Volunteer Walkthrough

Power Changers

STEM Lessons for Primary Schools in the UK and Ireland

Energy

sse | For a better world of energy

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Volunteers should be aware of the following pieces of information before delivering these lessons:

All lessons in this suite are designed to be delivered in a normal classroom setting, although facilitators could adapt them for use in an assembly.

Each lesson plan contains information about how it can be adapted to suit pupils with SEND provision.

Each lesson plan builds one essential skill step from the Skills Builder Framework for essential skills. This Framework provides a common language for defining and developing eight essential skills. You can explore the Framework here.

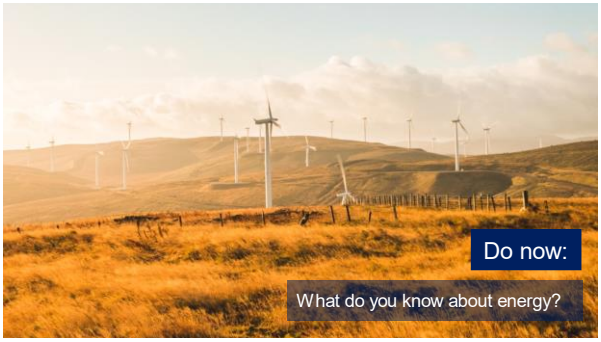
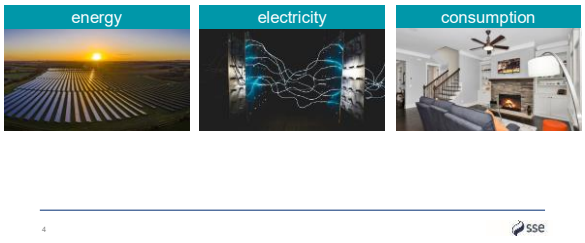
Detailed lesson plans, slide decks, worksheets and knowledge organisers for each lesson can all be found on the STEM at SSE website.

Please share your pupils' work on social media, tagging @SSE on Twitter or @SSEplc on Instagram and using the #STEMatSSE tag.

ENERGY

Lesson 1

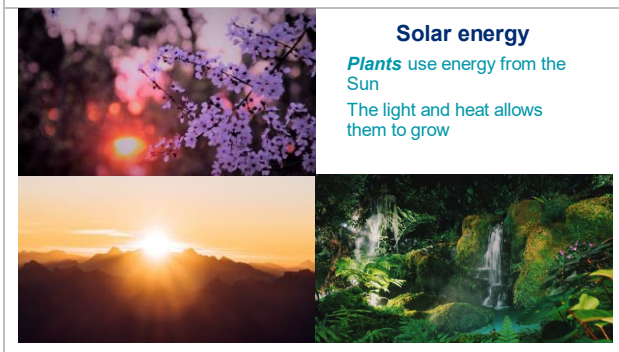
POWER TO THE PEOPLE

	Introduce yourself as the educator.
	Briefly introduce yourself and explain who SSE are and what they do.
	**Do Now (5 mins)** Leave the following question on the board for pupils to engage with: *'What do you know about energy?'* Ask pupils to share their ideas aloud – the facilitator may refer them to examples of familiar features like transmission towers, wood poles, turbines and solar panels
	Explain key words used in the lesson

Discuss how energy is what makes things move, act and perform a job

Explain that there are many types of energy (some of which will be brought up today)

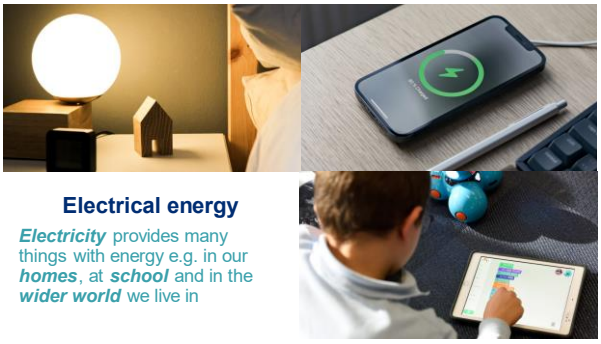
Discuss food energy – food provides vitamins, minerals, protein etc. for animals



Discuss solar energy – light and heat for plants

Talk partner opportunity - pupils should think of the names of any plants which use solar energy to grow

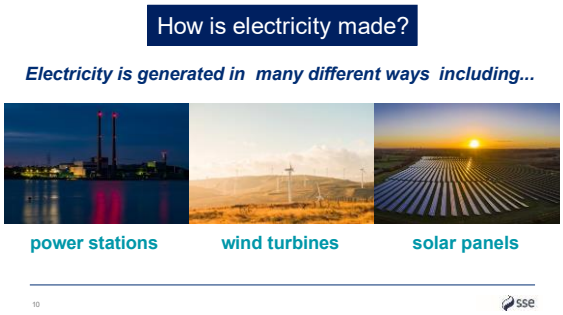
Discuss fuel energy – fuel for vehicles e.g. petrol and diesel



Discuss electrical energy – we can connect appliances and devices to electricity using cables or even wireless

Ask children if they can think of anything else that is powered by electricity at home or at school

Talk partner opportunity – can pupils think of any other devices, gadgets or appliances which use electrical energy?



