STEM KS3- Environment Agency
Plastic Pollution: Source to sea

The carbon cost of plastic waste

Time: 15mins

In groups of 5 or 6, you will investigate the carbon cost of our plastic waste, and different ways we can reduce this through a change in our actions and behaviours. You will do a few simple calculations and note down your answers in the spaces provided.

Materials needed for this session:

- Calculator

Background

Have you thought about the carbon cost of our plastic waste?

Most plastic is made from non-renewable fossil fuels such as oil, and energy is needed to extract oil, manufacture, transport and dispose of our plastics.

Oil and gas stored under the sea and land are important carbon stores. Using fossil fuels as a starting material, and energy source for plastic production and use, releases greenhouse gases into our atmosphere, contributing to the climate emergency.

Each piece of avoidable plastic we purchase also has a carbon cost.

Task 1- Calculating the carbon cost of our plastic waste

Latest research suggests each person in the UK generates an average of 98kg of plastic waste per year*.

It is also reported that for every tonne or 1,000 kg of plastic waste, this represents approximately 3,000 kg of CO_2 based on production and disposal of plastic!

Let's work out the average carbon cost of one person's plastic waste per year.

Step 1 Calculate the amount of CO_2 released per kg of plastic waste

Plastic waste (kg)	CO_2 emitted (kg)
1,000	3,000

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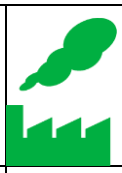
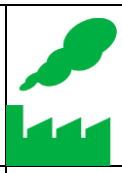
If 1 tonne or 1,000 kg of plastic waste represents 3,000 kg of CO_2, what is the CO_2 value for 1 kg of plastic waste?

 Plastic waste (kg)	 CO_2 emitted (kg)
1	

Step 2 Calculate the average person's CO_2 cost for their annual plastic waste.

If we now know the carbon cost of 1 kg of plastic waste, what is the CO_2 value for 98 kg, which represents one person's average plastic waste?

 Plastic waste (kg)	 CO_2 emitted (kg)
98	

Task 2- Calculate our carbon savings when we avoid plastic waste

Through our actions we can reduce our plastic waste. For example, choosing to use a reusable item or buying a product with no packaging.

A useful way to calculate how much plastic we use in our everyday life is to complete a plastic survey to see which plastic items we use the most, and which items we can easily avoid or reduce.

A recent waste survey* of 2,000 British people found that on average they threw away 2,087 individual plastic items per year, which included:

In groups of 5 or 6,

109	Single-use coffee cups
242	Plastic bottles
209	Foil crisp packets
241	Plastic yoghurt pots/pudding pots
378	Snack wrappers
10	Shampoo/conditioner bottles
9	Body wash soap bottles

We can also use a waste audit or plastic survey to calculate how any changes we make to the amount of plastic packaging we use will affect the total amount of plastic waste produced. We can compare the results of the waste audit before and after making any changes.

Calculate the amount of plastic waste avoided

Assume that the following two people have carried out a plastic survey before and after making a change in their use of plastic packaging and calculated the percentage saving.

Use this information to calculate how much plastic waste has been saved over the year for both Person 1 and Person 2, and what this means in terms of a CO_2 saving.

Person 1

Action: Bought a reusable hot drink container and reusable water bottle

Result: Reduced plastic waste by 15%

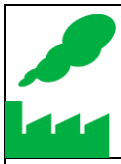
If we assume each person produces 98kg of plastic packaging waste per year:

a. How much plastic waste has person 1 avoided (kg) by changing to reusable drink containers?

 Plastic waste saved (kg)

Using the information from above and in step 1, calculate the following:

b. How much CO_2 (kg) has been saved after changing to reusable drinks containers?

	CO_2 saved (kg)

Person 2

Action: Changed to shampoo bars and solid soap

Impact: Reduced waste by 1%

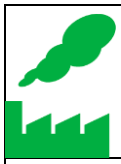
If we assume each person produces 98kg of plastic packaging waste per year:

a. How much plastic waste has person 2 avoided (kg) by changing to shampoo bars and solid soap?

	Plastic waste saved (kg)

Using the information from above and in step 1, calculate the following:

a. How much CO_2 (kg) has been saved after changing to shampoo bars and solid soap?

	CO_2 saved (kg)

** Poll reveals 'typical' Brit's annual waste. Circular. May 2020; Lavender-Law et al. (2020) United States contribution of plastic waste to land and ocean. Science Advances*