outcome ***To develop understanding of:***	Method/activity ***Assume 1 hour per lesson***	Suggested Resources ***See Week 1 Attachment*** **I THINK WE SHOULD HAVE GSHPA PRODUCED ITEMS**	Differentiation Throughout this module teacher encouragement for pupils to make increasingly independent contributions.	Assessment Opportunities
Week / Lesson 1	***The definitions of Renewable and Non- Renewable Energy.*** ***The effects of our energy use on air quality.*** ***Climate Change*** Specifically try to include: Our heating systems; Medical conditions and how many illnesses & deaths are linked directly to poor air quality; The transport we use for travel; Our food including diary and meat production; Delivery of items such as our food. Conclude: ***How can we collectively and individually improve air quality?***	Teacher led reminder of what the definitions of ***non-renewable energy*** and ***renewable energy*** are. Teacher to introduce the topic of air quality and question whether the pupils think that poor air quality could be affected by the various types of energy we use and how that could influence us as individuals. ***(10 minutes)*** Pupils to work in pairs to investigate the effects of energy use on air quality and on humans. Record using 3 x PowerPoint slides using headings: ***The effects of our energy use on air quality. This should include mention of climate change and greenhouse gases.*** ***The effects of energy use on individuals – for example medical conditions such as asthma.*** ***How can we as individuals improve air quality?*** (***35 minutes)*** Teacher led whole class plenary of what the pupils have found out. Does the type of energy we use effect air quality? Do our choices have an effect on air quality? ***(15 minutes)***	https://www.who.int/airpollution/news-and-events/how-air-pollution-is-destroying-our-health https://climatekids.nasa.gov/air-pollution http://ypte.org.uk https://ec.europa.eu/programmes/erasmus-plus/project-result-content/8c19b0e3-11a4-485f-b3b9-b06e9fc4986b/O5-air-IT-Type%20of%20household%20heating%20and%20its%20impact%20on%20air%20pollution-CLIL.pdf Pages 5 – 7 most useful https://www.eco-schools.org.uk/wp-content/uploads/2016/11/Air-Pollution-Teachers-Pack.pdf (Key Stage 2 pack but informative) https://www.healthyair.org.uk/documents/2013/02/healthy-air- education-pack-2012.pdf/ (Key Stage 2 pack but informative) https://www.nationalgeographic.com/environment/global-warming/pollution https://www.bbc.co.uk/bitesize/topics/zshp34j/articles/zntxgwx https://blogs.microsoft.com/blog/2020/01/16/microsoft-will-be-carbon-negative-by-2030/	Core - as in method/activity. ***Support*** – guiding pupils to relevant information links when researching. Focus on KS2 materials. Providing partly populated slides. ***Extension*** – List the gases which cause air quality issues. https://ww2.rspb.org.uk/ourwork/teaching/resources/science/air_pollution.aspx ***ICT sessions could include***: **Ongoing:** Making a recording of the installation of the ground source systems going into school which would include the external drilling work and the internal heating systems. Could be a time lapse for School website. Blogs on School website Begin to develop a presentation for governors, staff and parents. **Lesson specific:**	Can the pupils explain the effects of poor air quality and the reasons for it? Can the pupils recognise that people's influence and actions have impact on their environment? Can pupils explain why non-renewable energy is not good for the future of the earth? **Science 4 Energy, Forces & Space** **National Curriculum Level Descriptions** ***The Sustainable Earth. Organisms are affected by environment, including the accumulation of toxic materials.*** ***Earth is a source of limited resources.*** **Level 6 –** Pupils explain the importance of the responsible use of unsustainable sources of energy. **Level 7-** Pupils describe and explain the importance of the need to conserve limited energy resources.

