

# Forests, timber and climate change

## Forests NSW Commercial Services

### The current challenge

Climate change is a current global concern. The increase in carbon dioxide and other gases in the atmosphere has been associated with global warming or the greenhouse effect.

Forests and forest products play a vital role in using and reducing these greenhouse gases, which influence the greenhouse effect.

### The greenhouse effect explained

The greenhouse effect occurs naturally. A combination of gases in the Earth's atmosphere are known as greenhouse gases. These include carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), water vapour and nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs). These gases form a shield around the Earth.

Sunlight passes through the Earth's atmosphere and is reflected back into space. Some of this reflected light will be trapped by the greenhouse gases. This is the greenhouse effect, which is a natural process that maintains an average temperature of 16°C on Earth, and ensures the survival of plant and animal life.

If there were no greenhouse gases in the Earth's atmosphere, the environment would be similar to that of the moon which has no evidence of life.

Only about 1% of the Earth's atmosphere is made up of naturally occurring greenhouse gases. If this fine balance of gases is increased, there could be significant effects on Earth. These could include increases in the average temperature, changes in the world's rainfall pattern and vegetation cover, and rising sea levels from melting ice caps.

Greenhouse gas emissions have increased due to human activity since the industrial revolution started in the 1800s. These activities include the burning of fossil fuels, increased mining and the clearing of forested land for agriculture and housing. Carbon dioxide is the main greenhouse gas produced from these activities. Scientists believe carbon dioxide levels increased by 25% between 1900 and 1985.

### Use of carbon dioxide in forests

Plants carry out a process called photosynthesis. They take in carbon dioxide from the air through their leaves and use energy from the sun to make food. As part of this process the carbon is then stored or 'fixed' within the stems, leaves and branches of the plant, and oxygen is released into the air. 50% of the dry weight of plant biomass is carbon with one tonne of carbon representing 3.67 tonnes of CO<sub>2</sub>. The carbon dioxide is only released again when the plant is burnt or decomposes.

### Carbon credits

Carbon credits are recognised reductions or absorptions of carbon relative to the normal way of doing things. A carbon credit is equivalent to one tonne of carbon dioxide (CO<sub>2</sub>). Within NSW carbon credits from eligible forests may be created by accredited entities under the NSW Greenhouse Gas Reduction Scheme ([www.greenhousegas.nsw.gov.au](http://www.greenhousegas.nsw.gov.au)).

Companies or individuals who create more carbon certificates than they need can sell the extra certificates to others who need to reduce their greenhouse gas emissions.

## The role of planted forests

New pine and eucalypt plantations in NSW are established on existing cleared land. The larger the area of plantations established and the faster they grow, the more carbon dioxide will be removed from the atmosphere, thus reducing the imbalance in the greenhouse effect.

## The advantages of using timber

Timber and other wood products store the carbon dioxide they absorbed when they were growing trees. The carbon stored in the timber will not be released even when a tree has been harvested and processed into timber products.

Plastics (derived from petrochemicals) and metals such as steel or aluminium actually produce greenhouse gases during their manufacture. Even the process of extracting some raw materials from the ground, such as bauxite for aluminium, results in greenhouse gas emissions.