Explain that electricity is generated in many ways – briefly discuss a few examples e.g. by burning fuel in a power station, spinning turbines (wind or hydropower), solar panels

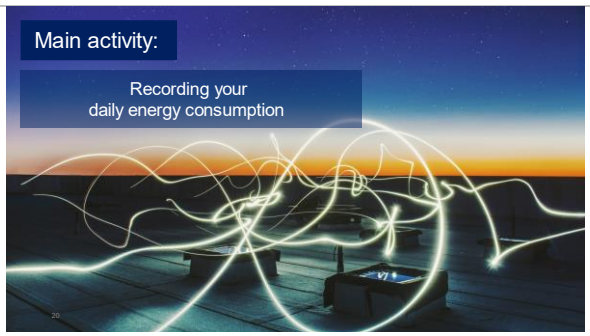
Explain how electricity travels through wires suspended by towers or poles to different places

Talk partner opportunity – can pupils think of the names of any other places which receive electricity e.g. museums, supermarkets and cinemas

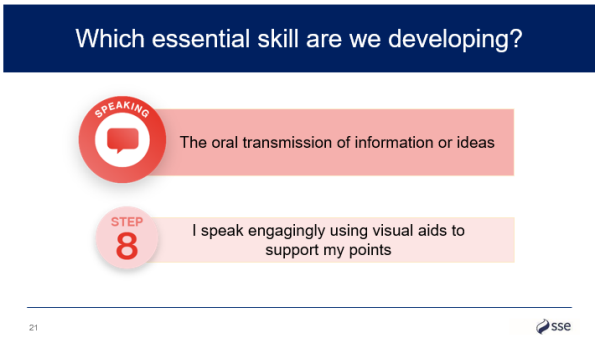
Spot energy consumption in the following slides, In this example, a kitchen e.g. lights, oven, fridge, freezer, kettle, plant

Talk partner opportunity – pupils can discuss the energy consumption first before sharing their ideas aloud with the class

There are 8 slides for this activity.

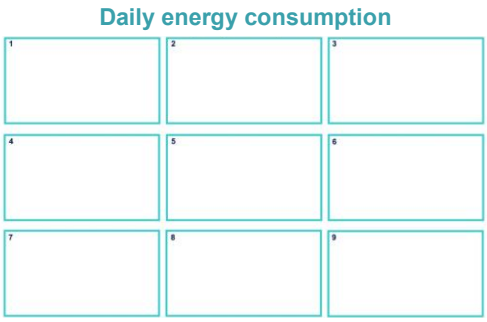


Introduce the main activity. Recording your daily energy consumption



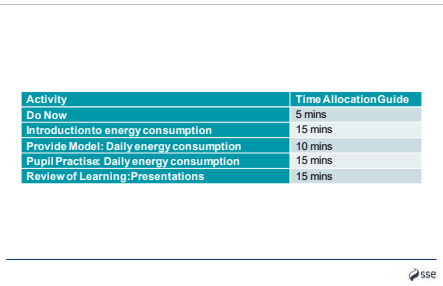
Explain that pupils will be presenting their timetables to the class and working on the essential skill of Speaking, in particular focusing on speaking engagingly by using visual aids to support their points.

Optional: describe an example of where you have demonstrated this skill step in your current role.

	Look at the example of a daily energy consumption routine – go through the different things you might do throughout the day that consume energy Talk partner opportunity – pupils can discuss the energy consumption at each stage first before sharing their ideas aloud with the class
	Create a shared daily energy consumption routine taking ideas from the class Talk partner opportunity – pupils can discuss their own energy consumption throughout the day before contributing their ideas to the shared poster
	Pupil Practise: Creating a storyboard (15 mins) Assign pupils the task of recording their daily consumption routine in a story board SEND pupils can focus on rearranging the pictures to sequence them in the correct order of consumption throughout the day *or* go through with a timetable they are familiar with (their visual timetable) and identify where there is energy consumption e.g. PE, snack time Higher attaining pupils can think about their own personal lives and draw their individual every day actions
	Review of learning: Presentations (15 mins) Ask pupils to share their daily consumption routine with the class using either their poster or a familiar timetable (e.g. a visual timetable) Encourage each pupil to share at least part of theirs Recognise when pupils are using visual aids well: • Can listeners see them? • Are they relevant? • Are they clear? • Are they appropriate?

Ask the pupils how they used their Speaking skills. Open a class discussion around the questions on screen. This will help pupils understand and communicate the skill they have built alongside their knowledge.

A glossary for facilitators to refer to if they need help defining technical vocabulary



Activity	Time Allocation Guide
Do Now	5 mins
Introduction to energy consumption	15 mins
Provide Model: Daily energy consumption	10 mins
Pupil Practise: Daily energy consumption	15 mins
Review of Learning: Presentations	15 mins

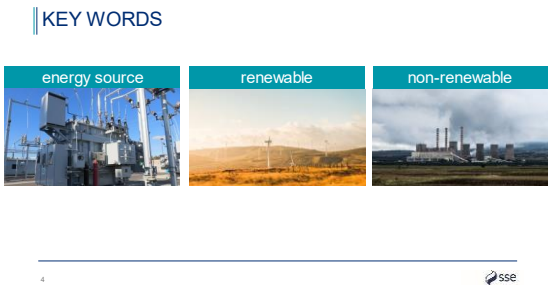
Use these timings as a guide – this can be adjusted for the session being led

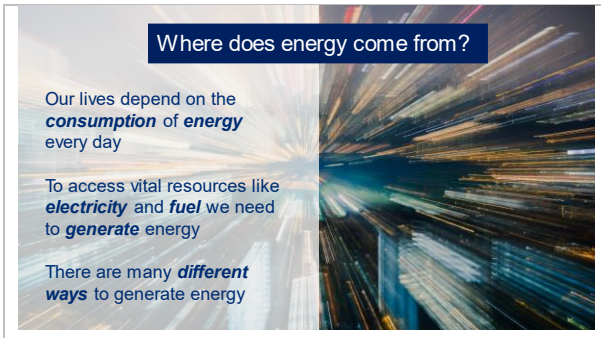
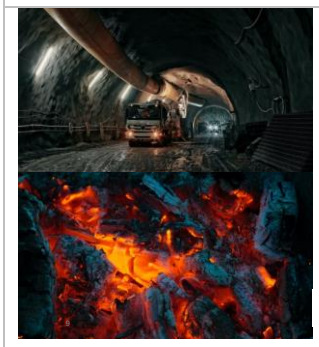
Please provide feedback via QR link – encourage children to submit examples of pupil work to social media.

