

Name: .....

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Date: .....

## WithOnePlanet

- > Module 1:  
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# Investigate

Lesson 4

Student worksheet

Tip-toe through the greenhouse jigsaw

Years **9** to **10**



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INQuIRY



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# Tip-toe through the greenhouse jigsaw

## Lesson 4: Student worksheet

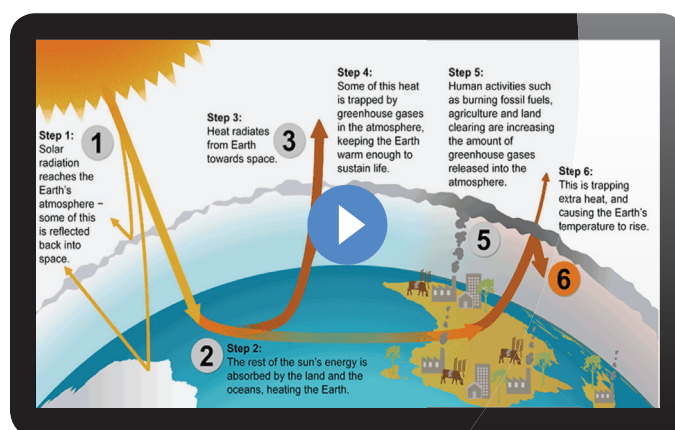
### Tipping points and the Earth's climate system

#### Introduction

You have now watched the video 'Wake up, freak out, then get a grip'. These following videos contain a lot of information about the Earth's climate, all of the tipping points that potentially exist and what might happen if the Earth moves past them.



The Greenhouse Effect: [http://www.climatechange.gov.au/sites/climatechange/files/files/CLIMIGS-GreenhouseEffect-02-OptimisedAnimation-870px\(23Sep13\).gif](http://www.climatechange.gov.au/sites/climatechange/files/files/CLIMIGS-GreenhouseEffect-02-OptimisedAnimation-870px(23Sep13).gif)



Climate Change in a Nutshell 2: What is climate? <http://vimeo.com/19798261>



Source:

The Greenhouse Effect: online video viewed 24 February 2014, <<http://www.climatechange.gov.au/greenhouse-effect>>. Climate Change in a Nutshell 2: What is climate? online video viewed 24 February 2014, <<http://vimeo.com/19798261>>. Leo Murray: Wake up, freak out, then get a grip: online video viewed 24 February 2014, <[vimeo.com/1709110](http://vimeo.com/1709110)>.

In this jigsaw activity, you will become an 'expert' on one main area of the Earth's climate and use your knowledge to explain how it works to others in your 'home' group.

## The Earth's climate system

The 'Wake up, freak out, then get a grip' video mentions the following components of the Earth's climate system. You will need to become an expert on ONE of the components.

1. Albedo effect
2. Uncondensed water vapour
3. Ocean acid concentrations
4. Plants absorbing CO<sub>2</sub>
5. Melting permafrost
6. Stored methane

## How a jigsaw activity works

This type of activity is known as a jigsaw. A jigsaw activity involves the formation of these two types of groups.

### The home group

This is a group of learners who will teach each other about the key question or topic area. Each member of the home group will become knowledgeable about a particular key question and report back to the rest of the home group members. For this activity, there must be six members of each home group – one for each of the six components of the Earth's climate, as outlined above.

### The expert group

This is a group of learners who will help each other to all become experts about one particular component of the Earth's climate – 1. to 6., as outlined above.

In a jigsaw, every student is a member of both a home group and an expert group.

## Home groups

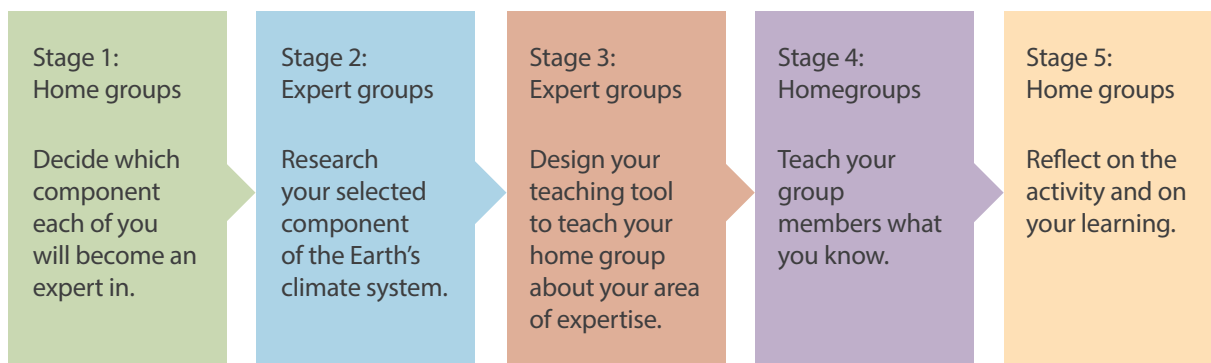
The Home groups for this activity are listed below.

Home group 1	Home group 2	Home group 3
Add names here ...	Add names here ...	Add names here ...

Please assemble into your home groups and, together, read through the steps you need to take to complete Stage 1 below.

## Stages of the jigsaw activity

This jigsaw activity is divided up into 5 stages. See the summary below for an overview of the stages. More information on each stage is provided on the following pages.



### Stage 1: Home groups

- > Your task, as a home group, is to educate your group about the 6 components of the Earth's climate.
- > You will do this by each member becoming an expert on one of the 6 components.
- > This expert will then be responsible for teaching the other home group members about their component.

