Wood Processing – Process Heat and Greenhouse Gas Emissions

What is process heat?

In the wood processing sector, process heat is the heat used to produce hot water, steam or hot oil to make wood-based products. It is typically generated onsite using boilers, furnaces, or thermal oil heaters.

What does the wood processing sector cover?

The wood processing sector covers:

• **Wood product manufacturing** including log sawmilling, timber dressing, veneer and plywood manufacturing.

• **Pulp, paper and paperboard manufacturing**, and converted paper product manufacturing (for example, paper bag and stationery manufacturing).

2016 data shows there are 131 wood processing sites that use process heat in New Zealand – 88 in the North Island and 43 in the South Island.

In 2016, boilers provided about **80%** of the sector’s energy requirements. About **90%** of the process heat was generated at temperatures between 100 and 300 degrees Celsius. This is a ‘medium’ temperature of process heat.

The sector’s process heat usage varies depending on the product being made. For instance, process heat is used at different temperatures for the following:

• **Kiln drying sawn timber**. Timber drying kilns typically use pressurised hot water at temperatures between 120°C and 180°C to heat the kiln’s air.

• **Particle board manufacturing**. Wood particles, sawdust or flakes are mixed with resin and formed into sheets which are then compressed under high pressure at temperatures of around 180°C.

• **Medium density fibreboard (MDF) manufacturing**. Hardwood or softwood residues are broken down into wood fibres and then combined with wax or resin binders to form sheets. Similarly to particle board, the sheets are then compressed under high pressure at temperatures of around 230°C.
The wood processing sector is New Zealand’s largest user of process heat. In 2016, it used 57.0 petajoules (PJ) of process heat (or 28.7% of New Zealand’s total process heat demand). This is equivalent to the total amount of energy consumed by 90% of New Zealand’s households annually.

Of the 57.0 PJ used by the wood processing sector, wood product manufacturing used 36.2 PJ and pulp and paper manufacturing used 20.7 PJ.

Wood processing GHG emissions were relatively low when compared with other industrial sectors at around 0.51 million tonnes (MT) of carbon dioxide equivalent (CO₂-e) – or 6.1% of all process heat related emissions in 2016.

87.5% of the energy consumed was from renewable sources, namely wood, geothermal, and a small proportion of electricity. This produced 20.4% of the sector’s process heat emissions. While 12.5% of energy consumed was from non-renewable sources, it contributed to 79.6% of the sector’s process heat emissions (see Figure 1).
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Figure 2 shows the sector’s percentages of fuel use and emissions by fuel type. 79.1% of energy consumption was met using wood fuels. However, this only accounted for 13.6% of GHG emissions. Most emissions were from using natural gas (57.5%), coal (10.4%), and LPG (8%).

Figure 3 displays absolute levels of fuel demand and emissions by fuel type. The sector’s biggest emissions reduction opportunity is reducing natural gas consumption by increasing energy efficiency or switching to renewable fuels.

Sources

1. Refers to Australian and New Zealand Standard Industrial Classification (ANZSIC) 2006 Subdivisions C14 and C15.
2. 2016 Heat Plant Database, MBIE/EECA (2018). Note, the number of wood processing sites as at 2018 may be different from the 2016 data.
7. 85% electricity consumption is attributed to renewable sources – Source: Energy in New Zealand: 2016, MBIE (2017).