How Big Is Your Footprint?

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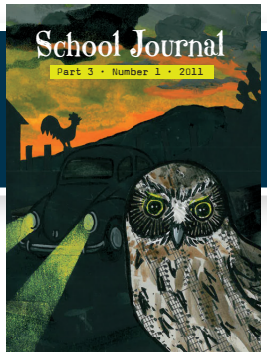
Noun frequency level: 9.5–10.5
Year 5



Overview

The introduction to this report depicts a futuristic Earth, dramatically changed by "the greenhouse effect gone mad". The article gives detailed information about the greenhouse effect, the effect it has on Earth, the concept of a carbon footprint, and how people can reduce their carbon footprints.

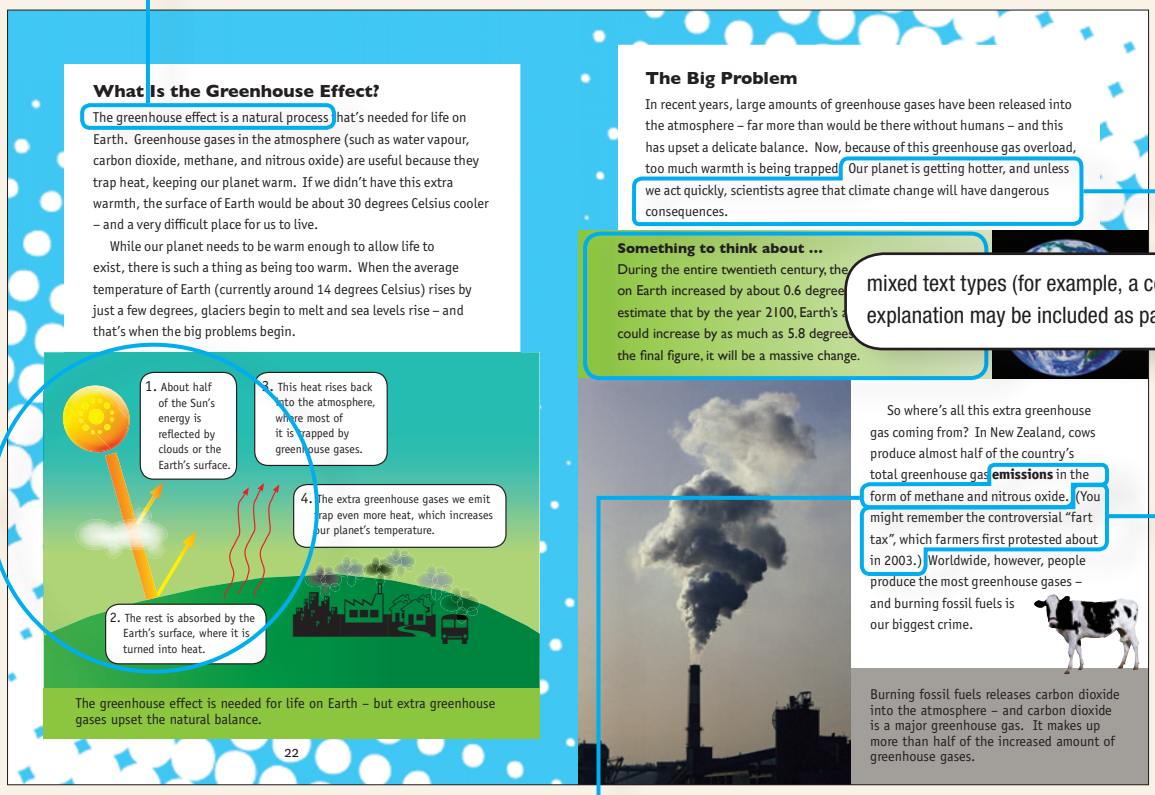
Although the content is complex, the use of clear headings, photographs, a labelled diagram, and a glossary provide strong support for readers. The use of questions addressed to the reader and some informal language also provide support, although students who are not familiar with these features may need extra help.

Texts related by theme ***Connected*** 1 and 2.08 | ***Connected*** 3.07 | ***Connected*** 3.02

Text characteristics from the year 5 reading standard

abstract ideas, in greater numbers than in texts at earlier levels, accompanied by concrete examples in the text that help support the students' understanding

sentences that vary in length and in structure (for example, sentences that begin in different ways and different kinds of complex sentences with a number of subordinate clauses)



What Is the Greenhouse Effect?

The greenhouse effect is a natural process that's needed for life on Earth. Greenhouse gases in the atmosphere (such as water vapour, carbon dioxide, methane, and nitrous oxide) are useful because they trap heat, keeping our planet warm. If we didn't have this extra warmth, the surface of Earth would be about 30 degrees Celsius cooler – and a very difficult place for us to live.

