forestworks
LEARNING AND SKILL DEVELOPMENT
FOREST, WOOD, PAPER & TIMBER PRODUCTS INDUSTRY

LEARNER RESOURCE

Maintain and Contribute to Energy Efficiency in the Forest and Forest Products Industry

This Learner Resource has been developed to support –

FPICOT3263 Maintain and Contribute to Energy Efficiency

UNIT DESCRIPTOR

This unit describes the outcomes required to maintain energy efficient work practices and contribute to systems improvement with regard to energy efficiency in the forest and timber products industry. It also includes developing an understanding of the positive benefits of the forest and wood products industry in reducing greenhouse emissions, and promoting them to stakeholders.

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Forest and forest products **industry profile**

Wood and paper products meet the everyday needs of consumers and businesses. They provide materials essential for communication, education, packaging, construction, shelter, sanitation and protection.

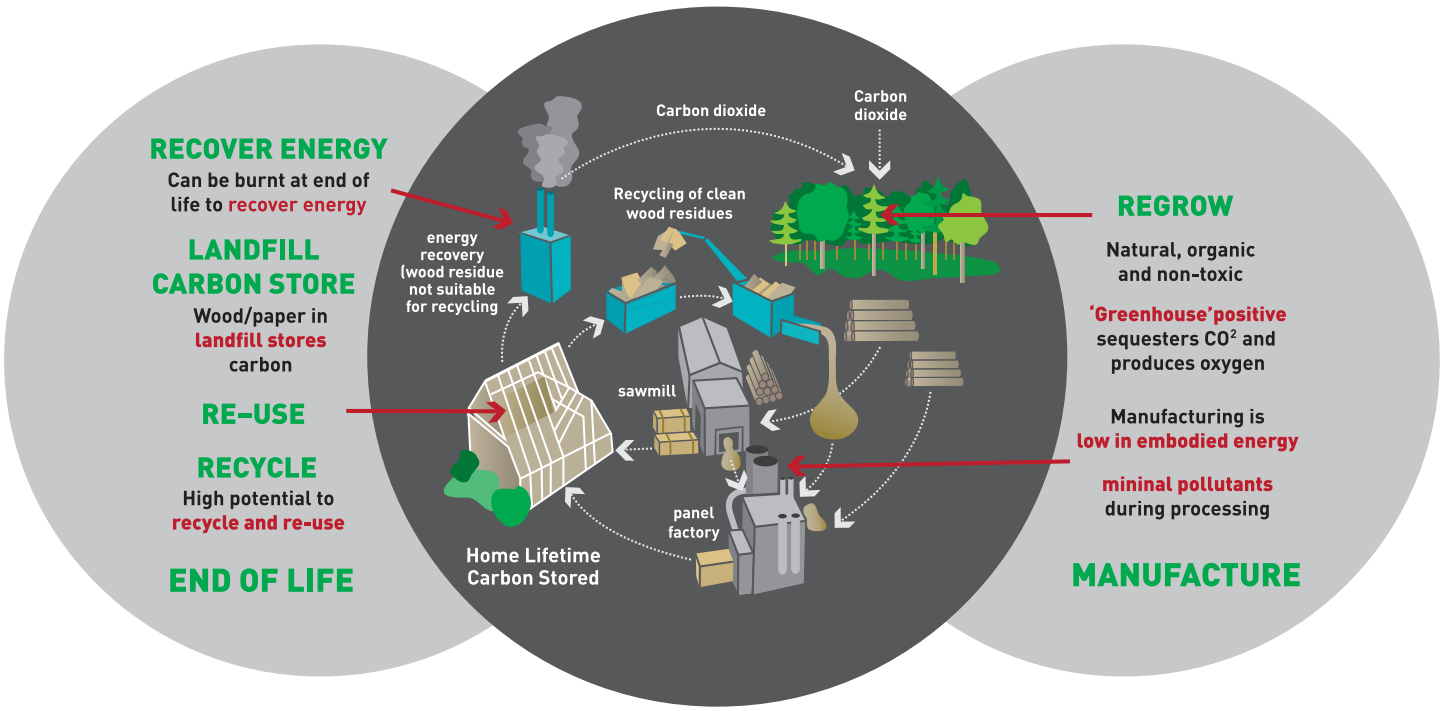
The forest and forest products industry is based on a renewable and sustainable raw material: wood. All forests – native and plantation forests – are significant stores of carbon. Forest products used in buildings and disposed of in landfills also store carbon over the long term. Residues generated by harvesting and processing forest products provide a valuable source of renewable energy. The forest, wood, paper and timber products industry makes a valuable contribution towards carbon management.