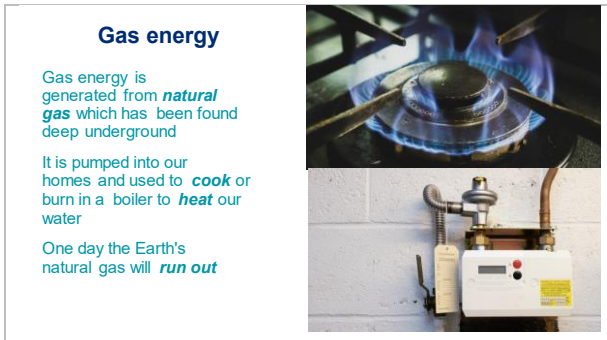
A more detailed lesson plan can be found in the SSE ‘Power Changers’ Primary booklet.

TAKING CHARGE

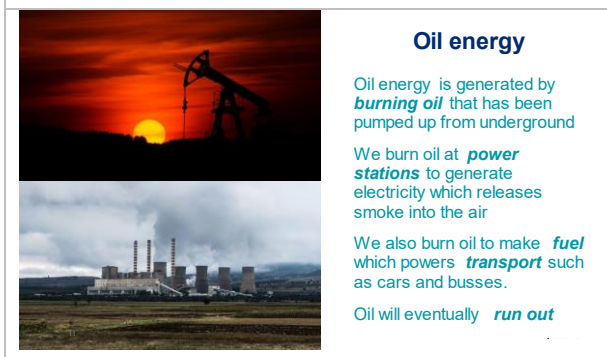
Lesson 2

	Introduce yourself as the educator
	Briefly introduce yourself and explain who SSE are and what they do.
	Do Now (5 mins) Leave the following question on the board for pupils to engage with: *'How do we consume energy?'* Ask pupils to spot the energy consumption in the example setting – a kitchen e.g. lights, oven, fridge, freezer, kettle, plant Pupils may also identify energy consumption in other settings e.g. at school or the wider world – pupils should discuss in talk partners before sharing aloud with the class
	Explain key words used in the lesson

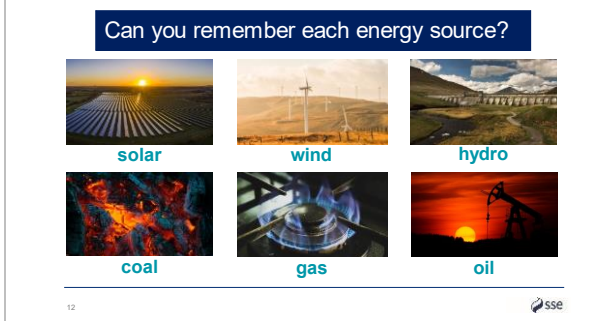
	Reinforce how our everyday lives depend on consuming energy e.g. for electricity and fuel – explain that there are many different ways to generate energy, and that this lesson will cover *some* of them
Solar energy Solar energy comes from the ***sun*** The sun provides ***heat*** energy Solar ***panels*** convert sunlight into ***electricity*** These can be installed on our ***rooftops*** or in an open space creating a **solar *park*** ***SSE*** began its first solar project in ***England*** in January 2022! 	Discuss key features of solar energy January 2022 – SSE announced its first solar project in Worcestershire, England! https://www.sse.com/news-and-views/2022/01/sse-acquires-its-first-30mw-solar-project-in-its-role-as-the-uk-s-clean-energy-champion/
 Wind energy Wind energy comes from the ***wind.*** Wind ***turbines*** convert wind energy into ***electricity*** The wind blows the blades around and this ***movement*** is converted into electricity A group of wind turbines is called a ***wind farm*** – these can be ***onshore*** or ***offshore*** ***SSE*** have windfarms across the world including the ***UK & Ireland***	Discuss key features of wind energy
Hydropower energy Hydropower energy comes from ***moving water***, including dams, rivers and seas. Fast-flowing water spins ***turbines*** to generate ***electricity*** **Water wheels** are placed in rivers to irrigate farmland The ***movement*** of big ***waves*** at sea can also be used to spin these turbines ***SSE*** also have ***hydro power stations*** across Scotland! 	Discuss key features of hydropower energy Optional: SSE Virtual Hydro Tour https://www.sserenewables.com/news-and-views/virtual-hydro-tour/
 **Coal energy** Coal energy is generated by ***burning coal*** from underground which releases smoke into the air We burn the coal in ***power stations*** to generate ***electricity*** Coal cannot be replaced and it will eventually ***run out***	Discuss key features of coal energy



