

Non-metallic Mineral Product Manufacturing – Process Heat and Greenhouse Gas Emissions

FACT SHEET

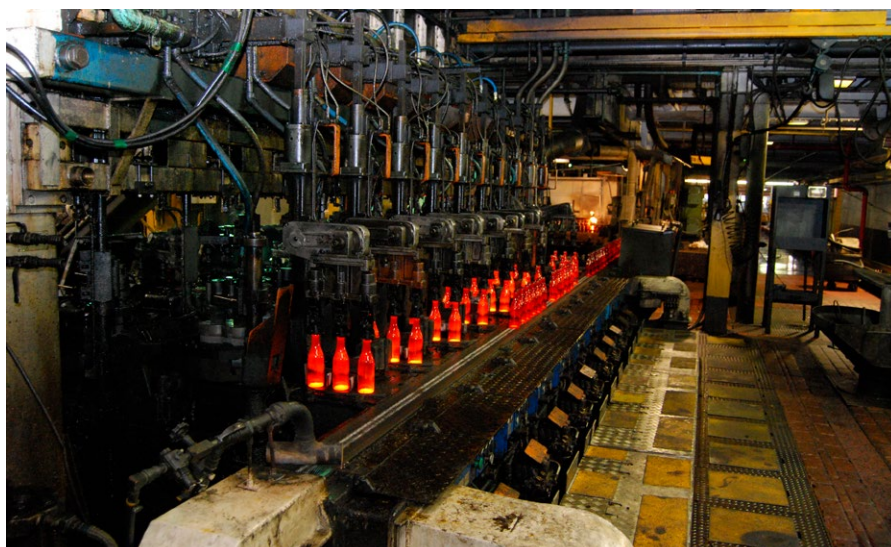


What is process heat?

In this sector, process heat is the heat used to change raw materials into other products, such as sand into glass, or clay into ceramics. Most process heat in this sector is produced from kilns or furnaces and is at a high temperature (>300° Celsius).

Process heat in this sector is used for the following types of operations in New Zealand:

- turning glass ingredients into glass products using furnaces at temperatures of about 1500° Celsius
- turning limestone, clay and other ingredients into 'clinker' using rotary kilns at temperatures of about 1500° Celsius
- facilitating the chemical transformation of limestone into lime products using furnaces at temperatures of about 1000° Celsius.



What is the non-metallic mineral product manufacturing sector?

The non-metallic mineral sector covers the manufacturing of glass and glass products, ceramics, cement, lime, plaster and concrete products. New Zealand has glass, cement/concrete and lime manufacturing operations that use process heat. These products are sold domestically to other manufacturers and also exported.



440
thousand tonnes
of carbon dioxide equivalent (CO₂-e)

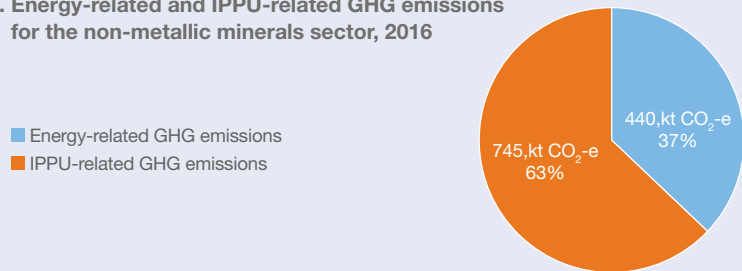
The approximate volume of the Non-metallic Mineral Product Manufacturing sector's GHG emissions in 2016.

Industrial process and product use (IPPU) greenhouse gas (GHG) emissions in this sector

IPPU emissions are emissions produced in the manufacturing processes that are not a direct result of energy consumed. For instance, CO₂ is produced as a by-product of chemical reactions in cement production.

In this sector, IPPU emissions make a significant contribution (63%) of the sector's total GHG emissions² (see Figure 1), with the remaining GHG emissions derived from energy consumption.

Figure 1. Energy-related and IPPU-related GHG emissions for the non-metallic minerals sector, 2016



What was the fuel demand and energy-related GHG emissions volume from process heat in this sector?

The sector is a relatively small user of process heat compared to other sectors, such as wood processing or dairy manufacturing. In 2016, this sector used 6.3 Petajoules (PJ) of process heat. This was **2.6%** of New Zealand's process heat demand in 2016.³ This is equivalent to the total amount of energy consumed by about 170,000 households annually in New Zealand.⁴

In 2016, energy-related greenhouse gas emissions (GHG) from process heat use in this sector was 440 kilo tonnes (kt) of carbon dioxide equivalent (CO₂-e). This was **4.5%** of New Zealand's total process heat energy-related GHG emissions in 2016.⁵

As seen in Figure 2, **90.4%** of energy consumption was from non-renewable sources such as coal and natural gas – and accounted for almost all of its energy-related GHG emissions. Renewable sources of energy, namely biomass and electricity⁶, supplied **9.6%** of the energy consumed, and contributed **1.2%** of the energy-related GHG emissions in this sector.

