Teachers Guide

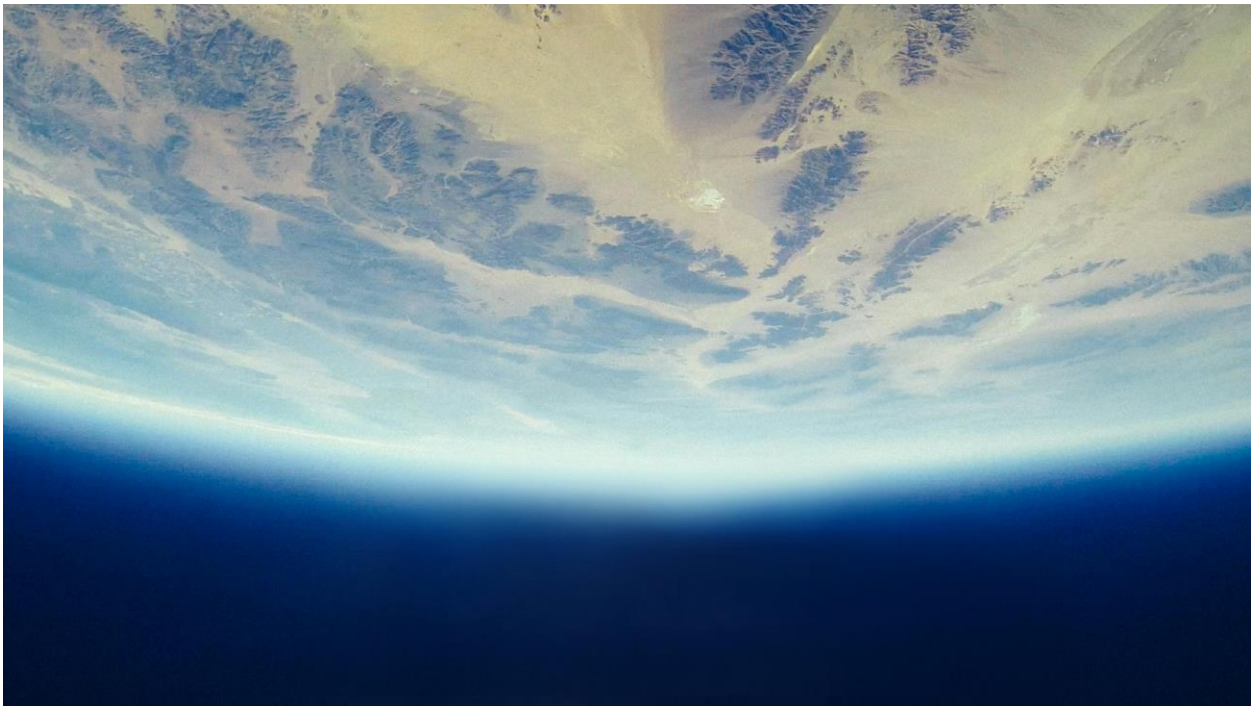


Table of Contents

A guide to carbon literacy workshops

This teacher guide contains two workshops. One workshop is meant for adults who want to gain an understanding of carbon literacy and how to reduce their carbon emissions, the other workshop is meant for children aged 6-12, and it is an interactive workshop that teaches children the concept of carbon literacy.

This Teachers Guide contains a flash drive with the presentations for the Family and Adult workshops. It also includes a list of what resources are needed for the activities originally in the Family workshop. All activities can be substituted to accommodate participants and facilitator.

Objectives

This workshop's objective is to encourage individuals to continue their learning of carbon literacy. The workshop provides individuals with an introduction to carbon literacy and teaches individuals about efforts they can make to reduce their carbon footprint.

The long-term objective of this workshop is to encourage individuals to take The Carbon Literacy Project's full carbon literacy training. The Carbon Literacy Project (CLP) is an organization that promotes climate solutions and actions through detailed training programs and well-organized events. The CL highlights sustainable change and supports individuals to use what they learned in their workplace, community, school, university, and other settings. The program provides participants with a carbon literacy certificate.

