

WithOnePlanet

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Question

Lesson 2

Teacher notes

The real question about carbon

Years

5 to 6



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INQuIRY



The real question about carbon

Lesson 2: Teacher notes

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This document provides the teacher with the details of the lesson.



At a glance

To use the understandings, information and questions developed during the *Introduce* phase of the *INQuIRY* process to assist students in determining the essential questions that will form the basis of their investigation.

Students will:

- > distil the learning from the *Introduce* phase and consider the key questions that arise for them from this learning
- > develop one or more essential questions about carbon for use in the *Investigate* phase of the *INQuIRY* process.

INQuIRY focus: Question

The focus of the *Question* phase is for students to develop an essential question or a small number of essential questions that accurately reflect their ideas and thoughts from the *Introduce* phase and can act as a springboard for their learning in the *Investigate* phase.

Key lesson objectives

Science

Students will be able to represent their current understanding as they:

- > develop essential question(s) about carbon as a chemical, a component of other chemicals and as a source of electricity, as well as the consequences for the use of carbon on life on Earth.



Literacy

Students will be able to:

- > reflect on their ideas from the *Introduce* phase
- > contribute to discussions about the key concepts and components of the essential question.

This lesson also provides opportunities to monitor the development of students' general capabilities.

Teacher background information

Essential questions

Wiggins and McTighe (1998); OCM BOCES (2013) outline the following core attributes of successful essential questions:

Core-Focused, INQuIRY-Based, Reinforce Thinking Skills, Interdisciplinary, and Engaging.

At Years 5 and 6, it is likely that students will need to be introduced to the key characteristics of essential questions and therefore would not have any prior experience of this specific thinking and learning tool. Students will require substantial support and guidance, in the form of scaffolding and modelling, to be able to construct their own essential question, either as a whole class, or in small groups. Use the *Essential questions guide* document and *The real question about carbon Student worksheet* to assist students with their learning.

The development of the essential question(s) is a natural progression from the student-provided understandings, thoughts, observations and questions that have arisen in the *Introduce* phase of the *INQuIRY* process.

Through summarising and paraphrasing student contributions from the *Introduce* phase, as well as through the use of stimulating and clarifying questioning, the teacher can act as a facilitator in the development of the essential question.

The *WithOnePlanet Module 1: Natural Science; Unit 1: Carbon – Science curriculum* is based on 5 essential questions that are considered at each stage in the students' schooling from F to 10. These are shown in Table 1 below. In addition, the specific *WithOnePlanet Big ideas* for Years 5 and 6 are also a key stimulus for the development of the essential question(s) at this stage in the *INQuIRY* process. These are shown in the table below.

Table: WithOnePlanet Big ideas for Years 5-6

Big Ideas	What is carbon?	What is the carbon cycle?	What is climate change and what role does carbon play in it?	What is my carbon footprint and how can I reduce it?	What can be done to mitigate climate change on a regional scale?
Years 5 to 6	Carbon is a chemical substance that can join chemically to other substances to form molecules such as carbon dioxide, crude oil and sugars.	Humans can make use of natural processes that occur in the carbon cycle to generate electricity. Some of these processes produce carbon dioxide as a by-product.	When atmospheric temperatures rise, there are many consequences for the living and non-living things on the Earth.	I can reduce my carbon footprint by making some simple changes to my daily life.	People in other places in the Asia-Pacific region have lifestyles with a variety of carbon footprints for a variety of reasons.

Sources:

Wiggins, G & McTighe, J 1998, *Understanding by design*, Association for Supervision & Curriculum Development, Alexandria, VA.

OCM BOCES 2013, *Curriculum Mapping Essential Questions Guide*, viewed 1 December 2013, <http://www.ocmboces.org/tfiles/folder1682/OHS_essentialquestions.pdf>.

These essential questions can provide a stimulus for, and form the basis of, the essential questions that students develop in the *Question* phase of the *INQuIRY* process. However, the questions that the students arrive at may not necessarily be exactly the same as these *WithOnePlanet Big ideas* essential questions. This is preferable as it is important that the questions are student-driven rather than provided by the teacher. Student ownership and engagement in the unit is important. However, it is also important that the teacher plays the role of effective facilitator and gently guides the students' thinking in an appropriate direction using the techniques outlined above.

Some examples of possible student-derived essential questions include:

- > Why is carbon such an important chemical?
- > Why is carbon-dioxide such a problem for life on Earth?
- > Is there a way to make electricity from carbon that does not contribute to climate change?
- > Is it a good idea to take carbon out of the Earth to use as a source of electricity?
- > How can we reduce the amount of carbon-dioxide being produced?
- > What decisions can we make as students that will help to reduce the carbon footprint of ourselves and our families?
- > What impact will our efforts to combat climate change have on the lives of people in the Asia-Pacific?

Equipment

For the Class

A summary of the students' ideas from the *Introduce* phase in Lesson 1.

Preparation

- > Read the Essential questions guide document. OCM BOCES 2013, *Curriculum Mapping Essential Questions Guide*, viewed 1 December 2013, <http://www.ocmboces.org/tfiles/folder1682/OHS_essentialquestions.pdf>.
- > Review and summarise students' ideas from the *Introduce* phase, including responses to both the *KWHL chart* and *Carbon on my mind ... map Student worksheets*. Focus in particular on the **H** phase (i.e. How?) of students' *KWHL* responses.
- > Using students' ideas and the *WithOnePlanet Big ideas* (see table above), generate some possible essential questions that can act as a teacher reference guide when facilitating student discussion of the essential question during the lesson.

Lesson steps

1. Students to review their own ideas, *KWHL charts* and *Carbon on my mind ... maps* from the *Introduce* phase.
2. Provide the class with a brief summary of their ideas from these activities, focusing particularly on the **H** phase (i.e. How?) of their *KWHL charts*, as these are already in the form of questions.
3. Explain to students that in order to investigate their ideas further, it is valuable to come to a consensus about key ideas, thoughts and *questions* that the students have thought of so far.
4. Use the *Essential questions guide* to introduce students to the idea of essential questions - what they are, the role they play in learning and the key attributes that make a good essential question. Provide students with some examples of essential questions, as shown in the *Essential questions guide*.

5. Introduce *The real question about carbon Student worksheet* to the students, and facilitate the development of an essential question - related to Lesson 1 and the *WithOnePlanet Big ideas* – with the class. Students can complete the worksheet by themselves and take part in whole class discussions about students' ideas. Alternatively, students can work in small groups and each group can present their ideas to the rest of the class.
6. From this essential question, students should form small groups of no more than 3 students. Students to brainstorm a list of the concepts and other questions that they feel they need to research and/or answer in order to answer the essential question.
7. Each student group to provide feedback from their discussions. The teacher can generate a list of the key concepts and questions that students have generated. This will inform teacher planning of the *Investigate* phase of the *INQuIRY* process.