

Learning Intentions

For students to:

- Investigate, collect and present evidence
- Work effectively in a group
- Use new vocabulary such as: finite and renewable resources, mitigation, contraction and convergence, off-setting carbon and carbon credits

Context:

- graph displaying varying use of CO₂ by different countries
- information on how long people live, literacy levels, types of jobs people do and energy use per person

Resources

Provided

- Graph on national emissions per capita in 2002
- Student worksheet – Talking graphs

Needed

- Atlases providing country statistics

Links to National Curriculum subjects

Science KS3

Analysing and evaluating evidence about energy use (1.1b)

Geography KS3

Enquiry and skills (1a, 1c, 1d, 1f, 2a, 2c)

Knowledge and understanding of places (3a, 3b, 3c, 3d, 3e)

Patterns and processes (4a, 4b)

Environmental change and sustainable development (5a, 5b)

Breadth of study (6d, 6e, 6h, 6i, 6j, 6k)

1. Talking graphs

Overview

'Talking graphs' encourages students to consider energy use in different countries. Students will carry out independent research and use this information to explore the potential impact of CO₂ on the environment and to consider questions of justice.

Teaching activity

This activity works well if students have studied China and the United States. It is particularly suited for GCSE level or for students who have almost finished the National Curriculum Key Stage 3 curriculum, as it is helpful if they understand development indicators.

- 1 Provide students with atlas notes about countries.
- 2 Give students flags of two countries; some might choose to select other countries where they have more knowledge, eg. France and India.
- 3 As a group, discuss the ways in which these countries are different using the sheets from the atlases.
- 4 Introduce the idea of CO₂ emissions and the role of cars, planes, factories, etc in emitting CO₂.
- 5 Ask the students in pairs to look at the graph and discuss the questions on their worksheet 'Talking graphs'.

Questions include:

- How do you think the countries produce CO₂?
 - If the weather changes and there is less food due to flooding or drought, who will be able to afford to buy food in your countries?
 - If the ice at the poles melts, which country might be worst affected by sea flooding?
 - Should either of these countries change their practices? Should one alter more than the other?
- 6 Use the concluding discussion to introduce the concept of contraction and convergence (see http://en.wikipedia.org/wiki/contraction_and_convergence for more information). Plants are one of the biggest carbon stores and play a significant role in mitigating CO₂ emissions. Much is made of planting trees to off-set climate change but plants can acclimatise to extra levels of CO₂ (see page 18 in Plants and Climate Change: which future?). Discussions could focus on off-setting, as some pupils may have thought about paying for trees to be planted when they fly.

Students are likely to believe that re-cycling will have the greatest impact on reducing waste. However, it is important for them to understand that transport, food packaging and processing generate a great deal more waste. Increasing population is also a common factor in the rising need for energy. To appreciate this, students can look again at the graph.