Forests help the global carbon balance by taking up carbon dioxide from the atmosphere and storing carbon in timber manufactured products.

Technical challenges facing the forest and forest products industry are centred on environmental initiatives, such as recycling materials cost-effectively, reducing energy costs and maximising resource utilisation.

THE TIMBER CARBON CYCLE

Carbon released and CO^2 absorbed by new trees



SECTION **ONE**

Maintain and contribute to **energy efficiency**

Energy usage at your workplace

Energy efficiency varies dramatically across manufacturing sectors, and across the various process and non-process end uses in each sector.

Less-than-optimal energy efficiency means that some of the input energy is lost, either mechanically or as waste heat. Energy losses amount to increased energy costs and increased amounts of greenhouse gas emissions.

Essentially, energy we use can be divided into three classifications:

1 Primary energy, which is used to describe all forms of energy that are either extracted or directly captured from natural resources. This energy can be divided into non-renewable energy (fossil fuels, such as coal, crude oil, and natural gas) and renewable energy (biomass, solar, wind and geothermal are prominent examples).

2 Intermediate energy describes the forms of energy produced in converting primary energy to other forms, for example coking coal derived from raw coal.

3 Final energy, which refers to the energy that consumers or industry use in their daily activities. Industry uses final energy for the various services or utilities it requires, such as transport, powering electrical machinery, producing compressed air, heating and chilling, etc.

LEARNER ACTIVITY 1

Forms of primary, intermediate and final energy in your workplace

Think of some processes that use energy at your workplace, or in a sawmill or panel factory.

Use the list below as a guide. Can you think of other processes to add to the list?

- Process heating
- Process cooling and refrigeration
- Electro-chemical
- Machine drives (shaft energy)
- Machine driven systems, such as pumps, fans, and compressed air
- Materials handling
- Materials processing (e.g. grinders)
- Materials transport
- Other processes and systems

Industrial energy efficiency

The energy supply chain begins with electricity, steam, natural gas, coal, and other fuels supplied to a manufacturing plant from off-site power plants, gas companies, and fuel distributors. In addition, some manufacturing plants – including many wood products manufacturing facilities – use by-products from their own manufacturing processes to generate energy, which in turn can reduce the amount that these plants need to purchase from off-site power plants, gas companies and/or fuel distributors.

Energy flows to either a central energy generation system or is distributed immediately for direct use. Energy is then processed using a variety of highly energy-intensive systems, including steam, process heating, and motor-driven equipment, such as compressed air, pumps and fans.

LEARNER ACTIVITY 2

Energy efficiency opportunities in your workplace

Over the next week, note two opportunities where energy efficiency could be achieved at your workplace. For each of those opportunities, ask yourself:

- Who would be responsible for implementing these energy efficiency initiatives?
- How might this happen?

The Department of Resources, Energy and Tourism website has a number of case studies describing ways that some different workplaces, such as AMCOR's Botany Packaging Paper Mill, are improving energy efficiency.

Understanding the links between energy efficiency and the principles of reduce, re-use, recycle

REDUCE refers to lessening the use of materials in production

RE-USE is about using materials in creative ways

RECYCLE is about finding another use for a waste product

LEARNER ACTIVITY 3

Value from residues

Visit www.forestworks.com.au/learningresources to access and view videos number 3 and 5 from the "Implement practices to maximise value from wood residue" unit.

Video 3 describes the key concepts associated with maximising value from wood residues.
Video 5 discusses ways to maximise the value of wood products.

After viewing these videos, consider any waste product at your worksite and discuss the following questions:

- How is waste product dealt with at your worksite? (provide two examples)
- How could a product at your worksite potentially be reduced, re-used and/or recycled? (provide one example)

SECTION **TWO**

Follow and promote **energy efficient work practices**

Carbon and forests

Most people are taught at school how important living trees are to producing oxygen through the process of sequestration. However, not as many people understand the importance of trees to reducing the amount of carbon in the atmosphere.

