

Engineering our climate

Teachers' notes

Lesson1: *What is plan B?*

Where does it fit? This lesson is likely to come after a series of lessons on causes and consequences of climate change. This could be used to introduce a potential solution and to start to exemplify the complex nature of finding 'solutions'. Students will have already looked at existing local, national and international responses to climate change.

This lesson aims to introduce the concept of geo-engineering. Students will learn what geo-engineering techniques are and should begin to challenge the idea by weighing up the pros and cons and asking geographical questions about the issue. It is important to stress that many scientists do not consider geo-engineering as an alternative to reducing emissions but as a means of coping with the effects in the shorter term. Reducing carbon emissions is plan A.

Starter

Start by asking students why we need to save the world and what are we saving it from. Most students will identify global warming as the issue.

Use fact: If annual emissions continue to increase by current rate global temperatures could rise by 5.5 degrees C by 2100. Students will respond to this and will probably know that this is a worst case scenario.

Then ask students how they would save the world and they use *The Times* article to help them. By identifying the top three ways students begin to think about solutions.

As geo-engineering is likely to be a new term for A level students and clarification of the term will be needed. Geo-engineering is used to describe modification of the Earth's systems to meet human demands. It is most commonly linked to methods of manipulating the Earth's climate to counteract the effects of global warming from greenhouse gas emissions.

With that in mind students will then be able to identify geo-engineering techniques from the list.

Main activities

Crazy but true

The idea of this is to show that although some of the techniques may sound or look a bit strange the scientific theory could work and in many cases it does. Students should work in pairs or small groups (no one should be on their own so allowing discussion).

Each group has a blank sheet with the basic information about the technique they need to think about. Depending on class size and ability some groups could be given more than one sheet. The techniques are not described in depth, so gives the students opportunity to think about the actual methods they think will be used. You may need to help explain some of the techniques as you go round class, ensuring they are on the right track. Students should be discussing amongst themselves what they think the positives and negatives are for their technique – they may need guidance. During the feedback allow time for discussion of the ideas and students initial responses to them.

Students will then have to assess the various techniques and decide how they would choose one to be used. This activity allows students to consider cost benefit analysis and gives them opportunity to discuss with their groups their thoughts and ideas.

Challenge the concept

This task aims to get students to think and to ask geographical questions about a new concept. Explain that geo-engineering raises a number of questions and ask students to consider economic, environmental, political, social and ethical areas. Allow students free reign to ask anything that they would want to know before giving the go ahead for actually implementing geo-engineering techniques. Once students have written questions onto paper and placed them in a pile, another student can select a question. The purpose of this is not to answer the questions but to demonstrate the range of questions that geo-engineering poses and as a result shows why it is a current controversial issue.

Plenary

Vote with your feet

This is for students to weigh up all the information that they have absorbed during the lesson and to see if they can identify where they stand on the issue. As an extension students might ask their own big questions. The idea of this is to show that there are no correct answers but it is important to be able to justify position. This can then relate to A2 level exam responses.