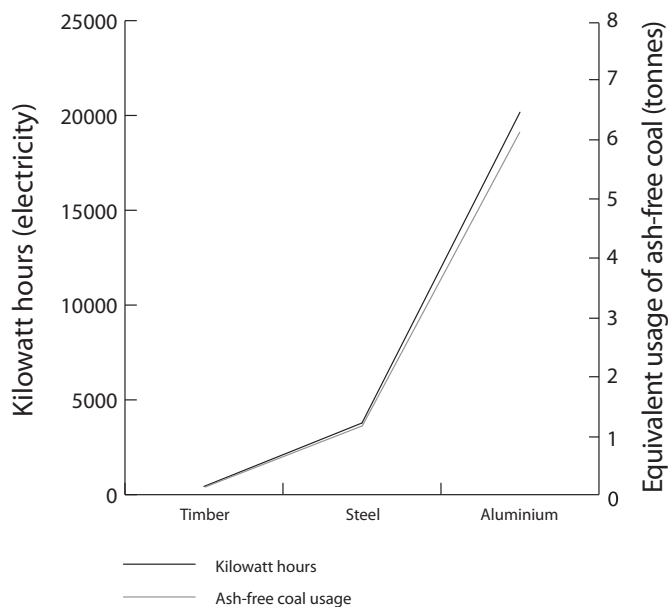


Figure 1: Comparison of energy usage in production of building materials (producing one tonne of each)

The figure above shows that it takes far less energy to produce timber than it does to produce steel or aluminium for use as building materials.

Energy is equivalent to electricity. The main source of electricity in NSW is coal. Coal is formed from dead plant matter after millions of years of heat and compression. Coal therefore contains large amounts of carbon, which is released into the air when it is burnt to make electricity. So, the less electricity used, the less carbon dioxide released into the atmosphere.

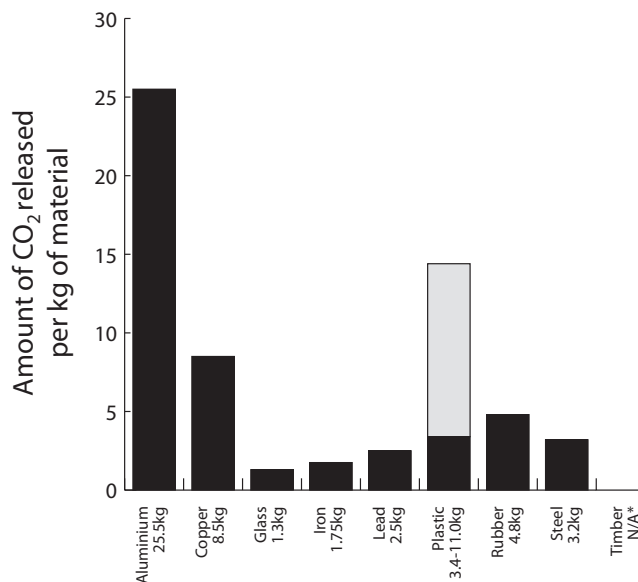


Figure 2: Amount of carbon dioxide released during manufacture of different materials

\* Timber contains stored carbon dioxide from the atmosphere. Although some carbon dioxide is released during the milling of timber, the net effect is that 8.3 kg of carbon dioxide is actually absorbed during both the growth and processing of timber and no carbon dioxide is produced.

The CRC for Greenhouse Accounting studied the greenhouse implications of substituting forest products for alternative materials in house construction. By choosing wood products wherever possible, greenhouse gas emissions equivalent to up to 25 tonnes of carbon dioxide per house could be saved. This is because wood requires much less energy in its manufacture than competing materials and also because it continues to store the carbon sequestered by trees.

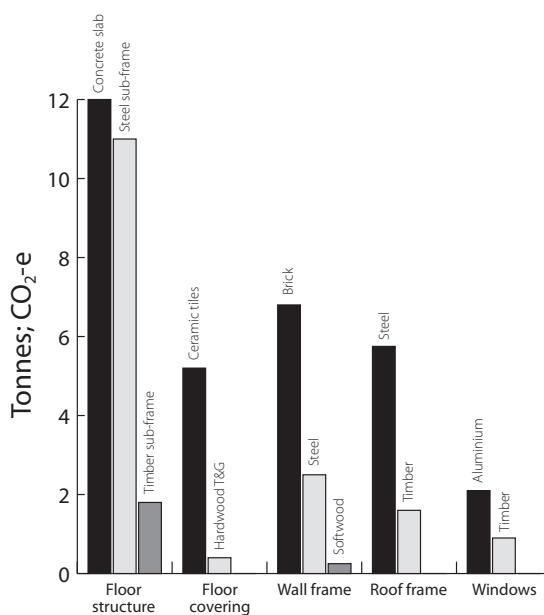


Figure 3: Greenhouse gases emitted in the manufacture of building materials used in a range of construction components for a single storey house in Sydney, Australia