Carbon is absorbed into a tree through a process known as sequestration and the carbon is stored. Harvesting forests has a positive impact on the carbon cycle because carbon stored in wood products remains embedded for very long periods often over 100 years. For this reason trees are regarded as carbon sinks. Carbon remains trapped well after a tree has been harvested and made into a timber product. Planting new trees will continue the process and increase the total amount of carbon being removed from the atmosphere and stored.

Renewable energy

Renewable energy is energy that comes from resources that are continually replenished and won't run out. This includes tree and biofuels as such. About 16% of global final energy consumption comes from renewable resources such as trees and biofuels from wood residue. Other sources include as sunlight, wind, rain, tides, waves and geothermal heat. (International Energy Agency)

Non-renewable resources

A non-renewable resource is a natural resource that cannot be reproduced, grown, generated or used on a scale which can sustain its consumption rate; once depleted there will be no more available for future use.

Resources that are consumed much faster than nature can create them are also considered non-renewable. Fossil fuels (such as coal, petroleum, and natural gas), nuclear power (uranium) and certain aquifers (including most geothermal opportunities) are examples of non-renewable resources. Metal ores are prime examples of non-renewable resources.

LEARNER ACTIVITY 4

Climate change and the forest industry

You can find a simple diagram called **'The Life Cycle of Stuff'** at: **http://www.epa.gov/climatechange/climate-change-waste/life-cycle-diagram.html** to help learn more about carbon emissions over a product's life cycle.

Forestry helps manage carbon in the atmosphere

Forests are a major store of carbon and, when properly managed, contribute significantly to reducing carbon dioxide (CO^2) in the atmosphere. Forests have been, and will continue to be, one of the most important mechanisms for managing the balance of CO^2 in the carbon cycle. As may be seen in Diagram 2 below, forest, wood, paper and timber industry products and processes help balance CO^2 in the atmosphere.

All communities need wood, paper and fuels. A lot of these forest, wood, paper and timber industry products can be recycled, reducing their impact on the carbon cycle. Another way industry can have a positive impact on the carbon cycle is to look at materials provided by companies involved in the industry's supply chain and require them to use processes that are geared towards the reduction of greenhouse gas emissions.

Carbon is stored naturally in forests and wood products

The amount of carbon sequestered (or stored) by standing vegetation (e.g. forest plantations, regenerating forests, and re-vegetated stands of native bush) changes over their life cycle – increasing slowly early in life, accelerating as trees increase in size, and ultimately reaching an equilibrium. Approximately 50 per cent of the dry weight of a forest's biomass is carbon that is converted from atmospheric CO^2 by sequestration. (Forestry Commission U.K. 2011 www.forestry.gov.uk)

