Lesson 2.1 | What is the Greenhouse Effect?

Prior Requirements:

This lesson will ideally follow on from Topic 1 so that the students have fresh in their mind the difference between climate and weather and the traits of climate, in particular. This lesson will begin to explain what climate change is, and its causes. It will be important for students to have a good grasp on the timescale of climate change.

Learning Objectives:

Students will learn about what climate change is, and what causes it.

Students will complete a hands-on activity to learn about the greenhouse effect. Understanding how trapped heat in the atmosphere is the driver of climate change.

NC Links:

Social Studies

Identify and explain local and global environmental problems and individual roles in minimizing them.

Success Criteria*. In 'child friendly' language:*

I can explain what climate change is.
I can explain the Greenhouse Effect as being like a blanket that makes the world warmer.
I can explain what causes climate change.

Key Language:

The Greenhouse Effect - The greenhouse effect is like a natural blanket that keeps our planet warm. When the sun's rays reach Earth, some of the heat is absorbed and then radiated back. Greenhouse gases, like carbon dioxide, trap some of this heat in our atmosphere, preventing it from escaping into space. It's a bit like how a greenhouse keeps plants warm. However, human activities, such as burning fossil fuels, can add more greenhouse gases, leading to an increase in Earth's temperature, known as global warming.

Atmosphere - The atmosphere is like an invisible layer of air that surrounds Earth. It's what we breathe and is made up of different gases, like oxygen and nitrogen. This air envelope helps regulate temperature by trapping some of the sun's heat, creating a climate that supports life. The atmosphere also protects us from the sun's harmful rays and is crucial for weather patterns. Think of it as a protective blanket that makes our planet just right for living!

Carbon dioxide - Carbon dioxide is a gas in the air that's important for life on Earth.

Weather – Weather is like what's happening outside each day. It's about whether it's sunny, rainy, windy, or snowy. The temperature, how hot or cold it is, is also part of the weather. So, when you look out the window and see if you need a jacket or an umbrella, you're checking the weather!

Climate – Climate is like the usual weather a place has over a really long time, like many years. It's what you can expect in terms of temperature and whether it's mostly hot, cold, rainy, or sunny in a certain area. So, while weather is what happens today or tomorrow, climate is more about what the weather is usually like over a long, long time.

Predictions - "Predictions" are like making guesses about what might happen in the future. It's like trying to figure out what could happen based on what we know. For example, weather forecasts are predictions about the upcoming weather. Scientists and experts use data and information to make these educated guesses, helping us prepare for what might happen next. Predictions are like looking into the future and making smart guesses based on what we already know!

Anticipated learning misconceptions / difficulties:

Some of the children will struggle to understand that gases that we can't see are making such a difference to our atmosphere, or in this case, that the CO2 given off by the plant can make the temperature warmer.

Introduction (5 mins):

Recap from Topic 1, the difference between climate and weather. Reminder that climate changes over longer lengths of time.

Main Activity (45 mins):

1. Set up your 2 jars with one plant in each.
2. Add a thermometer to both jars and place a lid on **one** jar leaving the other jar open.
3. Take initial temperatures of both jars at the beginning of the activity and get students to make predictions about what will happen to the temperature at the end of the activity.
4. Continue to take measurements at regular intervals throughout and then a final temperature at the end.

It is expected that the jar with the lid will be warmer than the jar without the lid. The rise in temperature will demonstrate the 'trapping' nature of the lid and in a similar way that increased CO2 in our atmosphere is increasing the greenhouse effect.

Materials required:

2 jars with removable lids
2 small plants
2 thermometers
Stopwatch

Key Questions

Will the temperature change for either of the jars?

Why might the temperature be changing in the jar with the lid?

Conclusion (15 mins):

1. Discuss what has happened with the two jars.
2. Ask the students if their predictions were accurate.
3. Discuss why they think the jar with the lid was warmer than the jar without.

Key questions

Why do you think the jar with the lid was warmer than the jar without?

Did your predictions line up with the results?

Does anyone have any idea why this activity may be linked to climate change?

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	Why might it be called the Greenhouse Effect?

Activity variations:

1. This activity could take place over the course of a day and be used to model data, work with data handling and plot data on a graph. Running it this way could lead to greater interest, more engagement and opportunity to keep referring to the predictions. This would allow the students to change their predictions and conjectures about what is happening and why, further reinforcing the concept.
2. This activity could also be done as a secret - where there is a reveal at the end and thereby creates some drama over the course of the day or lesson.

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