Medium Term Plan

Week / Lesson 4 Decarbonisation of Heat

	Expected Learning Outcome ***To develop understanding of:***	Method/activity ***Assume 1 hour per lesson***	Suggested Resources ***See Week 4 Attachment*** **GSHPA PRODUCED ITEMS CRUCIAL**	Differentiation Throughout this module teacher encouragement for pupils to make increasingly independent contributions.	Assessment Opportunities
Week / Lesson 4	***Heat decarbonisation***	Teacher to introduce the topic using the statement: ***Decarbonising heat means*** *reducing and eliminating the greenhouse gases emitted during its generation and use. Is it essential to tackling climate change?* *Teacher to spider diagram 10 pupils' responses as to what this could mean.* ***(10minutes)*** Pupils to make notes whilst watching GSHPA produced clip on heat decarbonisation. (***15 minutes)*** Pupils to record their notes in a narrative and include how they believe changing the heating habits of the UK would influence the climate. (***20 minutes)*** Teacher led whole class plenary examining the 10 items offered in the introduction and compare to what they have discovered. Show of hands for pupils who think heat decarbonisation is essential or not essential. ***(15 minutes)***	**https://energysavingtrust.org.uk/blog/decarbonisation-heat-–-crossroads** https://www.energy-uk.org.uk/our-work/new-energy-services-and-heat/decarbonisation-of-heat.html http://ypte.org.uk Week 4 attachment. https://youtu.be/_hBNqpKqXyQ **GSHPA produced Doodly clip on Heat Decarbonisation & video** Decarbonisation of Heat.mp4	Core - as in method/activity. ***Support*** – help pupils to record relevant information. ***Extension*** – Survey 10 people of how they heat their homes and produce charts and graphs to show the information. Consider what is the most popular and the least popular. Discover what Fuel Poverty means. ***ICT sessions could include***: **Ongoing:** Making a recording of the installation of the ground source systems going into school which would include the external drilling work and the internal heating systems. Could be a time lapse for School website. Blogs on School website Continue to develop a presentation for governors, staff and parents. **Lesson specific:** Research and presentation. Producing display poster to encourage others to consider how to decarbonise their heating systems. Could be for school or home.	Can pupils form a reasonable argument for decarbonisation of heat? *(Sustainable Earth)* Can the pupils recognise that people's influence and actions have impact on their environment? *(Sustainable Earth)* Can pupils explain how human activity influences the environment and climate? *(The Change in Climate)* **Science 4 Energy, Forces & Space** **National Curriculum & Level Descriptors** ***The Sustainable Earth.*** ***Earth is a source of limited resources.*** ***The production of carbon dioxide by human activity and the impact on the climate.*** ***Organisms are affected by environment, including the accumulation of toxic materials. The potential effects of, and mitigation of, increased levels of carbon dioxide and methane on the Earth's climate.*** **Level 6** – Pupils explain the importance of the responsible use of unsustainable sources of energy.

Medium Term Plan

Week / Lesson 5 Heat Pumps as the Future for Providing Energy

	Expected Learning Outcome *To develop understanding of:*	Method/activity *Assume 1 hour per lesson*	Suggested Resources *See Week 5 Attachment*	Differentiation Throughout this module teacher encouragement for pupils to make increasingly independent contributions.	Assessment Opportunities
Week / Lesson 5	***What a heat pump is.*** ***How a heat pump works.*** ***How the use of heat pumps will reduce carbon emissions – focus on homes.***	Teacher to recap last session explain that around 20% of the UK's carbon emissions are generated by domestic heating. Show some or all of video clip of the options of decarbonisation of heat can be achieved. https://www.eti.co.uk/insights/heat-insight-decarbonising-heat-for-uk-homes or introduce the types of heating that have been suggested as alternatives to gas and fossil fuels. https://www.bbc.co.uk/bitesize/guides/zxc2sg8/revision/3 Show pack of posters that include biomass, wind turbines, tidal power, solar power, hydroelectric power and geothermal. Explain that this session will focus on heat pumps. ***(15minutes)*** Use GSHPA video and booklet to explain: The difference between ground source and geothermal; How the heat pump works; Methods of abstracting heat; How heat pumps are powered; Why heat pumps are the future of all heating systems – not just domestic. (***15 minutes)*** Pupils to design a poster to complete the pack of posters for heat pumps. Have pack on display as example templates. (***15 minutes)*** Summary briefing with teacher to record why pupils think heat pumps are being suggested as the	• https://www.eti.co.uk/insights/heat-insight-decarbonising-heat-for-uk-homes https://www.bbc.co.uk/bitesize/guides/zxc2sg8/revision/3 .**http://ypte.org.uk** Pack of simple posters of types of power. *(Included in attachments as Posters)* GSHPA Video and associated booklet to include : *Difference between ground source and geothermal;* *How the heat pump works ;* *Methods of abstracting heat;* *How heat pumps are powered;* *Why heat pumps are the future of all heating systems – not just domestic.* **Adventures of Iggy – GSHPA version for this age group needed.** https://www.renewableenergyhub.co.uk/main/heat-pumps-	Core - as in method/activity. ***Support*** – help pupils and underline relevant information in the booklet for designing the poster. ***Extension*** –Complexity of information on poster. ***ICT sessions could include***: **Ongoing:** Making a recording of the installation of the ground source systems going into school which would include the external drilling work and the internal heating systems. Could be a time lapse for School website. Blogs on School website Complete a presentation for governors, staff and parents. **Lesson specific:** Research and presentation. Further research on heat pumps being the replacement for fossil fuels and some other renewables.	Can pupils provide an argument for why heat pumps will help with heat decarbonisation and get to the goals of 2050? *(Sustainable Earth)* Can the pupils recognise that people's influence and actions have impact on their environment? *(Sustainable Earth)* Can pupils explain how human activity influences the environment and climate? *(The Change in Climate)* **Science 4 Energy, Forces & Space National Curriculum & Level Descriptors** ***The Sustainable Earth.*** ***Earth is a source of limited resources. The production of carbon dioxide by human activity and the impact on the climate.*** ***Organisms are affected by environment, including the accumulation of toxic materials.*** ***The potential effects of, and mitigation of, increased levels of carbon dioxide and methane on the Earth's climate.*** **Level 6** – Pupils explain the importance of some applications and implications of science, such as the responsible use of unsustainable sources of energy. **Level 7-** Pupils describe and explain