While our planet needs to be warm enough to allow life to exist, there is such a thing as being too warm. When the average temperature of Earth (currently around 14 degrees Celsius) rises by just a few degrees, glaciers begin to melt and sea levels rise – and that's when the big problems begin.

1. About half of the Sun's energy is reflected by clouds or the Earth's surface.
2. The rest is absorbed by the Earth's surface, where it is turned into heat.
3. This heat rises back into the atmosphere, where most of it is trapped by greenhouse gases.
4. The extra greenhouse gases we emit trap even more heat, which increases our planet's temperature.

The greenhouse effect is needed for life on Earth – but extra greenhouse gases upset the natural balance.

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The Big Problem

In recent years, large amounts of greenhouse gases have been released into the atmosphere – far more than would be there without humans – and this has upset a delicate balance. Now, because of this greenhouse gas overload, too much warmth is being trapped. Our planet is getting hotter, and unless we act quickly, scientists agree that climate change will have dangerous consequences.

Something to think about ...

During the entire twentieth century, the on Earth increased by about 0.6 degree estimate that by the year 2100, Earth's could increase by as much as 5.8 degrees the final figure, it will be a massive change.

mixed text types (for example, a complex explanation may be included as part of a report)

So where's all this extra greenhouse gas coming from? In New Zealand, cows produce almost half of the country's total greenhouse gas **emissions** in the form of methane and nitrous oxide. (You might remember the controversial "fart tax", which farmers first protested about in 2003.) Worldwide, however, people produce the most greenhouse gases – and burning fossil fuels is our biggest crime.

Burning fossil fuels releases carbon dioxide into the atmosphere – and carbon dioxide is a major greenhouse gas. It makes up more than half of the increased amount of greenhouse gases.

illustrations, photographs, text boxes, diagrams, maps, charts, and graphs that clarify or extend the text and may require some interpretation

a significant amount of vocabulary that is unfamiliar to the students (including academic and content-specific words and phrases), which is generally explained in the text by words or illustrations

some information that is irrelevant to the identified purpose for reading (that is, some competing information), which students need to identify and reject as they integrate pieces of information in order to answer questions

Reading standard: by the end of year 5

Possible curriculum contexts

SCIENCE (Living World)

LEVEL 3 – Ecology: Explain how living things are suited to their particular habitat and how they respond to environmental changes, both natural and human-induced.

ENGLISH (Reading)

LEVEL 3 – Purposes and Audiences: Show a developing understanding of how texts are shaped for different purposes and audiences.

ENGLISH (Writing)

LEVEL 3 – Purposes and Audiences: Show a developing understanding of how to shape texts for different purposes and audiences.

Possible reading purposes

- To find out about the greenhouse effect and climate change
- To identify how people can affect Earth's climate
- To explore one of the challenges facing Earth
- To evaluate the structure and features of the text, including the way the author has used headings and illustrations to shape the text.

See Instructional focus – Reading for illustrations of some of these reading purposes.

Possible writing purposes

- To describe how a local project or business can reduce its carbon footprint
- To describe one aspect of environmental change or damage in our local area
- To develop a plan for reducing our carbon footprints
- To plan for a debate (for or against) about the concept and possible consequences of climate change.

See Instructional focus – Writing for illustrations of some of these writing purposes.

The New Zealand Curriculum

Text and language challenges

VOCABULARY:

- Possible unfamiliar and/or specialist words and phrases, including "zone", "basking", "tepid", "degrees Celsius", "land mass", "occupation", "intensive", "greenhouse effect", "bad publicity", "carbon dioxide", "methane", "nitrous oxide", "currently", "absorbed", "infrared radiation", "emit", "released", "overload", "climate change", "dangerous consequences", "estimate", "emissions", "controversial", "fossil fuels", "weaning", "generates", "Deforestation", "carbon footprints", "efficiently", "globally", "clomping", "significant", "section", "crops", "appliances", "air conditioning"
- Colloquial words and expressions: "greenhouse effect gone mad", "that's when the big problems begin", "fart tax", "Basically", "First off", "the hard questions"
- Simile: "like a giant blanket"
- Metaphor: "carbon footprint".

Possible supporting strategies

Identify the vocabulary and concepts your students will need support with. Use strategies to preview key vocabulary before reading, such as having the students skim the illustrations and diagram, then discuss them and the concepts they represent. Record the students' descriptions in one column of the chart and then write the correct terminology in the other column.

After working on the vocabulary (and perhaps reading the first page), give pairs of students the subheadings "The Big Problem", "What is a Carbon Footprint", and "What Can I Do?" and ask them to write some ideas about what will be in the section, using the vocabulary and concepts that you've discussed. Have each pair share their ideas with other pairs. Ask the students what kind of text they think this is and what the features of that text are. Encourage them to make links to other texts they know that have similar features or content. Tell them to compare the text with their ideas as they read.