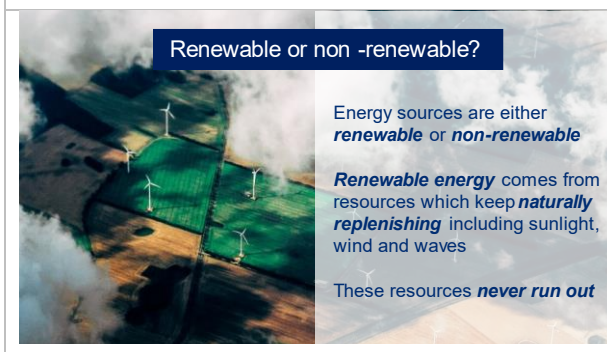
Discuss key features of gas energy



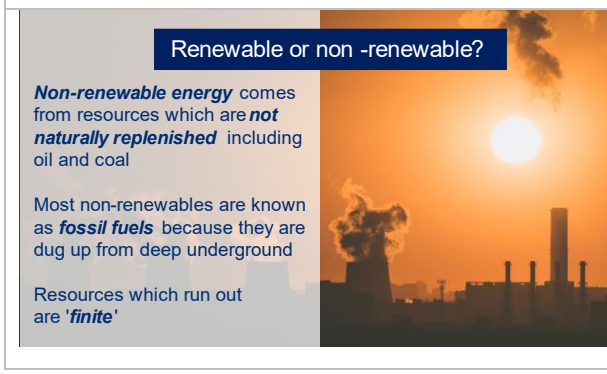
Discuss key features of oil energy



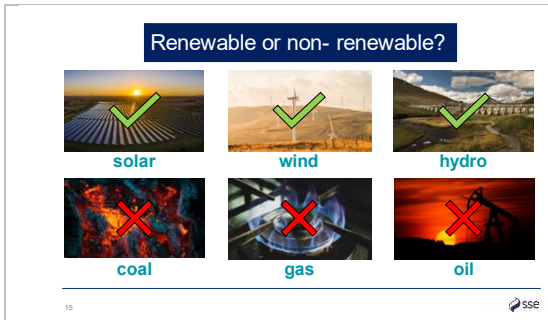
Ask children to look at the pictures to guess the source of energy - pupils should discuss in talk partners before sharing aloud with the class



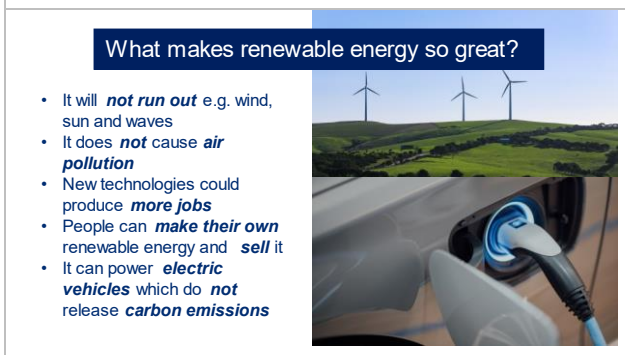
Explain how energy sources can be sorted into two groups – define renewable



Define non-renewable



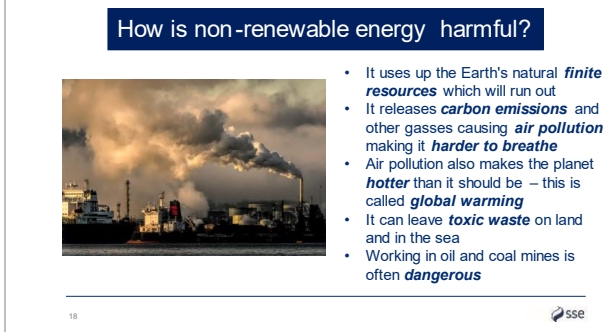
Ask children to look at the pictures to guess whether the sources of energy are renewable or non-renewable - pupils should discuss in talk partners before sharing aloud with the class



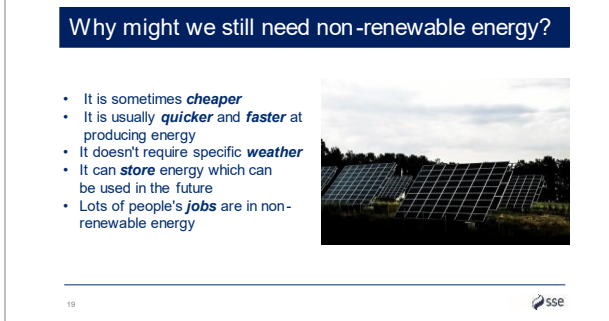
Discuss the advantages of renewable energy

A wind turbine saw a solar panel and said ***"Hey, I'm a big fan!"***

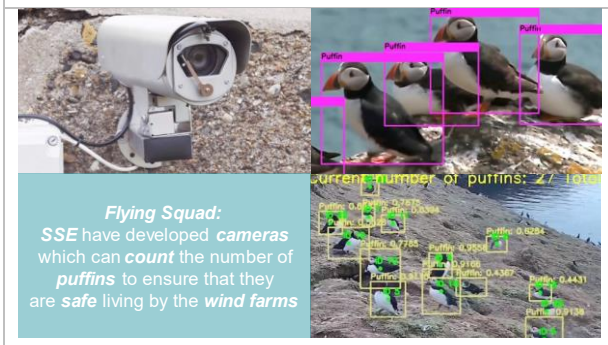
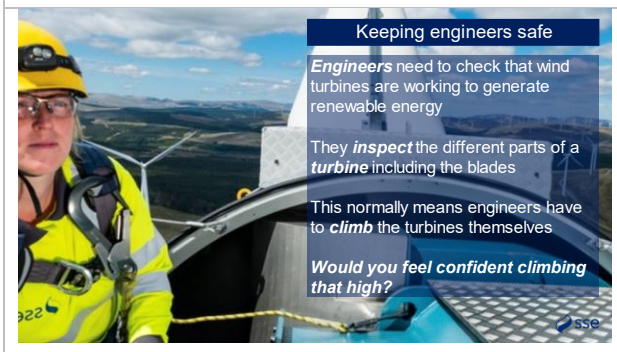
A joke celebrating the success of renewable energy!