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Careers and Industry

- Design & Consultancy
- Education
- Installation
- Manufacture and Supply
- Local and National Management
- Product Research
- Sales
- After Care

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They came in the night and they came in the day
They came until they took it all away
And all they left was a barren ground
Where no life can be found
They didn't give a reason and they didn't say why
Millions of trees had to die
In the name of progress is all they'd say
Step aside and get out of our way

Chorus:
What I want to know is where we gonna go
When the rain don't make our garden grow
And the soil's too dry for the seeds to sow
How long till we learn
You play with fire and be sure to burn
A one way ticket with no return
Cause where we gonna go
Well I don't know.

They tell us technology is a wonderful thing
Not to mention the destruction it brings
One step forward and two steps back
Go from the light and into the black
They feed us with lies and treat us like fools
But don't stop to realise it’s a game we all lose
On a road to self destruction with every step we take
Like a ship sinking fast and no escape bridge
Spending money to find life on Mars
It doesn't make any sense to me
Like trying to live at the bottom of the ocean
Some things are not meant to be.

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Long Term Plan Year 11

Natural Resources, Renewable and Non-Renewable Energy, Sustainability

Weeks 1 – 6 What is ground source heating?

Weeks 7 – 12 Pre-installation preparation

Weeks 13 – 18 On-site installation

Weeks 19 – 24 Post-installation and practical assessment

"It is time to end the pointless nonsensical gulf that's been fixed for more than 100 years between the so-called academic and so-called practical side of education. Everything is ultimately a skill."

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Week 1 - Schematics from web and introduction the system
Introduce GSH.

Week 2 - Heat Pumps
Examine the various types of heat pumps and how they work.

Week 3 - Ground Collectors
Examine the various types of heat collectors and how they work – ground, air or water.

Week 4 - Commercial or Non-Commercial
Examine the differences between commercial and non-commercial installations.

Week 5 – Making the Choice
How to decide which heat pump and heat collector to use.

Week 6 – Written exams
Exams on above skills.

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Weeks 7 – 12 – Pre-Installation Preparation

Week 7 - Taking the Enquiry
Taking the full details from web, phone, shows and other sources and preparing to visit the potential customer.

Week 8 - Visiting the customer
What information to take with you including calculations for ground collector and potential grant such as RHI, who visits, choosing appropriate ground collector.

Week 9 - Developing the correct commercial system
Preparing drawings, liaising with 3rd parties, placing of hardware, ground collector etc.

Week 10 - Developing the correct non-commercial system
Preparing drawings, liaising with 3rd parties, placing of hardware, ground collector etc.

Week 11 – Deciding upon and developing the correct commercial or non-commercial system
Examining and selecting when to use commercial or non-commercial systems.