Forests and forest products have an important role in reducing greenhouse gases. Young, actively growing regrowth forests and plantations take in large amounts of carbon dioxide from the air. Older and mature forests are an important storehouse of carbon. Timber products not only require far less energy to produce than alternatives such as steel and aluminium, but also act as a long-term storage for carbon.

### For further information

Forests NSW website  
[www.dpi.nsw.gov.au/forests](http://www.dpi.nsw.gov.au/forests)

TimberCAM a timber carbon accounting model developed by NSW DPI  
[www.dpi.nsw.gov.au/forests/timbercam](http://www.dpi.nsw.gov.au/forests/timbercam)

Intergovernmental Panel on Climate Change  
[www.ipcc.ch](http://www.ipcc.ch)

United Nations Framework Convention on Climate Change  
<http://unfccc.int/2860.php>

Greenhouse Gas Reduction Scheme  
[www.greenhousegas.nsw.gov.au](http://www.greenhousegas.nsw.gov.au)

Australian Government  
Department of Climate Change  
[www.greenhouse.gov.au](http://www.greenhouse.gov.au)

*Temperatures rise in the global greenhouse*  
by Gribbin, J, *New Scientist* 110 (1508): pp32–33.

*'Greenhouse gases: evidence for atmospheric changes and anthropogenic causes'*  
in Pearman (ed) *Greenhouse*, E. J. Brill Publishers, Leiden, p.752.

*'Organic matter accumulation in a series of Eucalyptus grandis plantations'* in *Forests Ecology and Management* 17: pp231–242.

*Timber in building construction ecological implications*, Lawson, W.R, University of NSW, 1996.

InWood International Magazine, Issue 55,  
Feb-Mar 2004

### For more information on forests and forests management contact:

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website: [www.dpi.nsw.gov.au/forests](http://www.dpi.nsw.gov.au/forests)

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[www.dpi.nsw.gov.au/primefacts](http://www.dpi.nsw.gov.au/primefacts)

Disclaimer: The information contained in this publication is based on knowledge and understanding at the time of writing (October 2008). However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up-to-date and to check currency of the information with the appropriate officer of New South Wales Department of Primary Industries or the user's independent adviser.

# Forests, Timber and the Greenhouse Effect



Use the fact sheet to answer the questions below. Questions marked with \* require a personal response or further research.

**Q1** *The greenhouse effect is a natural phenomenon, so what's the problem?*

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**Q2** *Name some greenhouse gases*

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**Q3** *Design a diagram to explain the greenhouse effect.\**

**Q4** *How do people enhance the greenhouse effect?*

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**Q5** *Why are planted forests referred to as carbon sinks?*

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**Q6** *What is a carbon credit?*

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**Q7** *Explain the role young and mature forests play in reducing greenhouse gases*

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## Q8 *What are the advantages of using timber?*

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## Q9 *Use the information in the fact sheet to complete these graphs*

**(a) Comparison of energy used in production of building materials (one tonne of each). Use a line graph for electricity and a bar graph for coal**