Definitions

- **Carbon Literacy**: Awareness of carbon impact of your actions on the world and decreasing your own emissions and the community.
- **Carbon Emissions:** Human activities like burning fossil fuels (coal, oil, and natural gas), industrial processes, deforestation, and some agricultural practices predominantly cause the emission of carbon dioxide.
- **Carbon Literacy Project:** offers participants a day's worth of Carbon Literacy learning, covering climate change, carbon footprints, why climate change is relevant to you and your organization, and how you can act on climate change.
- **Greenhouse Gas:** any of the gases whose absorption of solar radiation is responsible for the greenhouse effect, including carbon dioxide, methane, ozone, and fluorocarbons. (*Dictionary.com | Meanings & Definitions of English Words*, 2024)
- **Net Zero Emissions:** a goal of completely eradicating the amount of greenhouse gases created by human activity through emission reductions and the implementation of carbon dioxide absorption techniques.
- **Climate Change**: a long-term change in the earth's climate, especially a change due to an increase in the average atmospheric temperature. (Dictionary.com | Meanings & Definitions of English Words, 2024)
- **Carbon Footprint:** the amount of carbon dioxide or other carbon compounds emitted into the atmosphere by the activities of an individual, company, country, etc... **(Dictionary.com | Meanings & Definitions of English Words, 2024)**
- **Sustainability:** The ability to be sustained, supported, upheld, or confirmed. **(Dictionary.com | Meanings & Definitions of English Words, 2024)**
- **Climate Co-benefits**: beneficial outcomes from climate actions that are not directly related to climate change mitigation. Such co-benefits include cleaner air, green job creation, public health benefits from active travel, and enhancing biodiversity through expanding/ enhancing green space.
- **Global Warming:** The extremely rapid rise in Earth's average surface temperature over the last century, due mostly to greenhouse gases emitted when people burn fossil fuels.
- **Mitigation:** Activities which reduce the rate of climate change.
- **Adaptation:** Refers to adjustments in our decision making, activities and structures that we make in response to observed or expected changes in climate.

Scripts

Family Session:

Slide 1: Hello, everyone! Welcome to Eco Pals, a family adventure! Our names are [blank...] and we're so excited you've decided to join us today!

Slide 2: You've been chosen for a top-secret mission that's going to help save the planet! Are you ready to become Earth-saving superheroes? (Look excited and enthusiastic)

Slide 3: Our mission today is to learn about something called a "carbon footprint." We'll discover what it is, how it affects our planet, and most importantly, what we can do to help. By the end of this mission, you'll be equipped with the knowledge and power to make a difference. Are you ready to accept this challenge? (Wait for response, encourage participation)

Slide 4: Let's start with the basics. What do you think we breath in? (breathe dramatically) Oxygen, right? What do you think we breathe out? (repeat) We breathe out carbon dioxide! Do you think we can see either of them? No right? But that doesn't mean its not in the air all around us.

Slide 5: Now, imagine if every time you took a step, you left a footprint. A carbon footprint is kind of like that, but instead of leaving a visible mark, it's the amount of carbon dioxide we release into the air through our daily activities. Everything from the food we eat to the way we travel leaves a carbon footprint. The earth remembers all of this and it makes an impact.

Slide 6: Carbon dioxide is what we call a greenhouse gas. Have you ever been inside a greenhouse? It's warm and cozy, perfect for plants to grow. Earth's atmosphere acts like a big greenhouse, trapping heat from the sun. But when we have too many greenhouse gases, like too much carbon dioxide, it's like the Earth is wearing a thick, heavy coat that it can't take off! This extra heat can cause the Earth's temperature to rise, leading to climate change.

Slide 6: This is where carbon literacy comes in. Being carbon literate means understanding how our choices and actions affect the amount of carbon dioxide in Earth's atmosphere. It also means learning ways to reduce the carbon we put into the air. By becoming carbon literate, we can make a difference and protect our planet!

Slide 7: Let refresh what we've learned about so far. The carbon dioxide in the air is getting trapped in the atmosphere and making the temperature of the earth rise too much, which isn't good for the planet. The carbon emissions from things like cars, factories, and even electricity production are causing the Earth's climate to change. We're seeing rising temperatures, melting ice caps, and more extreme weather events. These changes can have big impacts on plants, animals, and people around the world. (Engage the kids and ask them to brainstorm ways they think they can help reduce carbon emissions.)