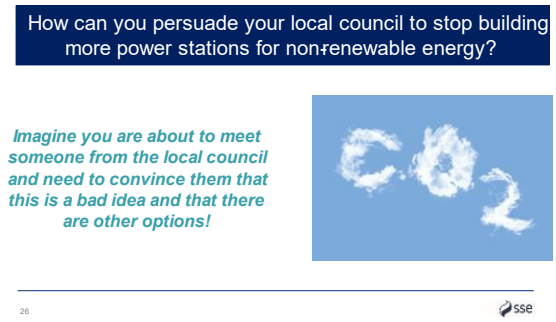
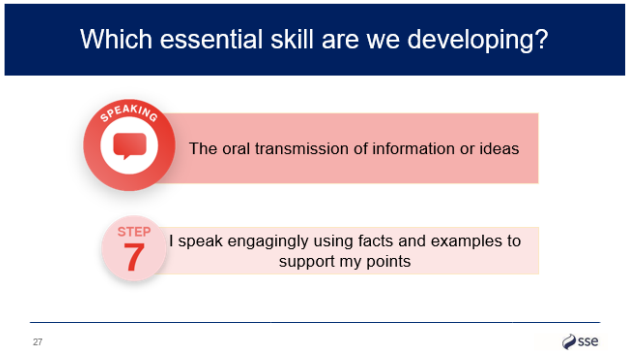


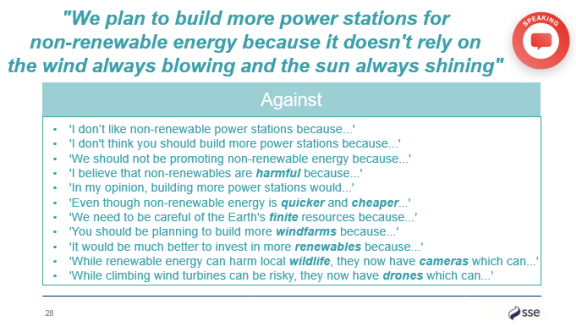
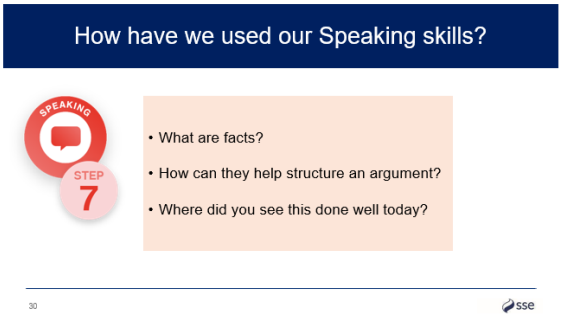
Discuss the disadvantages of non-renewable energy

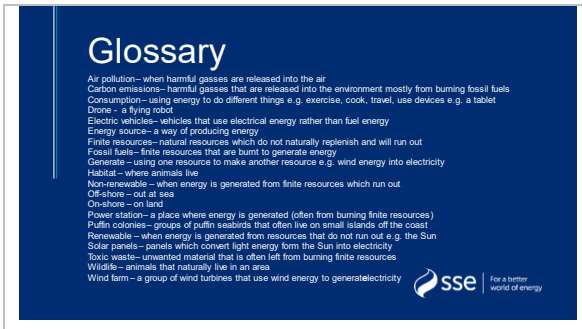


Discuss why we might need both renewable and non-renewable energy – explain how most of the world's electricity and fuel is generated using non-renewable sources because of this

	Discuss renewables in the UK & Ireland e.g. wind farms – talk about SSE's on and off-shore developments
	Explain how SSE are conscious of local wildlife when they build their wind farms
	Discuss the cameras which SSE have installed to monitor the puffins' wellbeing
	Explain that wind farms can also be dangerous for engineers that need to climb high to check the turbines Ask the class if they would feel confident climbing a piece of equipment so high – show of hands
	Explain how SSE have developed drones and software to inspect the turbines virtually instead

	Provide model: Guidelines for debate – slides 25-26 (15 mins) Ask the children to imagine that someone from the local council (or authority depending on the area) has said the following: "We plan to build more power stations for non-renewable energy because it doesn't always rely on the wind always blowing and the sun always shining" Refer to the image of smoke and carbon emissions entering the environment – refer back to previous slides on disadvantages of non-renewables if needed Ask pupils to discuss how this makes them feel in talk partners and then get the class to vote with a hands up on whether we agree with him or not
	Explain guidelines for activity – explain that they will imagine they will deliver a persuasive speech to the local council to convince them against building more power stations for non-renewables
	Explain to pupils that they will be using their Speaking skills during the speech and focus on speaking engagingly by using facts and examples to support their points. Optional: Describe an example of where you have demonstrated with skills step in your own role.

	**Pupil Practise**: Preparing for the persuasive speech (15 mins) Assign pupils the task of convincing the local council that they are wrong SEND pupils can use simple sentence stems e.g. 'I don't like power stations because...' with the support of an adult Higher attaining pupils can form and express their opinions using the more complex sentence stems towards the end or in their own words Higher attaining pupils can also refer specifically to technology that SSE developed They can work individually or in small mixed-attaining groups to verbally prepare for the persuasive speech
	Review of learning: Persuasive speech (15 mins) Allow pupils to respond to the talking point via a persuasive speech (using the sentence stems) Encourage each pupil to express their opinion, whether they say one sentence or a range using their own words Higher attaining pupils should aspire to raise points which have not been raised by their peers e.g. relating to new technology that helps solve some of the problems faced by renewable energy
	Ask the children how they used their Speaking skills. Open a class discussion around the questions on screen. This will help children understand and communicate the skill they have built alongside their knowledge



A glossary for facilitators to refer to if they need help defining technical vocabulary

Activity	Time Allocation Guide
Do Now	5 mins
Introduction to sources of energy	15 mins
Provide Model: Guidelines for debate	15 mins
Pupil Practise: Preparing for the debate	15 mins
Review of Learning: Formal debate	10 mins