Give the students multiple opportunities to encounter the specialist words that are relevant to this topic (for example, "greenhouse gases", "emissions") before, during, and after reading and also with other topics and texts.

The English Language Learning Progressions: Introduction, pages 39–46, has some useful information about learning vocabulary in a second language.

SPECIFIC KNOWLEDGE REQUIRED:

- Knowledge of natural processes needed for life on Earth
- Some understanding of threats to Earth's environments
- Knowledge of the ways human behaviours contribute to and/or reduce climate change
- Some understanding of the scientific principles behind climate change.

Possible supporting strategies

Provide opportunities for students to explore the necessary background knowledge, facts, and information for this article. For example, they could read or reread related *School Journal* articles, watch DVDs or video clips about pollution, discuss the causes of environmental problems around the world, and share information about local efforts to reduce greenhouse gases.

TEXT FEATURES AND STRUCTURE:

- The futuristic introduction (in italics) and the illustration
- Questions and statements addressed directly to the reader
- The use of headings
- The use of ellipses and dashes
- The illustrations, photographs, and labelled diagrams.

Possible supporting strategies

Support the students to identify that the first two pages set the scene with a futuristic scenario. Prompt them to identify what may be different in the future and discuss why.

Review the features of a report, skimming the headings and illustrations to gain an overview of the article.

If necessary, support the students to identify the questions addressed directly to the reader and to discuss how they might respond to them. Students could work in pairs or small groups to compare the suggestions on pages 25–27 with what they already do or would like to do.

Sounds and Words

Instructional focus – Reading

Science (Living World, level 3 – Ecology: Explain how living things are suited to their particular habitat and how they respond to environmental changes, both natural and human-induced.)

English (Level 3 – Purposes and Audiences: Show a developing understanding of how texts are shaped for different purposes and audiences.)

Text excerpts from "How Big Is Your Footprint?"	Students (what they might do)	Teacher (possible deliberate acts of teaching)
What Is the Greenhouse Effect? The greenhouse effect is a natural process that's needed for life on Earth. Greenhouse gases in the atmosphere (such as water vapour, carbon dioxide, methane, and nitrous oxide) are useful because they trap heat, keeping our planet warm.	*Students identify the heading and expect to locate information that will answer the questions. They use word knowledge and knowledge of sentence structure to **identify the main idea** in the first sentence.* *Students **ask and answer questions** and **make connections** with what they already know about the greenhouse effect to establish how greenhouse gases are useful.* *Students locate the main clause and thus **identify the main idea** in the second sentence.*	**ASK QUESTIONS** to support students to identify the main idea. • How does the question in the heading help you to know the information in the first paragraph? • What is the main idea of the first sentence? • Did you know that the greenhouse effect was a natural process? What questions do you have about this? • What is the purpose of the bracketed information? What does it add to the main idea?
The greenhouse effect is needed for life on Earth – but extra greenhouse gases upset the natural balance. Worldwide, however, people produce the most greenhouse gases – and burning fossil fuels is our biggest crime. Burning fossil fuels releases carbon dioxide into the atmosphere – and carbon dioxide is a major greenhouse gas. It makes up more than half of the increased amount of greenhouse gases.	*Students **identify the main idea** in each section. They **make connections** between these ideas and **integrate** them to **infer** that human use of fossil fuels is upsetting the natural balance of greenhouse gases.*	**EXPLAIN** to the students that good readers often need to locate, evaluate, and integrate information from more than one part of the text. • Look at these extracts and think about the information in them. What is the main idea in each extract? • Look at the extracts together and identify the main idea from each sentence. Write it in note form. Use the notes to summarise the "big idea". • Evaluate how each idea is adding to your understanding of the greenhouse effect, then bring them together to understand the "big idea". This is called integrating the information. • Based on this, what does the author imply has had the biggest impact on the natural balance of greenhouse gases? • Reread the extracts and locate the pieces of evidence in each paragraph that support your inference.
What Can I Do? First off, ask yourself a few questions. Are you clomping around in size ten shoes when you could actually fit a size five?	*Students **ask and answer questions** to understand the shoe/footprint metaphor. They **make connections** with their knowledge of shoe sizes and **integrate** this with ideas from the text to **infer** the meaning of "clomping" in this context.*	**EXPLAIN** that a useful reading strategy is to ask questions in your head as you read. The questions you ask help you to find information. **MODEL** some possible questions: • What does clomping mean? Can someone show me what "clomping looks like? What does clomping mean in terms of a carbon footprint? Why has the author used this term? Together, write the meaning of this sentence without using the metaphor. Ask the students what the metaphor adds and why the author uses it. Students who know other languages may find it useful to think about how metaphor is used in that language.
		GIVE FEEDBACK • You've shared a lot of interesting ideas about how to reduce your carbon footprint. Making personal connections with the text is an excellent reading strategy for understanding what you've read. • I noted that you helped your partner work out how to read the labelled diagram. What were the main things you told her? • You asked some useful questions as you read the text. These obviously helped to clarify your understanding. Remember to ask questions as you read other texts to clarify your understanding.