Slide 8: But here's the good news: there are simple things we can do every day to help! By walking or riding our bikes instead of taking a car, we reduce the amount of carbon dioxide released from vehicles. Eating more vegetables and less meat can also help, as raising animals for food produces a lot of greenhouse gases. And by simply turning off lights when we leave a room, we save energy and reduce the carbon footprint of electricity production. Every action counts!

Slide 9: *Short Activity* Ask participants how they arrived at the presentation today. Discuss the four forms of travel on the slide, Plane, Train, Car, and Walking. Ask participants what they think is the least carbon efficient way to get places.

Slide 10: The plane has a three because it is the least efficient. Ask participants again what they think is the least carbon efficient way to get places out of what remains.

Slide 11: The train and car produce similar carbon emissions. Ask participants what the most efficient mode of transport is.

Slide 12: Discuss how walking is the most efficient way because it releases the least amount carbon into the atmosphere

Slide 13: I want to introduce you to a real-life superhero. This is Greta Thunberg, a young girl not much older than you. She's working hard to raise awareness about climate change and inspire people to make a difference. Greta is proof that no how little you are, you have the power to make a difference!

Slide 14: (Guide the kids through a simple, hands-on activity like planting herbs. Explain how plants absorb carbon dioxide and release oxygen, helping to balance the atmosphere. Encourage them to care for their plant and watch it grow, fostering a connection with nature.)

Slide 15: Now, it's time for us to make a pledge. A pledge is a promise we make to ourselves and to the Earth. What's one thing you can do starting today to reduce your carbon footprint? (Encourage kids to share their ideas and make their own pledges. Offer suggestions if needed, like pledging to turn off the tap while brushing teeth or to remind their parents to bring reusable bags to the grocery store.)

Slide 16: Let's recap what we've learned today. People are releasing large amounts of carbon dioxide into the air through activities like driving, using electricity, and even farming. This extra carbon dioxide is wrapping around the Earth like a big, heavy blanket, causing our planet to heat up. But by making small changes in our daily lives, like the pledges we just made, we can work together to reduce the carbon dioxide in our atmosphere and help protect the Earth.

Slide 17: You did it! You've completed your mission and are now official Earth-saving superheroes. Your top-secret mission is to take what you've learned today and put it into action. Remember, every choice you make, no matter how small, can make a big difference. Any final questions about what we've learned today? (Address any questions and encourage further discussion. End with a round of applause for their participation and commitment to making a difference.)

Adult Session:

Slide 1:

Introduce yourselves/yourself and the workshop

Slide 2:

“What do you know about Carbon Literacy?”

* Get a grasp on what people know. Invite people to speak up on what they think it is or whether they have heard of it or not. Ask: What do you know? What do you think it is? *

Slide 3:

“Carbon Literacy is knowing the carbon impacts of your actions on earth and decreasing your own carbon emissions and the community’s.

Being carbon literate involves the ability and motivation to reduce emissions on an individual, community, and organizational basis.”

Slide 4:

“Every time we breathe in air, we expel carbon dioxide, a natural biproduct of life.

Carbon dioxide is a naturally occurring and necessary molecule in our everyday lives, but in large quantities it is detrimental to our planet.

In the atmosphere, it acts like a greenhouse, keeping heat that comes from the sun, in our atmosphere.”

Slide 5:

“What is the difference between climate and weather?

Weather is a combination of temperature, humidity, precipitation, cloudiness, visibility, and wind.

Climate is the weather conditions of a particular location (region, continent, world) averaged over a long period of time (usually around 30 years).