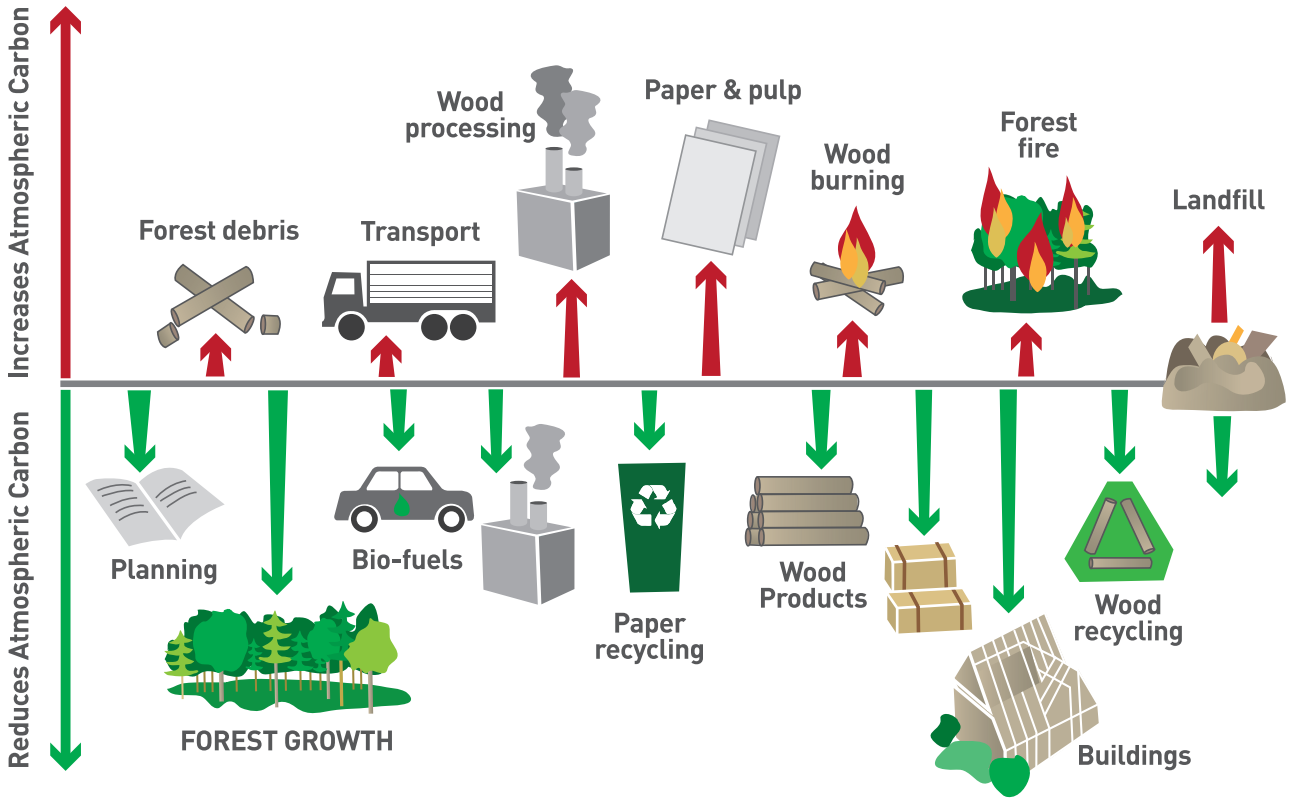


Diagram 2: Shows the forest activities that store and release CO^2.
Source: Intergovernmental Panel on Climate Change, 2007

LEARNER ACTIVITY 5

Understand the role of government in promoting a low carbon economy

Governments at the federal and state level can implement policies and legislative requirements for energy efficiency as well as offering rebates and other incentives for businesses, social groups and individual householders to become more energy efficient.

An overview of the strategies, processes and methodology that the government is using to promote a low carbon future can be found under Reducing Carbon at **www.climatechange.gov.au**.

Forest industries will benefit from initiatives such as the federal government's plan for a clean energy (low carbon) future.

Over time, initiatives such as carbon pricing will increase the value of wood products. However products which are non-renewable and currently compete with timber, such as cement and steel, will be taxed according to their carbon footprint and covered by the carbon price. This means timber products will become relatively more attractive to buyers as the world transitions to a low carbon future.

After looking at the website, explain how The Carbon Farming Initiative will provide opportunities for forestry activities that go beyond common industry practices.

"The Carbon Farming Initiative (CFI) allows farmers and forest growers to earn carbon credits for reducing emissions or increasing carbon stored in the landscape".

For example, new long rotation hardwood and mallee plantings are expected to participate in the CFI. Such plantings would receive credits under the Carbon Farming Initiative in recognition of the extra carbon stored in the landscape as a direct result of these activities.

SECTION **THREE**

Contribute to **systems improvement**

LEARNER ACTIVITY 6

Energy efficiency systems improvement

Describe an example in your workplace (or use a case study) where opportunities for innovation in energy efficiency have been identified. Using this example, explain why this initiative was undertaken as well as its costs and benefits.

Types of industry-specific examples to research could include:

- use of wood fibre from purpose-planted forests in non-traditional applications, such as bioenergy, biofuels, bioproducts and biochemicals
- innovative timber building technologies for multi-story constructions, such as use of laminated veneer lumber and cross-laminated timber
- wood preservation technologies and/or wood treatment processes.

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