METACOGNITION

ASK QUESTIONS to make students' strategies explicit for them.

- Why do you think the author used a futuristic introduction? What were you thinking when you read this? How did this affect your understanding of the rest of the article?
- This was a long article. Which particular reading strategies helped you to evaluate and integrate the information in it?
- How did asking questions help you to understand the text? How will asking questions help you when reading other texts?

Reading standard: by the end of year 5

The Literacy Learning Progressions

Assessment Resource Banks

Instructional focus – Writing

Science (Living World, level 3 – Ecology: Explain how living things are suited to their particular habitat and how they respond to environmental changes, both natural and human-induced.)

English (Level 3 – Purposes and Audiences: Show a developing understanding of how to shape texts for different purposes and audiences.)

Text excerpts from "How Big Is Your Footprint?"	Examples of text characteristics	Teacher (possible deliberate acts of teaching)
Fancy a holiday in Antarctica? It's now a food-growing zone, with people living in high-rise cities. Or maybe you'd like to visit Invercargill to lie on the beach – but watch out for the crocodiles basking in the tepid waters ...	**ENGAGING THE READER** *Authors use a variety of techniques to engage their readers. Addressing the reader directly (sometimes through questions), providing a dramatic scenario, and making controversial statements are all techniques used by authors to engage the reader's attention. They can be used to trigger thinking and "tune the reader in" to what is to come.*	**EXPLAIN** that authors of factual articles sometimes use a dramatic opening to connect with readers' prior knowledge or experiences. • It's a bit like advertising: a powerful opening can connect with the audience and keep them reading. • Refer the students to the notes you made about the effect of the first page and the techniques the author used to achieve that effect. Encourage them to select and adapt techniques to use themselves. • Think about how you'll engage your reader. What aspect of your topic could you use? What prior knowledge do you assume they hold? What prior knowledge will you connect to? • What questions do you want your readers to start asking?
Something to think about ... During the entire twentieth century, the average temperature on Earth increased by about 0.6 degrees Celsius. Scientists estimate that by the year 2100, Earth's average temperature could increase by as much as 5.8 degrees Celsius. Whatever the final figure, it will be a massive change.	**FACTS** *Using facts, supported by scientific evidence and detail, gives readers information as well as confidence that the author knows what he or she is talking about. Facts can be included in the main text or written as a separate "text box" alongside related information.*	**ASK QUESTIONS** to help students select information. • What are the important facts you want to communicate to your audience? Where will you find the facts? How can you be sure they are accurate? • How will you decide which facts are important and which are interesting but not essential? • How will you incorporate facts into the text? Will you need to use illustrations to help your readers understand the facts?
Ways to Reduce Your Carbon Footprint • Plant some trees – absorb CO_2 in your own backyard! • Eat less meat – crops are a more efficient way to use land. • Switch off appliances at the wall when you've finished with them.	**TEXT STRUCTURE** *Familiar text structures (for example, a set of bulleted instructions) support readers, allowing them to focus on the content.*	**PROMPT** students to use an appropriate text structure. • How will you organise the information you want to convey? What kind of structures will be familiar to your audience and will support them to understand what you're writing? • Remember to use what you know about text structure. Using features of texts that you know, have read, or have studied can be useful, but you need to keep in mind your own purpose and audience.
	TEXT FEATURES *Features such as headings, diagrams, explanations, bulleted lists, or glossaries allow authors to organise their thoughts and material so they can help readers to understand the information.*	**TELL** the students to identify the features of this text. • Notice the way headings and illustrations are used. Will these suit your purposes? If not, what features will you use? • Do you need to use a glossary for some technical words? How will you make sure the definitions will work for your audience? • Will you give your readers guidelines or instructions? How could they help convey your purpose?
		GIVE FEEDBACK to affirm students' writing decisions. • This is a great opening paragraph because you implied that something very important is happening. I really want to find out what. • I can tell you've taken time to research your topic because of these facts and details. • The questions you've asked the reader are very thoughtful. They will help your reader to think twice before they drop rubbish again – and maybe they'll stop doing it altogether.

METACOGNITION

ASK QUESTIONS to help students think more deeply about their purpose and audience when they write.

- Will your readers be able to understand the words and phrases you've used? If not, how can you help them?
- What will your readers know already about this topic? How will you make connections to what they know?
- Why did you choose this topic? How did you get your audience to be as interested in it as you are?

Writing standard: by the end of year 5
The Literacy Learning Progressions