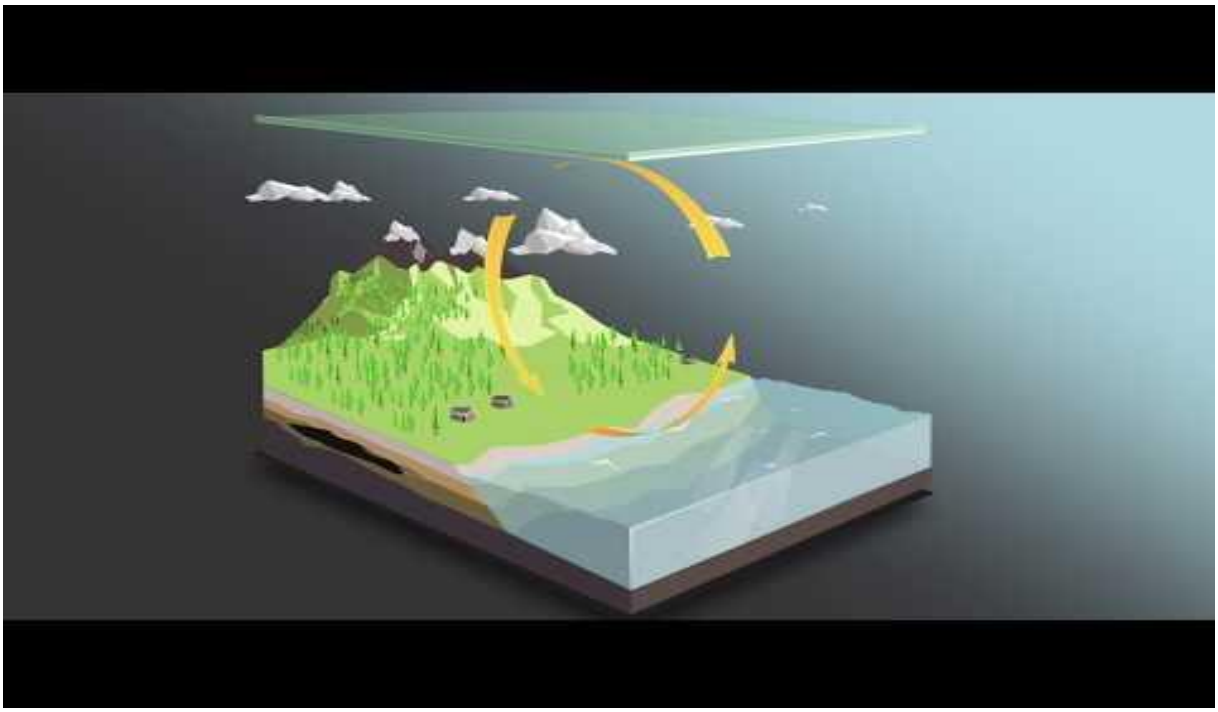
Climate is what you expect, weather is what you get. If you are going on a holiday somewhere, the climate of that region for that time of year helps you decide what

to pack in your suitcase. The weather you actually experience while there will help you decide what to wear each day.“

Slide 6:

“Now we will watch a very short video on the carbon cycle and greenhouse effect and see a visual representation of what happens.”

https://youtu.be/U7DbEeBXQBQ?si=Nccy-e2D4QXdt4cQ



Try to sit down while video is playing.

Slide 7:

“So, as we have heard, CO2 levels are rising.

The Mauna Loa Observatory on Big Island of Hawaii in the USA has been measuring atmospheric Co2 levels since 1958.

As you can see on the graph, from 1958 to today, Co2 levels have been rising.

The parts per million is a representation of how many carbon molecules there are in one million particles of air.”

Slide 8:

“What is the difference between global warming and climate change?

Global warming is the increase in the average surface temperature of the earth, and it is caused by the greenhouse effect. Global warming is a result of human activities.

Climate Change is any long-term shift in climate, global or regional. Climate change is a result of human AND natural causes."

Slide 9:

Quick activity

Ask which choices the audience thinks cause natural climate change from natural phenomena, and which choices cause man-made climate change. Let them guess.

Slide 10:

Reveal the correct choices from the activity.

Slide 11:

"Along with carbon there are other gases that cause the greenhouse effect, these are methane, nitrous oxide, and F gases. These are called greenhouse gases (GHG).

These gases' contribution to global heating changes based on their ability to radiate and absorb energy – this is called 'global warming potential' (GWP).

GWP is measured on a weight-by-weight basis compared to carbon dioxide. For example, 1 Tonne of methane has the same effect as 28 Tonnes of carbon dioxide."

Slide 12:

"So why is carbon dioxide the most concerning? The first reason is due to its comparatively long lifespan.