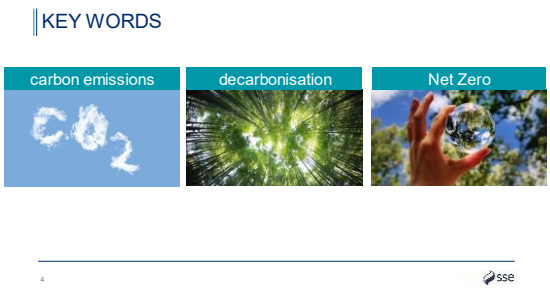
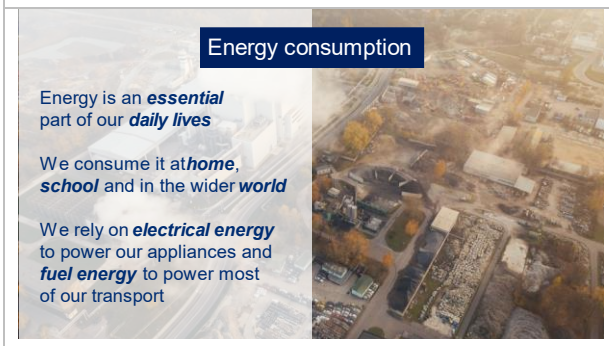
Use these timings as a guide – this can be adjusted for the session being led

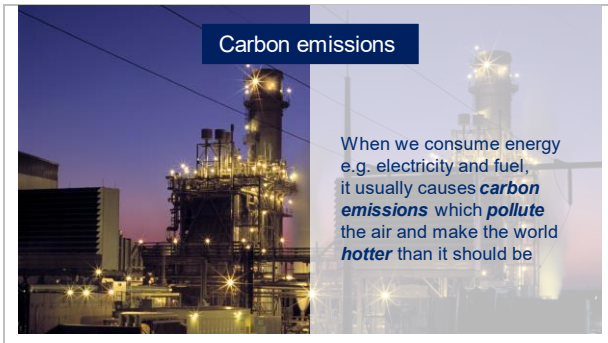
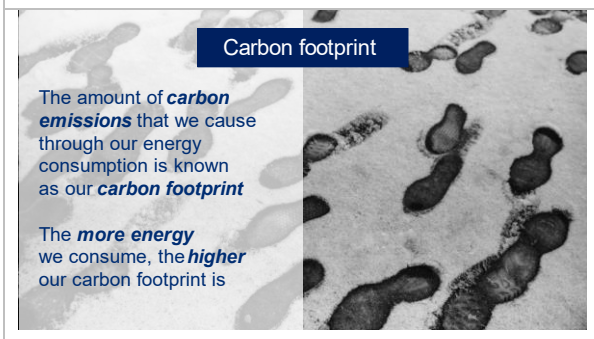
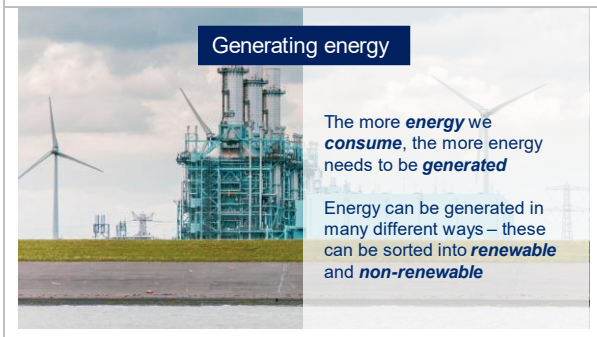
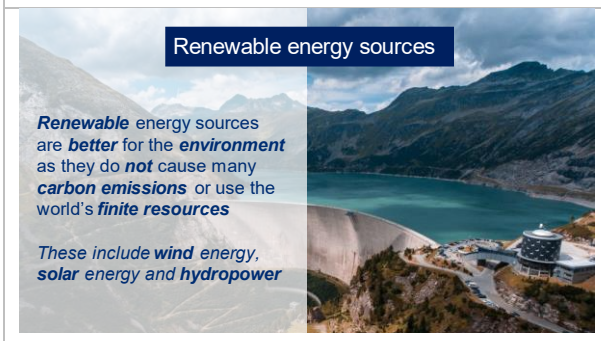
Please provide feedback via QR link – encourage children to submit examples of pupil work to social media.

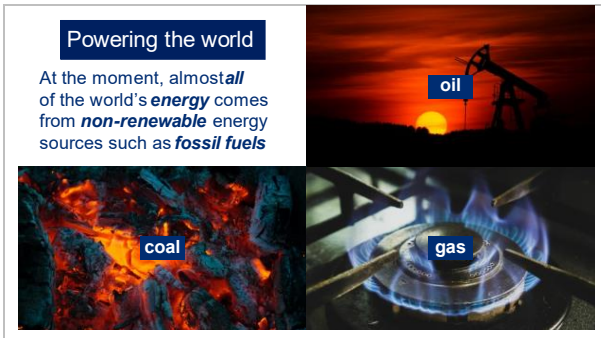
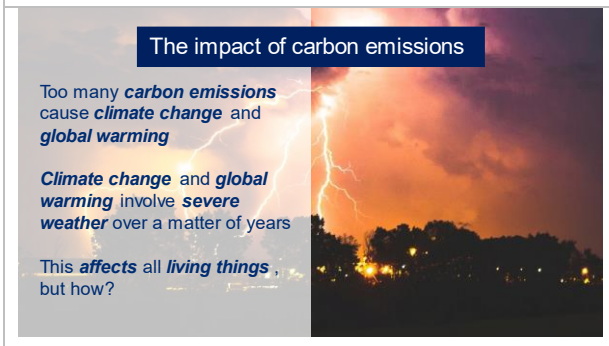
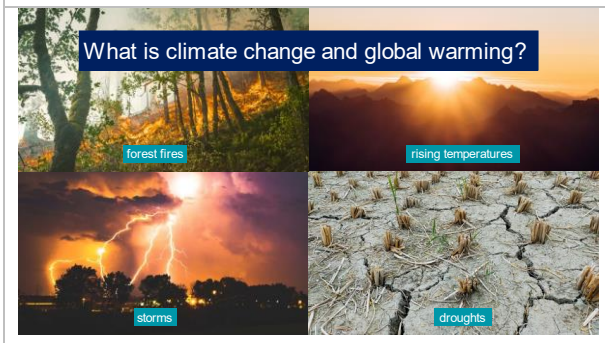
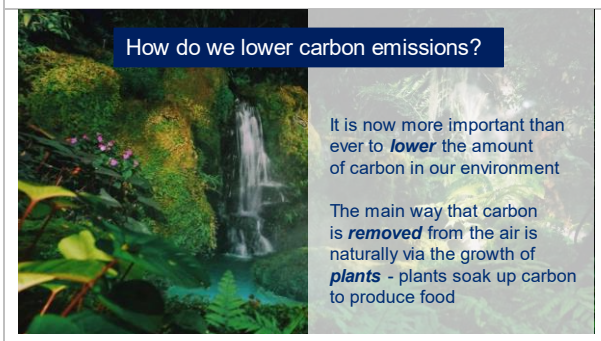
A more detailed lesson plan can be found in the SSE ‘Power Changers’ Primary booklet.