#### What to do:

- > Decide which group member will be become an expert for which of the 6 components. If there are more than 6 members of your group, one of your key questions will need to have two experts.
- > Once you have done this, proceed to Stage 2.

### Stage 2: Expert groups

- > It is the task of each expert group to become experts on one of the components of the Earth's climate.
- > To do this, you will need to research and then summarise information that clearly explains the specific component.

#### What to do:

- > As a starting point for your research, look at the list of resources for your particular component provided on the last page of this document.
- > As a group, work out how you are going to review these resources (Eg, are you going to look at each resource together, or are you going to divide up the resources between members of your group?).
- > Use the resources to produce a summary that answers your key question. The summary should:
  - Include both dot points (not paragraphs) AND helpful images / diagrams
  - Be neat and clear to read
  - Have all new scientific terms defined
  - Have a list of references

### Stage 3: Expert groups

- > Now that you are an expert on a specific component of the Earth's climate, it is time to produce a teaching tool that will educate your home group about that component.

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**What to do:**

- > Referring to your summary, completed in Stage 2, think about how best to communicate the key points of your research.
- > Consider including a number of following alternatives in your teaching tool:
  - Dot points (NOT paragraphs or slabs of text)
  - Images/diagrams
  - Infographics
  - Videos/animations
  - Additional resources – where students can go to find out more
- > Once you have completed the design of your teaching tool, test its effectiveness by presenting to the other members of your expert group.

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### Stage 4: Home groups

- > Now that you have become an expert on your particular component, it is your responsibility to teach the other members of your Home group about what you learned.

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**What to do:**

- > Take turns - going in order from Component 1 through to 6 - to present your findings to the rest of your group.
- > Using your teaching tool, take at least 3-5 minutes to present your information.
- > If you are not presenting, it is your responsibility to make sure you understand what the presenter is talking about. Please ask questions if you are unsure.

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### Stage 5: Home groups

- > It is now time to reflect on two things:
  - a. How effectively you taught the other members of your home group.
  - b. How well you now understand all of the other components of the Earth's climate system.

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**What to do:**

- > Discuss your thoughts on the following questions as a home group.
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## Stage 5: Home groups (continued)

### Reflective questions

1. Do you think you effectively taught your home group about the key question you researched? Why/why not?
2. Were you able to answer all of your home group's questions?
3. In what ways could you have improved your teaching technique or presented the information differently?
4. Do you think you now have a good overall understanding of the components of the Earth's climate system? Why/why not?
5. If you are unsure about a particular component or detail, what strategies can you use to develop your understanding further?
6. Did you like participating in this jigsaw activity? Why/why not?
7. If you were to do a jigsaw activity again, is there anything you would change about it?

## Resources for researching components of the Earth's climate system

Try some of these resources below, as well as some of your own.

### 1. Albedo effect

Albedo infographic explanation:

[http://thumbnails.visually.netdna-cdn.com/albedo-effect\\_5124571a1c371.jpg](http://thumbnails.visually.netdna-cdn.com/albedo-effect_5124571a1c371.jpg)

### 2. Uncondensed water vapour

Article (Goreham 2013) asserts that climate change is dominated by water cycle, not carbon dioxide:

<http://communities.washingtontimes.com/neighborhood/climatism-watching-climate-science/2013/oct/7/climate-change-dominated-water-cycle-not-carbon-di/>

Article (NASA 2008) confirms water vapour as major player in climate change:

[http://www.nasa.gov/topics/earth/features/vapor\\_warming.html](http://www.nasa.gov/topics/earth/features/vapor_warming.html)

Article (NASA 2004) asks, Will runaway warm water heat the world?: [http://earthobservatory.nasa.gov/Features/WaterVapor/water\\_vapor.php](http://earthobservatory.nasa.gov/Features/WaterVapor/water_vapor.php)

### 3. Ocean acid concentrations

Ocean acidification cartoon explanation:

<http://www.birdandmoon.com/acidification.html>

Ocean acidification video – via Scootle:

<http://www.scootle.edu.au/ec/viewing/R11656/index.html>

### 4. Plants absorbing CO<sub>2</sub>

Article (CSIRO 2007) confirms deforestation plays a critical climate change role:

<http://www.csiro.au/news/GlobalCarbonProject-Deforestation>

### 5. Melting permafrost

*Sydney Morning Herald* article (Darby 2013) reveals faster melting of Antarctic permafrost:

<http://www.smh.com.au/environment/climate-change/melting-of-antarctic-permafrost-speeds-up-20130725-2qmr.html>

Article (Lemonick 2013) examines the tipping point on melting permafrost:

<http://www.climatecentral.org/news/nearing-a-tipping-point-on-melting-permafrost-15636>

## 6. Stored methane

Australian Academy of Science article (2013) discusses the problem with methane gas:

<http://www.science.org.au/nova/118/118key.html>

## Bibliography

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Darby, A 2013, 'Melting of Antarctic permafrost speeds up', *The Sydney Morning Herald*, 25 July, viewed 19 December 2013, <<http://www.smh.com.au/environment/climate-change/melting-of-antarctic-permafrost-speeds-up-20130725-2qmr.html>>.

Goreham, S 2013, 'Climate change is dominated by the water cycle, not carbon dioxide', *The Washington Times*, 17 October, viewed 19 December 2013, <<http://communities.washingtontimes.com/neighborhood/climateism-watching-climate-science/2013/oct/17/climate-change-dominated-water-cycle-not-carbon-di/>>.

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NASA/Holli Riebeek 2004, *Will Runaway Water Warm the World?* Viewed 19 December 2013, <[http://earthobservatory.nasa.gov/Features/WaterVapor/water\\_vapor.php](http://earthobservatory.nasa.gov/Features/WaterVapor/water_vapor.php)>.