65-80% of carbon dioxide is dissolved into the ocean over 20-200 years.

The rest is removed by slower process that can take hundreds of thousands of years, meaning the carbon remains in the atmosphere for thousands of years.

The longer lifespan is considerably greater than the lifespan of other gases.

Methane takes 12 years, Nitrous Oxide takes 114 years, and F-Gases can remain for less than a year or 1000s of years.

This longer lifespan means that while it may not have as high of a global warming potential it can continue to impact the atmosphere for a comparatively long period of time."

Slide 13:

"The other factor that makes carbon dioxide more concerning is the amount of it that is emitted.

74% of greenhouse gases emitted is carbon dioxide. In comparison, Methane is the second highest with 17%, Nitrous Oxide makes up 6%, and F-Gases make up 2%.

This abundance of carbon means that even with its lower global warming potential just due to the large amount of carbon dioxide, it is having a significant effect.

When paired with the long lifespan, carbon dioxide can have a large amount of carbon affecting the atmosphere over thousands of years."

Slide 14:

"This pie chart breaks down carbon emissions by sector in the UK.

As can be seen, the greatest source is powering and heating homes, offices and other buildings at 30%,

Followed by transportation which accounts for 16%,

Both manufacturing and construction makes up 12%,

Agriculture also makes up 12%,

Other, while being 30%, is made up of many smaller emitters that individually do not have much effect but together make up 30%."

Slide 15:

"In 2022, the UK recorded its hottest ever year on record.

According to the MET, a temperature of 40 degrees, which London saw last summer, would not be possible without human caused climate emissions.

With this heat comes dry seasons and droughts, which dries up rivers and makes it harder to grow food.

What's the issue with hotter, drier summers? Droughts and heatwaves, water security, health impacts on young and elderly citizens, invasive species like mosquitoes, and unstable food prices."

Slide 16:

"On the other end of the spectrum, climate change is causing wetter winters. With warmer winters, warm air holds more water, which means more rain. This causes rivers to flood more. Additionally, with polar ice melting, coastal towns are more at risk for floods with rising sea levels.

What's the issue with wetter, stormier, warmer winters? Wet winters could become up to x5 more likely, and there are more frequent intense downpours driving flash floods.

North of England and Scottish Borders are most impacted, and in 2013-2014 we suffered the wettest winter for 250 years with 11,000 homes flooded."

Slide 17:

"Environmental impacts affect people in so many ways:

- Crop yields are 30% lower when subjected to drought and flood cycles, more food insecurity, increase in food prices.

Rising heat:

- Heat stroke, heat exhaustion, risk factor for people with respiratory and cardiovascular health issues, particularly young children and elderly at higher risk.

Communities with lower levels of income and education are often more impacted by pollution and climate change:

- Vulnerable communities become even more vulnerable.

Water quality:

- Water borne diseases, harmful algae blooms, cholera, water pollution.

Severe weather:

- Stronger storms happen more frequently, hurricanes, floods, loss of life and loss of homes, etc.

Forced migration

- Some places will become inhospitable leading to human migration.

Air pollution:

- Impacts the cardiovascular and respiratory systems, asthma.

Increase in disease:

- Malaria, West Nile, Lyme, etc. Increase due to more bugs and others to carry them and they move further."

Slide 18:

"What is Climate Justice? Climate justice is a concept that recognizes the ethical dimensions of climate change. Those most affected by climate change are the least responsible for it. They have a low responsibility for causing the emissions, and to demonstrate this..." (next slide)

Slide 19:

"Here are a couple images to show who is responsible, and who is impacted.

On each map the more blown up a country is the higher their overall number is (whether that number be emissions or population).

The top left map demonstrates emissions today, and shows that Asia is a large emitter, with The United States and Europe also contributing to current emissions.

The bottom left map demonstrates historical emissions from 1850-2011 and shows that historically the United States and Europe are larger emitters than Asia is.

The right map shows where the most people are at risk today, and Asia is shown having a comparatively massive number of people at risk. Africa, which is a low emitter, also has many people at risk. North America and Europe both have an incredibly low number of people at risk.