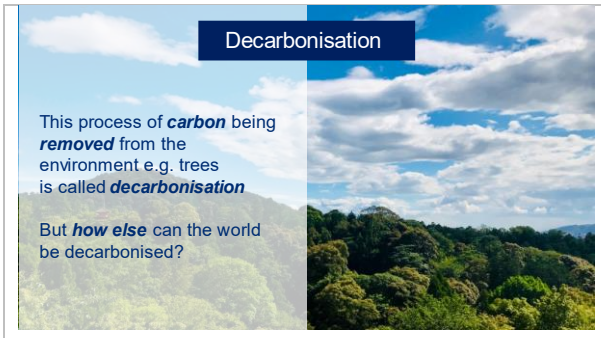
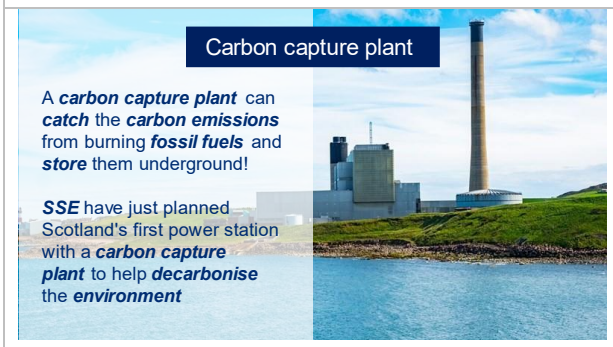
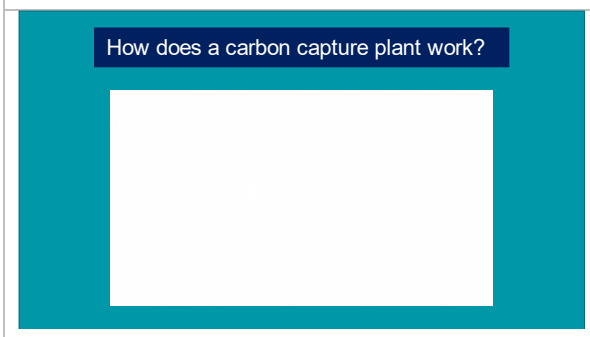
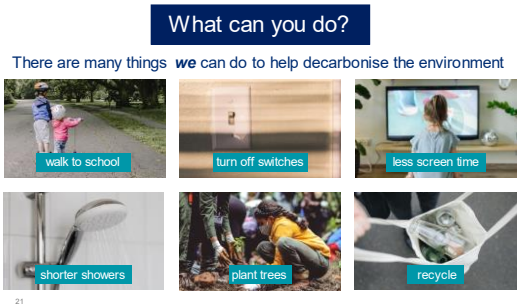
FUTURE OF ENERGY

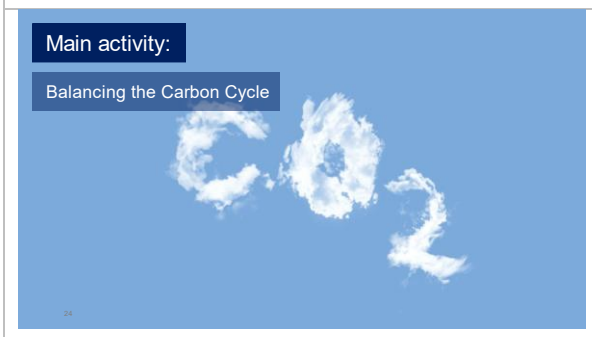
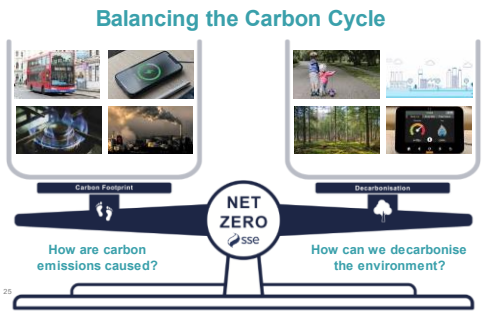
Lesson 3