Week 12 – Written exam
Exam on above skills.

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Weeks 13 – 18 On-Site Installation

Week 13 – Health & Safety on site
Standard Health & Safety requirements and compliance, site specific requirements.

Week 14 - Start date and times
Liaison and coordination with 3rd parties, customer and getting everything to site to include pre-start site meeting / induction for confirmation of job content, professionalism.

Week 15 - Installing – Ground collectors – land based
How closed-loop boreholes and ground array ground collectors work, how to choose and why choose a reputable installer.

Week 16 - Installing – Ground collectors – water based
How open-loop boreholes, water from lakes and other natural sources work, how to choose and why choose a reputable installer.

Week 17 - Installing – Heat Pumps
Getting the heat pump installed.

Week 18 Written exam
Written on above skills.

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Week 19 - Grants
RHI calculations for domestic and non-domestic.

Week 20 – Customer Relations, marketing and accounts
The importance of customer satisfaction including case studies and surveys, leaving details as point of contact, guarantees, specific marketing, the importance of keeping good accounts.

Weeks 21 - 24 Practical assessment
Installation of a complete system.

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Will it Work?

Can we Fix our Broken Planet?

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https://www.twinkl.co.uk/resources/ks2-topics/ks2-the-environment/david-attenborough

https://www.bbc.co.uk/programmes/p076w7g5

https://www.bbc.co.uk/iplayer/episode/m00049b1/climate-change-the-facts

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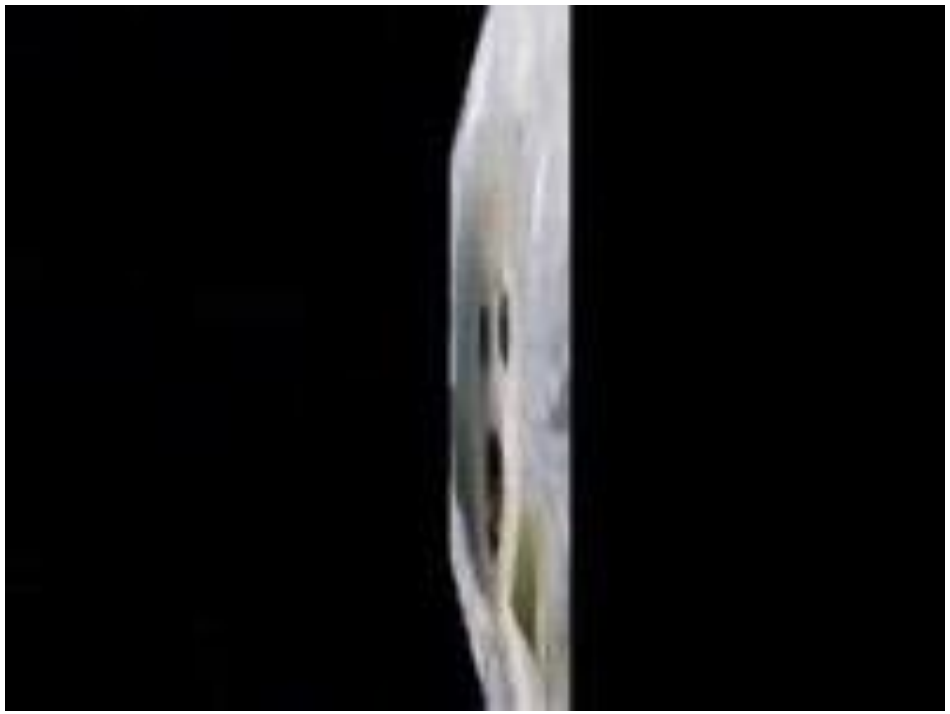
The Heat is On; 2021 – The Year of the Heat Pump

Our Earth; Use it – Don’t Abuse It



An Inconvenient Truth by Al Gore

Have I been sleeping?
I've been so still
Afraid of crumbling
Have I been careless?
Dismissing all the distant rumblings
Take me where I am supposed to be
To comprehend the things that I can't see
'Cause I need to move
I need to wake up
I need to change
I need to shake up
I need to speak out
Something's got to break up
I've been asleep
And I need to wake up
Now

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Thank You. Questions?

Diolch yn Fawr. Cwestiynau?

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