While currently Asia is the largest emitter The United States and Europe's historical emissions are greater. Taking into account the lifespan of carbon, these historical emissions could still be putting people at risk, which means that while they are not at high risk it is still part of their responsibility to help."

Slide 20:

Carbon Footprint Calculator activity

https://footprint.wwf.org.uk/questionnaire

- Introduce the Carbon Footprint Calculator and explain how it works.
- Ask participants to open the link and start working through the questions.
- If someone doesn't have a device, hand them one if you have one available.
- Give everyone around 5 minutes but extend this longer if someone needs more time.
- Once everyone has finished, ask them to click the "view full results" option.
- Tell participants you will not carbon shame, but if they would like to share, they are welcome to do so.
- Ask prompts about if they share with a family, live on their own, have a pet, travel a lot, etc.

Slide 21:

"Some common reasons for inaction are:

1.) 'It's someone else's job to address climate change'

2.) 'I'm just one person, I can't make a difference'

3.) 'I don't have the time or money to address climate change'

4.) 'Information about climate change is confusing'

5.) 'It's too late, so why try?'

Ask if anyone finds themselves doing any of these reasons for inaction, and if they have any others that weren't mentioned that they would like to share.

Much of the reason for inaction is feeling like one person cannot make a large impact. But this is not true! Every small bit helps. 60% of all greenhouse gas emissions in the UK can be traced back to household consumption. If demand is

not met, manufacturers will lower their production of polluting products like meat, plastics etc. So, we do have the power to cause change!”

Slide 22:

“What are some actions you can take?

Food Consumption: Eat a more plant-based diet and eat less meat. Healthier diets that are rich in vegetables have a smaller carbon footprint and require much less water than diets rich in meats and dairy. Eating healthier also means a longer, healthier life.

Home Energy Use: Make your home easier to heat, reduce hot water usage, and turn off / unplug electronics.

Transportation: Reduce reliance on personal vehicles like cars and motorbikes. Try to carpool, share rides, and walk/cycle as much as possible.”

Slide 23:

“Some more actions you can take are:

Making your voice heard by those with influence. Talk to people! Write to your MP (member of parliament) and local board members or people with positions of power at companies. You can also talk to friends and family.

Make your home easier to heat. Well-insulated homes cut energy bills and pollution while supporting good health. Use draught excluders, loft insulation, or double glazing, where possible.

Think about your consumption of goods. It's easy to spend money on things we don’t need, but this increases our environmental impact and often doesn’t make us any happier. Buy less, share more, avoid single-use items, repair, re-use, create, and go for second-hand whenever possible.

Respect and protect green spaces. Forests, parks, rivers, and natural coastal areas are essential for biodiversity, absorbing carbon and reducing air pollution. Also, try bringing nature into your home. Boost your mental well-being by getting some potted plants, reduce your carbon footprint by growing food, or plant wildflowers to support biodiversity.”

Slide 24:

Quiz Questions activity

- Three multiple choice quiz questions to engage the audience
- Make it known that all answer choices reduce Co2, none of them are bad or incorrect.
- The "correct answer" that they are trying to guess is the biggest impact choice.

The annual savings shown in the adult workshop quiz questions are from the best estimates of typical household energy savings presented in the report (and accompanying annex spreadsheet):

Palmer, J., Terry, N., and Pope, P. (2012). How much energy could be saved by making small changes to everyday household behaviours. Department of Energy & Climate Change. London, UK.

The report and annex spreadsheet are available here: https://www.gov.uk/government/publications/how-much-energy-could-be-saved-by-making-small-changes-to-everyday-household-behaviours

These energy savings have then been converted to greenhouse gas emissions (Scope 1 and 2 only) using the UK Government's 2019 conversion factors for greenhouse gas reporting, available here: https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2019

Slide 25:

COOKING BEHAVIOURS - QUESTION

"Which of the following behaviour changes would reduce carbon emissions the most?"

