LESSON 5: OUR SCHOOL'S CARBON FOOTPRINT (SCIENCE, MATHS)

OBJECTIVE	To understand the school's carbon footprint, to compare this to other building footprints and to calculate the emissions per year, per day and per capita.
BACKGROUND	- The school's Display Energy Certificate is needed for this challenge (this will probably be found in the school reception area, however if not please ask the appropriate person for the certificate). - This challenge involves approximately 1-2 lessons. - The Internet is needed for the class and / or individual students in order to use the Carbon Visual Display Energy Certificate visualisation tool (you will need Google Earth on your computer to use this) and the Carbon Quilt visualiser tool. The Carbon Visual Display Energy Certificate visualisation tool shows the carbon footprint of every public building in England and Wales – all 40,000. You customise your view by postcode and then it's interactive tools let you visually compare and contrast the footprints of local buildings. You can also compare the statistics, which list the volume of emissions and rating grade. The Carbon Quilt visualise tool allows you to customise your view by postcode then enter a mass of Carbon Dioxide. The tool is interactive and represents this amount visually. See notes in Stage 3 for more information. - These two tools can be used to see a visualisation of the school's carbon footprint in comparison to other public buildings, Carbon Visual Display Energy Certificate visualisation and then students can calculate the carbon footprint per capita and use the Carbon Quilt tool to visualise this individual amount.

PROCESS

Stage 1 – Introduction to school's Display Energy Certificate

Show the school's Display Energy Certificate to students. A background discussion can include:

- What is a Display Energy Certificate?
- What information do they contain?
- How are they calculated?
- Who obtains the data?
- Why were they introduced?
- How often are they updated and why?
- What other public buildings might they be on?

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Stage 2 – Understanding and visualisation
- Discuss the information and statistics presented on the certificate.
- Go to the Carbon Visual's DEC visualisation, enter your school's postcode and view the visualisation of your school's volume of carbon dioxide emissions.
- Discuss the findings with students and compare the school's emissions with the surrounding public buildings. The view can be changed to show yearly emissions (tall), yearly emissions (short), yearly emissions (floor-area) and daily emissions. It is interesting to view the different representations.
- You can compare the school's volume of emissions to other local schools and discuss the differences presented.

Stage 3 - Calculations
Using the display energy certificate information students can:
- Calculate the footprint per person. Students can then visualise these footprints using the Carbon Quilt visualiser. On the Carbon Quilt website students can do the following:
  - At the bottom of the Google map enter the school's postcode (so the volume is presented on the relevant area).
  - Go to 'Enter a mass of Carbon' at the top of the tool and press 'Visualise'.
  - The visualisation will be shown as an area. It can then be changed by pressing 'Cube of dimension' and 'Sphere of diameter'.
  - Click 'Facts and Figures' for this mass as a fraction of the global emissions and extra information.
- Calculate the rate per year, per day, per hour, per second for the school as a whole and per person.
- Calculate the money per year.
- Show the different types of energy and their corresponding footprints on the same bar chart.
- Work out the percentage of electricity, gas, oil and renewables *energy.*
- Work out the percentage of electricity, gas and oil *emissions.*
- Show the contributions of electricity, gas and oil and renewables to total energy in a pie chart.
- Show the contributions of electricity, gas and oil to total emissions in a pie chart.
- Note - There are also options on the Carbon Quilt visualiser to view world carbon emissions, energy sources, emissions of selected organisations etc.

LESSON SUCCESS
- Students can explain the school's Display Energy Certificate and the information presented.
- Using this information they can calculate the school's footprint per person and visualise this number using the Carbon Quilt visualiser and make various relevant calculations and present their findings in a pie chart.
- Students gain an understanding of their school's carbon footprint and can compare their school's footprint with other local schools and buildings' footprints.

DEVELOPMENT
- Using the Carbon Visual's DEC visualisation tool, students could compare their school's emissions with the emissions of other local schools. Discuss the differences and ask students to think of reasons why there are differences. If there are large differences it may be due to the age of the buildings and students can explain how and why new buildings will have different levels of emission efficiencies.
- Students can think of ways in which the school can reduce their annual volume of carbon dioxide emissions and the advantages for the school and the environment in doing so. Refer back to the broader Eco-Schools programme for support.
- Have a go at calculating your school's "global footprint" using Education Scotland's global footprint tool.