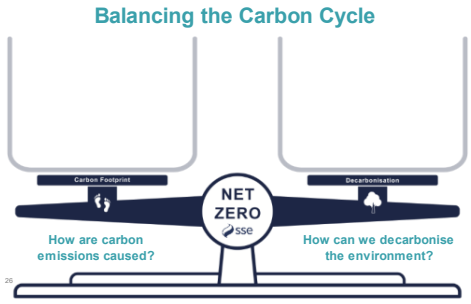
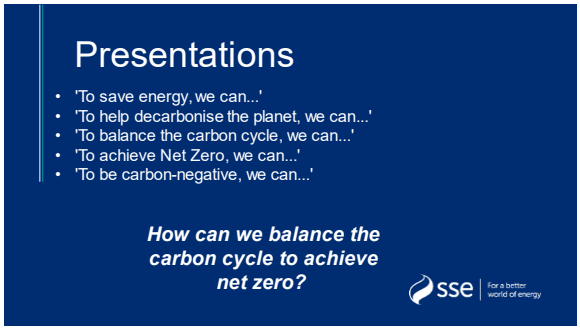
	Introduce yourself as the educator
	Briefly introduce yourself and explain who SSE are and what they do.
	Do Now (5 mins) Leave the following question and pictures on the board for pupils to engage with: *'How does this make you feel and why?'* Ask pupils to share their ideas aloud – the facilitator may prompt them by asking how they would feel if they experienced a fire, flood or drought
	Explain key words used in the lesson
	Reinforce how our everyday lives depend on consuming energy e.g. electricity for household appliances and fuel for transport

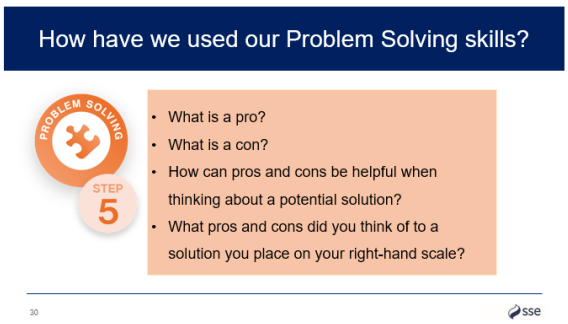
	Explain that the energy we consume causes carbon emissions which pollute the air and make the Earth hotter than it should be
	Explain that the amount of energy we consume is known as our carbon footprint
	Explain that there are many different ways to generate energy and that they can be sorted into renewable and non-renewable Remind them that each method has a different impact on the world
	Explain how renewable energy sources are generally better for the environment as they do not rely on the world's finite resources or cause many carbon emissions e.g. wind, solar and hydropower
	Explain how we still need non-renewable energy sources to generate enough energy for everyone, but that they release a lot of carbon emissions into the environment

	Explain that almost all the world's energy is generated using non-renewable energy sources like fossil fuels Talk partner opportunity – pupils should discuss what the three main fossil fuels are before sharing with the class
	Explain how too many carbon emissions make it harder to breathe and warmer than it should be – discuss the effects this has on humans, other animals and the weather
	Present pictures of climate change and global warming Talk partner opportunity – pupils should discuss what climate change and global warming entail before sharing aloud with the class
	Discuss how carbon is naturally removed from the environment (plants)
	Explain that the Earth is running out of trees as they are chopped down for many purposes

	Discuss process of decarbonisation – when carbon emissions are removed from the environment
	Explain how we are developing new technology to prevent non-renewable power stations from releasing carbon emissions
	Discuss how SSE are installing carbon capture plants to store carbon emissions underground
	Watch SSE's video on how a carbon capture plant works (42s)
	Talk partner opportunity – pupils should discuss what we can do ourselves to help decarbonise the environment

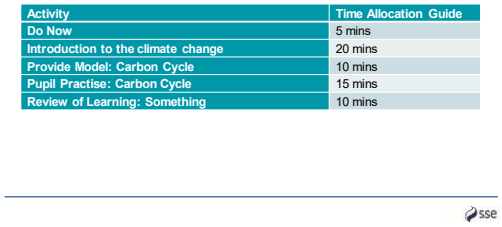
	Explain that we can use technology in our homes to help decarbonise the environment
	Discuss how we can achieve Net Zero
	Provide model: Recording your daily energy consumption
	Explain what the carbon cycle is and how it needs to be balanced to achieve Net Zero Discuss what sorts of things cause carbon emissions e.g. travelling via different modes of transport, using devices, cooking and generating energy from non-renewable sources Discuss what sorts of things decarbonise and remove carbon emissions e.g. walking instead of travelling by car, carbon capture plants, trees and smart technology Optional: Create flashcards from the additional resource and show how real-life balancing scales can be balanced by putting things that release and remove carbon emissions on either side

	Model completing the Carbon Cycle worksheet using ideas from the class Higher attaining pupils might think of other technology not mentioned in this lesson e.g. electric vehicles which can be powered by renewable energy as opposed to non-renewable energy
	Explain to pupils that they will be developing their Problem-Solving skills as they explore problems by thinking about the pros and cons of possible solutions. Optional: Describe an example of where you have demonstrated with skills step in your own role.
	Pupil Practise: Carbon cycle (15 mins) Assign pupils the task of completing their own carbon cycle balancing scales to demonstrate how to achieve Net Zero SEND pupils can focus on cutting and sticking the pictures on the additional resource into the correct side Higher attaining pupils can think of their own ideas including those not included in this lesson e.g. electric vehicles
	**Review of learning:** Carbon cycle (15 mins) Pupils should present their carbon cycles to the class and share how we can help decarbonise the environment to achieve Net Zero Those who are unable or unwilling to present can actively participate in the audience and challenge their peers if they think something has been placed on the wrong side of the balancing scales



Ask the children how they used their problem-solving skills. Open a class discussion around the questions on screen. This will help children understand and communicate the skill they have built alongside their knowledge

A glossary for facilitators to refer to if they need help defining technical vocabulary



Activity	Time Allocation Guide
Do Now	5 mins
Introduction to the climate change	20 mins
Provide Model: Carbon Cycle	10 mins
Pupil Practise: Carbon Cycle	15 mins
Review of Learning: Something	10 mins

Use these timings as a guide – this can be adjusted for the session being led

Please provide feedback via QR link – encourage children to submit examples of pupil work to social media.

A more detailed lesson plan can be found in the SSE ‘Power Changers’ Primary booklet.