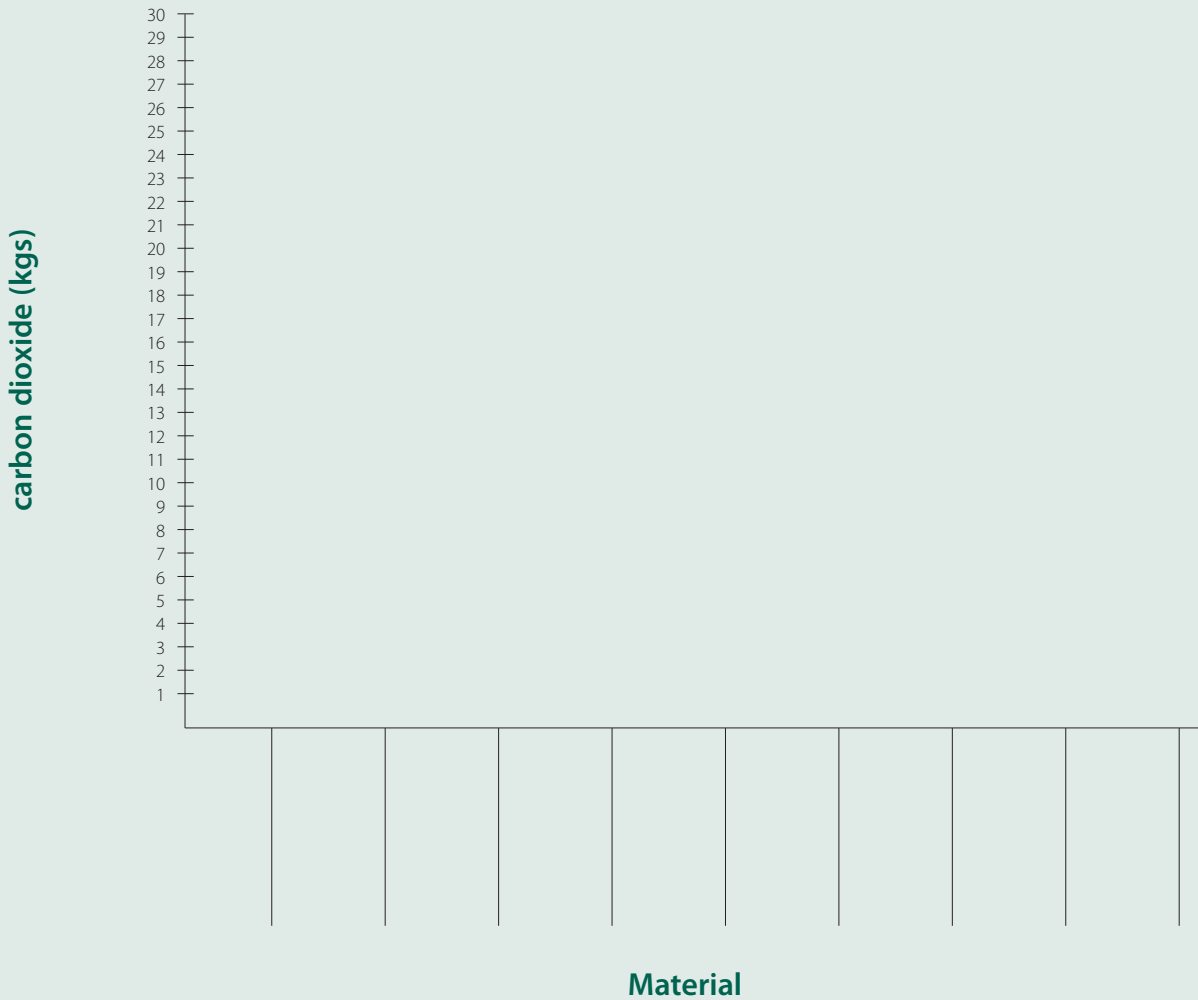
**Legend**

<input type="checkbox"/>	Electricity	<input type="checkbox"/>	Coal
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# Q9

cont.

**(b) Amount of carbon dioxide released during manufacture per kg of material. Graph the results in ascending order. Use a line graph and label each material.**



# Q10

**Use the tree carbon calculator to find out the amount of carbon stored in a tree in your backyard or playground.**

**( <http://www.greenhouse.crc.org.au/tools/calculators/treecarbon/> )**

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# Q10

***What could you do to reduce the amount of carbon dioxide produced and already in the atmosphere?\****

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