A. Only fill kettle to required level

B. Put lids on saucepans

C. Refit old and damaged seals on fridges and freezers

D. Defrost freezer regularly

Slide 26: BEST ESTIMATE ANSWER

1 = C. Refit old and damaged seals on fridges and freezers

Best estimate = reduces energy consumption by 25%

2 = B. Put lids on saucepans

Best estimate = 60% of 424 hob uses per year (254 uses) & extra energy used when lid not on = 60%

3 = A. Only fill kettle to required level

Best estimate based on 4 uses/day with 0.5 L excess water

4 = D. Defrost freezer regularly

Best estimate = saves 20% energy

Slide 27: DISHWASHING & LAUNDRY BEHAVIOURS – QUESTION

"Which of the following behaviour changes would reduce carbon emissions the most?"

A. Always use dishwasher on eco settings

B. Air dry laundry instead of using tumble drier

C. Use dishwasher only when full

D. Wash clothes at 40C or less

Slide 28: BEST ESTIMATE ANSWER

1 = B. Air dry laundry instead of using tumble drier

Switch to never using tumble drier

Weekly uses: Best = 5 uses/wk

2 = A. Always use dishwasher on eco settings

Reduces energy consumption by ~60%

Weekly uses: best = 5 uses/wk

3 = C. Use dishwasher only when full

Reduces use by 1/3rd.

Weekly uses: best = 5 uses/wk reduces to 3.3

4 = D. Wash clothes at 40C or less

Frequency of use at more than 40: Best estimate = 3 uses/wk

Slide 29: HEATING & HOT WATER BEHAVIOURS - QUESTION

"Which of the following behavior changes would reduce carbon emissions the most?"

A. Turn thermostat down by 1-2C

B. Turn off heating in unused room

C. Reduce shower time from 7 to 5 min (for 4 showers per week)

D. Install water efficient shower head

Slide 30: BEST ESTIMATE ANSWER

1 = A. Turn thermostat down by 1-2C

From 19/20 to 18C

2C 483 to 716, Best 569

1C 239 to 354, Best 281

2 = D. Install water efficient shower head

Best estimate = 149, Range = 76 to 833

Range based on variable shower time (5-10 min, best estimate 7) and shower flow rate (8 to 15 l/min for std, 4 l/min for eco)

3 = B. Turn off heating in unused rooms

Best estimate = 98, Range = 28 to 303

Reduces heat loss between 1.3% and 9.5%, best estimate 3.8%. Depends on proportion of dwelling envelope exposed by room and U values (insulation)

4 = C. Reduce shower time from 7 to 5 min (for 4 showers per week)

Best estimate = 24, Range = 9 to 65

Shower flow rate 4 (eco) to 15 l/min, best estimate 8 l/min

Slide 31: “Thank you for attending!”

Slide 32: “Do you have any questions?”

Activities

Adult workshop activities:

- Carbon Footprint Calculator (https://footprint.wwf.org.uk/)
    - Introduce the Carbon Footprint Calculator and explain how it works
    - Ask participants to open the link and start working through the questions
    - If someone doesn't have a device, hand them one if you have one available
    - Give everyone around 5 minutes, but extend this longer if someone needs more time
    - Once everyone has finished, ask them to click the "view full results" option.
    - Ask participants to share their carbon footprint
        - Tell participants you will not be judged
    - Ask prompts about if they live with a family, live on their own, have a pet, travel a lot, etc.
- Multichoice Quiz Question
    - Ask participants to answer each question
    - Discuss how each answer reduces a different amount of carbon emissions

Families workshop activities:

- Planting herbs, vegetables
- Sustainable Coloring Pages for kids
- Read along book on sustainability
    - "Greta and the Giants: Inspired by Greta Thunberg's Stand to Save the World" by Zoë Tucker and illustrated by Zoe Persico

Substitute activities

- Nature Scavenger Hunt
    - Set up a scavenger hunt, choose vehicles, buildings, plants, and or animals
    - Ask participants to compare the carbon emission released from them
- Community action plan
    - Split the participants into groups and ask them to come up with action plans that can take place within their community to reduce the communities carbon footprint
- Read along can have any book that relates back to sustainability or carbon footprint
    - "The Lorax" by Dr. Seuss
    - "The Magic School Bus and the Climate Challenge" by Joanna Cole

- "Greta's Story: The Schoolgirl Who Went on Strike to Save the Planet" by Valentina Camerini

References:

Dictionary.com | Meanings & Definitions of English Words. (2024, April 30). Dictionary.com. https://www.dictionary.com/