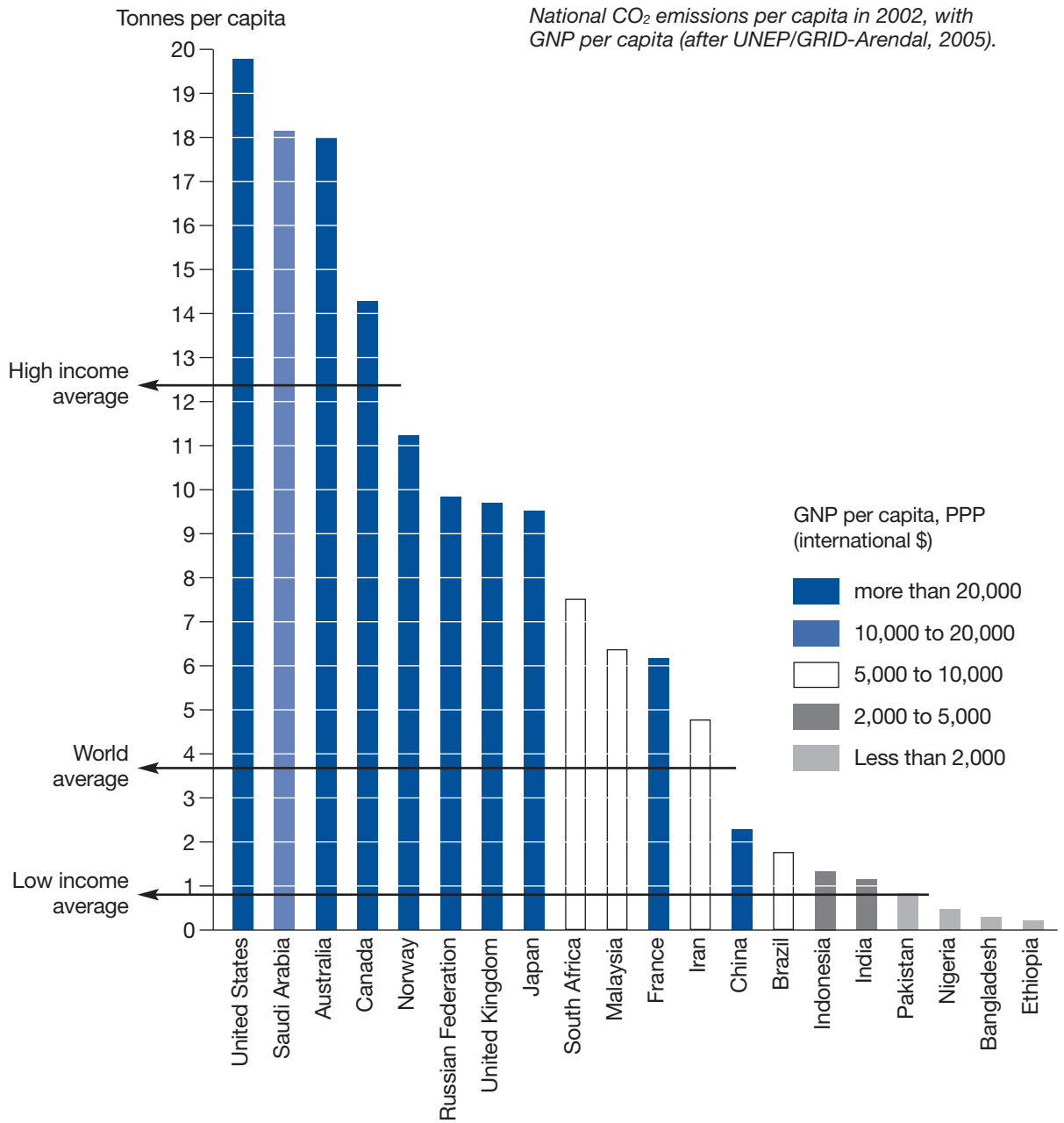
Follow up activities for students

See Making a difference section of the worksheet.

Assessment

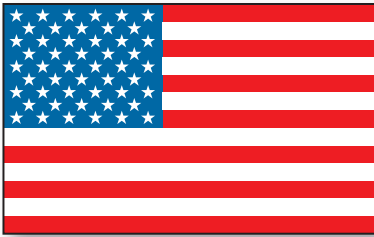
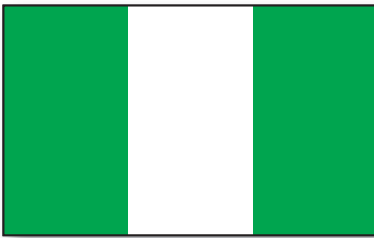
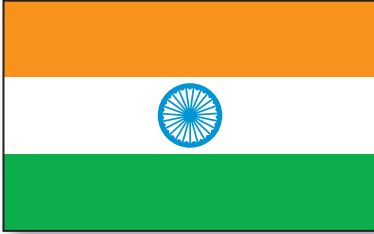
Students worksheets can be assessed for levels of response

- No recognition of role of CO₂ climate change
- Some recognition of role of CO₂ on climate change
- Notice made of small details and an awareness of the role of CO₂ in climate change
- Awareness of the role of a responsible citizen to alter the factors which are causing climate change



1. Talking graphs

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Discussion

Use the following questions to frame your discussion:

- In what ways do your countries produce CO₂?
Country 1
Country 2
- If the weather changes and there is less food due to flooding or drought, who will be able to afford to buy food in your countries?
Country 1
Country 2
- If the ice at the poles melt, which country would be worst affected by sea flooding?
Country 1
Country 2
Why?
- Should either of these countries change their practices? Should one alter more than the other?

Making a difference

Some people choose to lessen (mitigate) the amount of CO₂ they produce from transport (eg. car journeys, flights) and electricity use by buying carbon offsets. This involves people paying a sum of money to support projects that produce renewable energy. You can find out more about this on the internet.

- Find out what activities and/or projects can be used to off-set carbon emissions?
- If you planted trees what kind of trees would you plant and why?

Remember that an old tree will store much more carbon than a young tree. Also some trees are better than others for providing habitats for different species of insects and animals.

- Do you know how much CO₂ your family produces? Why not carry out a carbon audit?

There are plenty of carbon calculators on the website. Two that you might like to try are The Woodland Trust (<http://www.carbonbalanced.org/>) and Carbon Footprint Limited (<http://www.carbonfootprint.com/calculator.aspx>). For some of the calculations you will need an adult to provide you with information about how much energy your household uses. You may be surprised at the results and decide to help the planet by cutting your carbon emissions.

- What did you find out?
- Can you think of ways to cut your carbon emissions?
- What challenges do you face about cutting your carbon emissions?