

Bathurst Resources is a modern New Zealand coal mining company with operations on the West Coast and Southland.



COAL

From buildings to tennis racquets and refrigerators to shampoo, coal is used in the manufacture of products that touch every part of our lives.

Millions of years in the making

Coal is prehistoric plant matter that was trapped by mud and buried in swamps and peat bogs. Over time, changing weather and continental movement have resulted in the material being buried under new land forms.

The process subjected the material to high temperatures and pressure, which caused physical and chemical changes to the vegetation, transforming it into peat and then into coal.

The quality and type of coal is determined by how long and how deep the plant material has been buried and the temperature and pressure in which was formed.

Peat is at the lowest end of the quality scale, then lignite and sub-bituminous coal. This coal is largely used for burning in thermal power stations to generate electricity.

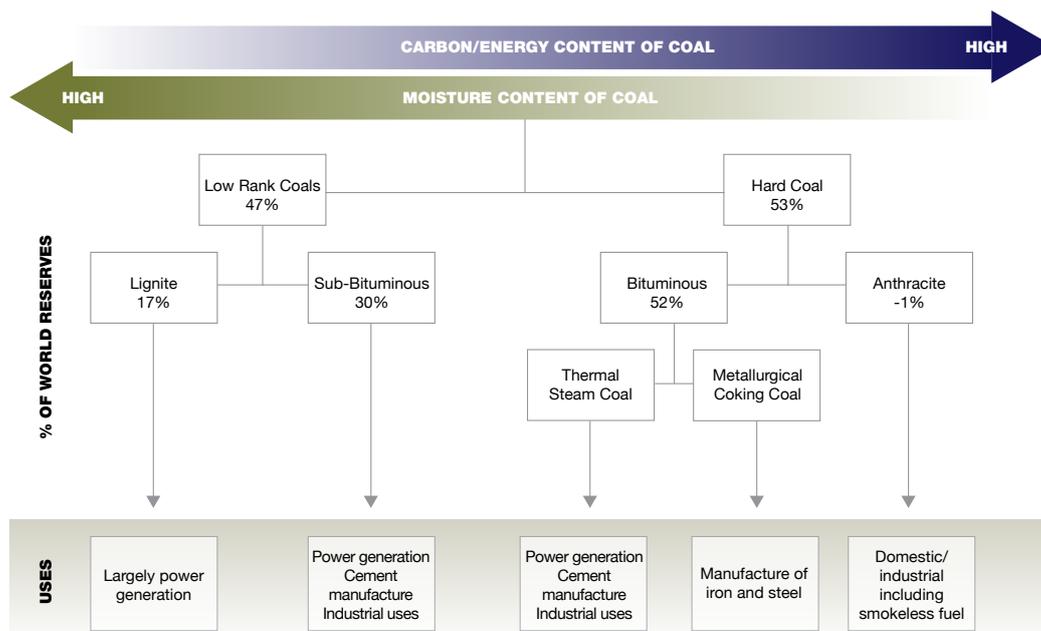
At the higher end of quality is bituminous coal which is harder and has a higher carbon and energy content. This type of coal is prevalent on the Denniston Plateau in Buller.

Different coal; different uses

Bathurst is mining bituminous coal, a glossy hard coal that contains more carbon, has less moisture, and produces more energy than lower quality coals.

There are two types of coal:

- 1 Thermal coal, otherwise known as steaming coal, used for power generation, cement manufacture and industrial uses.
- 2 Coking coal, or metallurgical coal, used in the production of steel and products such as cement, carbon fibre and carbon filters.



Source: World Coal Institute

Thermal coal

Thermal coals – along with lower-quality lignite – are the world's largest source for electricity generation.

- Thermal coal supplies 40% of the world's electricity supply, 80% of Australia's, 50% of America's, and 3.8% of New Zealand's (through the 1000 mega watt Huntly Power Station). Thermal coal is used in the manufacture of cement, dairying, industrial processing, and as cost-effective heating for hospitals and schools.
- Thermal coal extracted from Bathurst's Takitimu mine in Southland is used for:
 - food and dairy processing industries
 - heating hospitals, schools and swimming pools
 - Queenstown's tourist steam ship SS Earnslaw and Kingston Flyer steam train.

Coking coal

Hard coking (or metallurgical) coal is used in the:

- manufacture of steel
- carbon fibre for fishing rods, golf clubs, bicycles, tennis racquets
- carbon filters in dialysis machines
- production of silicon for computer chips, solar panels, resins
- production of silicones and silanes for shampoo, lubricants, water repellents, cosmetics and toothpaste.

Coking coal is scarce and more highly valued than thermal coal.

Coal for steel-making

Steel is used around the world in buildings, buses, bridges, refrigerators, wind turbines and medical equipment.

Steel can be repeatedly melted down and recycled; about 30% of the world's steel is made this way. The rest is made new, and coal plays a critical role in its production.

The most common way to make steel is by combining iron ore and coke (made from coking coal).

Carbon makes up less than 2% of steel, but its atoms are an essential ingredient to making the iron stronger and harder and less brittle.

Efficient coal

While essential to modern society, coal mining does impact the land. That is why Bathurst Resources is committed to both minimising and mitigating its effects.

The company is also committed to adopting and supporting new technologies to reduce emissions, and to ensure coal is used more efficiently, with less impact on the environment.

THE STEEL-MAKING PROCESS

1. COKING COAL IS TURNED INTO COKE

Coke is made by heating coal at extremely high temperatures in the absence of air.

The properties in coking coal cause it to soften, liquefy and resolidify into hard porous lumps, with a texture a bit like hokey pokey.

Coking coal from different areas has different properties so coking coals from different producers are blended to produce a homogenous quality product. Coking coal from the Denniston Plateau has unique characteristics. Its fluidity is very high and it has extremely low levels of contaminants which makes it sought after for blending with low fluidity coals.

Steel making is a bit of an art, even in this day and age – a bit like cooking. The natural variations in the iron ores and coking coals around the world means that the steel makers need to be like 'master chefs', blending and choosing their ingredients carefully – and high quality products with special qualities are highly regarded, like our Denniston coal.

2. COKE & IRON ORE ARE COMBINED IN A BLAST FURNACE

The most common way to make steel is by placing iron ore, coke, and limestone (used to collect impurities) into a blast furnace.

Air, heated to 1200 degrees Celsius, is then blown into the furnace, causing the coke to burn, producing carbon monoxide.

The iron ore melts and flows through the coke. Oxygen in the ore bonds with the carbon monoxide produced by the coke to make carbon dioxide. This removes oxygen from the iron ore, purifying the iron and making it suitable for steel-making.

Carbon from the coke also mixes with the iron.

When molten metal exits the blast furnace, oxygen is injected to remove some carbon, but leaving enough to make steel.

3. ADDITIVES INJECTED TO MAKE SPECIALTY STEELS

Additional agents can be added to the hot metal to make specialty steels such as stainless steel and tungsten steel.