Figure 2. Process heat fuel demand and energy-related GHG emissions for the non-metallic minerals sector 2016 – percentages (and actuals) by energy source⁷

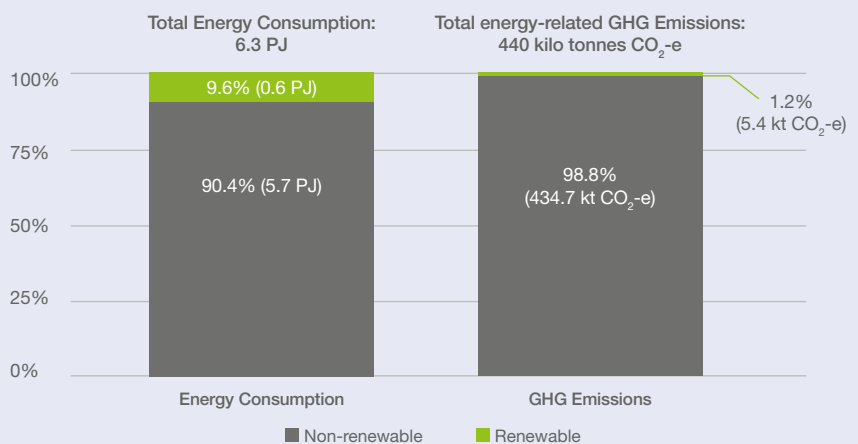


Figure 3 shows the percentages of fuel use and energy-related GHG emissions from process heat in the sector. **46.2%** of energy consumption was from coal. This accounted for **61.4%** of all the sector's energy-related GHG emissions. In contrast, wood accounted for **7.0%** of energy consumption and for less than **1%** of energy-related GHG emissions.

Figure 3. Process heat fuel demand and energy-related GHG emissions for the non-metallic minerals sector 2016 – percentages by fuel type⁸

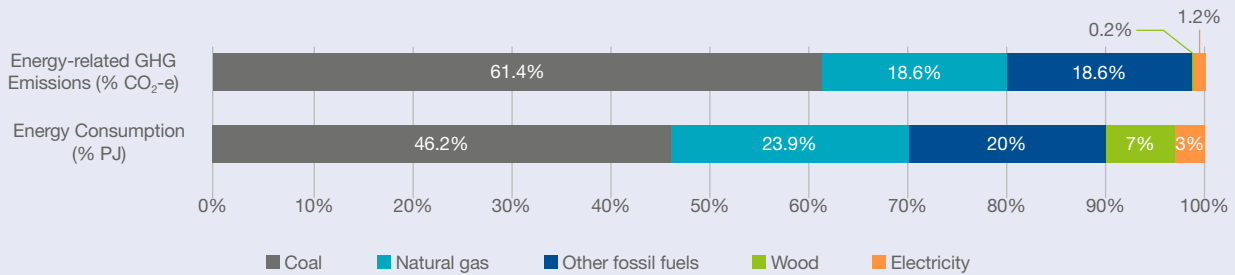
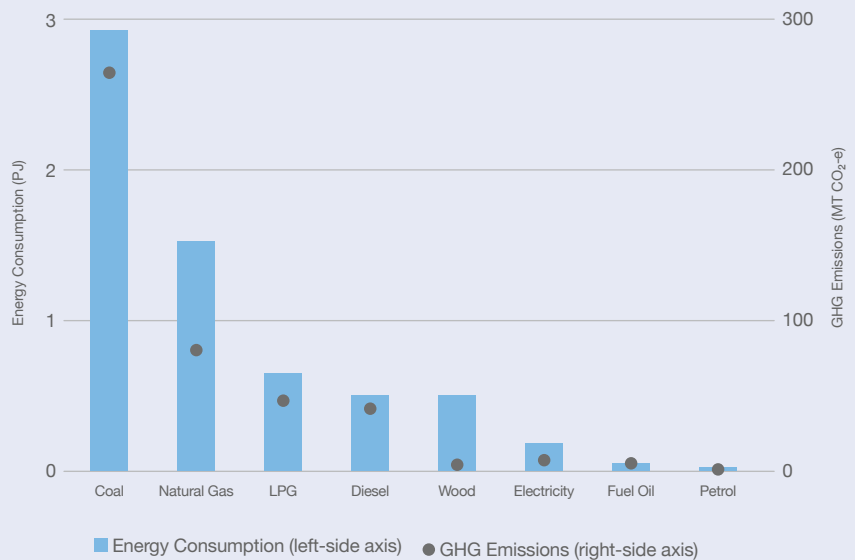


Figure 4 shows actual fuel demand and energy-related emissions by fuel type in the sector. Currently, the sector is highly dependent on coal for process heat, which is a particularly high-emission fossil fuel. Reducing coal consumption is the sector's biggest energy-related emissions-reduction opportunity.

Figure 4. Process heat fuel demand and energy-related GHG emissions for the non-metallic minerals sector 2016 – actuals by fuel type



Sources

1. 'Clinker' is a compound material made by heating limestone and clay at high temperatures. The product is then finely ground and used in the manufacturing of cement and concrete products.
2. In this sector, almost two-thirds (65.1%) of IPPU GHG emissions came from the production of cement (486 kt CO₂-e), ahead of lime (176 kt CO₂-e) and glass (64 kt CO₂-e). New Zealand Greenhouse Gas Inventory 1990-2016, Ministry for the Environment (2018).
3. 2016 Energy End Use Database (EEUD), EECA (2018).
www.eeca.govt.nz/resources-and-tools/tools/energy-end-use-database/
4. Based on Statistics New Zealand household estimates data (as at September 2018) and MBIE 2017 Residential energy demand data (published 2018).
5. 2016 EEUD, EECA (2018).
6. In 2016, 85% of electricity consumption was attributed to renewable sources – Source: Energy in New Zealand: 2016, MBIE (2017).
7. 2016 EEUD, EECA (2018).
8. 2016 EEUD, EECA (2018).
9. 2016 EEUD, EECA (2018).



Process Heat in New Zealand

You can find out more about Process Heat in New Zealand (PHiNZ) on the Ministry of Business, Innovation & Employment (MBIE) website - www.mbie.govt.nz/PHiNZ

For more information on PHiNZ please contact us at energymarkets@mbie.govt.nz