

YEARS 7-10

What's my Carbon Footprint?

Tōku tapuwae waro?



OVERVIEW

This cross-curricular, inquiry learning resource guides students to investigate and calculate their own carbon footprint, and then formulate an individual action plan to reduce their carbon emissions. Students will gain insight into how their activities compare on the local and global scales and may take up the opportunity to communicate with students in other countries.

NZ CURRICULUM LINKS

LEARNING AREAS:	ACHIEVEMENT OBJECTIVES:	LEVELS:	YEARS:
Science: Nature of Science: Participating & Contributing: Planet Earth & Beyond	Develop an understanding of socio-scientific issues by gathering relevant scientific information to draw evidence based conclusions and to take action where appropriate. Develop an understanding of how the geosphere, hydrosphere, atmosphere and biosphere interact to cycle carbon around the Earth.	5-6	7-10
Social Studies	Students will gain knowledge, skills and experience to...understand how people's management of resources impact on environmental and social sustainability.	5-6	7-10

TEACHER INFORMATION

This resource allows the student to conduct their own inquiry into the concept, measurement and application of carbon footprint. It is intended to be a largely student-driven inquiry learning project following some initial background and context setting.

Students will carry out independent research about carbon emissions individually or in a small group (three is ideal), and then apply the concepts gained to calculate their own carbon footprint. Following this they will formulate an action plan to reduce their carbon footprint.

It would be ideally suited to Year 9-10 science students and could serve as a basis of prior knowledge on carbon for NCEA Science 1.14 (Demonstrate understanding of carbon cycling). This resource could also be used as extension for younger students as well.

Background on Carbon

Carbon dioxide is a colourless, odourless gas naturally present in small quantities in the atmosphere. Plants absorb carbon dioxide during the process of photosynthesis. Animals and plants emit carbon dioxide during the process of respiration. Carbon in its various forms, cycles through the atmosphere, hydrosphere, biosphere and geosphere. Combustion of fossil carbon (coal, oil, gas) mined from the geosphere increases the amount of carbon dioxide in the atmosphere. Carbon dioxide is a greenhouse gas meaning that it is transparent to short wave solar radiation (largely visible, ultraviolet and near infrared light) but absorbs longer wave length infrared radiation heading back into space from warm surfaces. Increasing carbon dioxide in the atmosphere decreases the amount of long-wave radiation escaping back

into space which results in increased heat content of the ocean-atmosphere system.

Carbon dioxide is emitted through fossil fuel combustion by a wide range of human activities including electricity generation, transport, construction and agriculture. Carbon emissions, especially in the form of carbon dioxide, impact the global environment through enhancing the natural Greenhouse effect of the atmosphere. The effects of these emissions are already being observed through a measured increase in the average global surface temperature trend, increasing heat content of the oceans, increased extremes of climate events, melting of polar ice, sea-level rise, acidification of the oceans and other effects.

Carbon emissions of people are affected by the established infrastructures of the country and area in which they live, but they are also able to be hugely influenced through the conscious lifestyle choices and behaviours of individuals. The carbon footprint is a way of quantifying the amount of carbon in tonnes emitted by one person for one year and the contribution they are making to global warming.

This inquiry is a great opportunity for cross-curricular learning and links to several other areas of the NZC:

<p>Maths & Statistics</p>	<p>This resource could be the basis for a class to share, collate and process information they have gained about their carbon footprints. E.g. graph class data as a histogram and find the mean and standard deviation.</p> <p>Compare with other students around the world through a programme run by Stanford University called the International Student Carbon Footprint Challenge.</p>
<p>Economics and/or Geography</p>	<p>The Carbon Footprint of Nations website is an excellent source of data allowing customisable spatial, graphical and numerical comparison of such data as nation's populations versus GDP/CO₂ per capita and viewing how it has trended over time (since 1990).</p>

Resources needed

- Link to student worksheet [here](#)
- Link to resource support [here](#)

Any text highlighted in **orange** represents a link to further material. If you have printed this resource, please return to schoolgen.co.nz/for-teachers/resources to access the linked material.



Student Worksheet

What's My Carbon Footprint? Tōku tapuwae waro?

Student Inquiry

Overview

You will use internet-based research to find out about your carbon footprint using online carbon calculators. You will then plan practical ways that you can reduce it!

To start with you will need to do some research so that you understand the key concepts you are dealing with. Some good website resources are given to help you make a start. Remember to only use reliable websites and credible sources for information.

Carbon Footprint - what do you know already?

Brainstorm your ideas here:



Student Worksheet

Note: When you use the internet to research ideas, you must explain where you got the information from. Don't just use the first piece of information you find, ensure that the source you are using is correct by comparing a few answers from different sources.

Never copy and paste directly from a website. Read the information, put it into your own ideas and explain where you got the information from. There are a few different ways you can do this.

Example 1: *According to the National Geographic 2023, elephants use mud to create their own sun protection. They will throw the mud over their bodies with their trunks to protect their skin from the sun.*

Example 2: *One way you can tell the difference in species of elephant is by the shape of their ears. African elephants have the largest ears compared to the Asian elephants. (World Wildlife Fund, 2023)*

Task 1: Definition of key words

Write the definitions of the key words in the table below so that you understand them. Do not copy definitions straight from sources, attempt to use your own words where possible.

Key word	My definition:
Carbon	
Carbon Dioxide	
Combustion	
Greenhouse Gas	
Global Warming	
Climate Change	



Student Worksheet

Task 2: Investigate

What are some of the benefits of knowing what a carbon footprint is?

Task 3: Calculate

Calculate your own carbon footprint

Task 4: Action Plan

Describe the action you could take	Level of difficulty to do (Easy/medium/hard) Explain why you have chosen this level of difficulty.	Explain how this action would lower your carbon footprint



Student Worksheet

Task 5: Evaluate

Decide 2 actions that you could realistically commit to over the next year.

Action:	Evaluation: <i>Think about who might you need to help you achieve the action. Why is this a good action for you to do? What might stop you from doing this action? How could others take on this action?</i>
Action 1	
Action 2	

Task 6: Extend

Find the carbon footprint of NZ for a recent year and compare it to other countries. Does NZ have a higher or lower carbon footprint compared to other countries? What might be some reasons for the differences?

Task 7: Critique

If someone said, “It is impossible to change our global carbon footprint, it is far too hard”. What would you respond with and how could you use scientific evidence to back up your statements?



Student Worksheet

Task 8: Create

Create your own presentation on carbon footprint presentation to inform your school of the findings you have discovered in this inquiry.
This could be a poster/presentation/song/rap/poem/essay/artwork

Brainstorm your ideas here and get it signed off by your teacher before you start creating!

