



**The Australian Steel industry is committed to reducing waste through the reuse and recycling of by-products. For every tonne of crude steel approximately 360kg of by-products are produced<sup>1</sup>.**

### **Major By-Products**

Gas Recycling: Waste gases are produced and reused throughout all stages of steelmaking. Heat is recovered from the gaseous products of combustion by using them in heat exchangers to heat incoming combustion gases. Coke Ovens Gas and Blast Furnace Gas are combusted as fuel gases on site. This combustion not only displaces the use of other fuels but is also used to generate on-site electricity to reduce steel's demand on the grid.

Coal Tar - Coal Tar produced at the Coke Ovens is sold for alternative uses. 50% of the coal tar is used for pitch which is used in the Aluminium industry to manufacture the electrodes for the electric arc furnace. 10% is extracted as Naphthalene which is converted to Sulphonated Naphthalene Formaldehyde and used as an additive in cement. The remaining 40% is Carbon Black Feedstock which is used in the manufacture of Rubber, Ink and other products. Any tar and sludge that is not of sufficient quality to sell is recycled back into the Coke Ovens.

Ammonia – Ammonia gas is produced in the Coke Ovens and is reacted with sulphuric acid to form ammonium sulphate. This is dried and sold as an additive to fertilisers.

Dust - Dust is filtered from many combustion gases to prevent discharge to the atmosphere. It may also be removed through dust sprays to form a mixture of water and dust. The water is later removed from the mixture and this dust and the filtered dust is mixed into the ore beds to become part of sinter, an additive in the iron making process. Some of the dust that is sufficiently high in iron can be used in the steelmaking process.

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<sup>1</sup> <http://www.bluescopesteel.com/go/about-bluescope-steel/student-information/reusing-the-by-products/reusing-the-by-products-of-the-steel-industry>



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Mill scale - This is formed on the outer surface of steel slabs and a billet due to the oxidation of iron and is removed before further processing to prevent surface defects. This scale is collected and recycled into the ore beds or sold for iron recovery.

Coating Metal Recovery Impure zinc and aluminium are recovered from BlueScope Steel coating lines and sold for zinc and aluminium recovery.

At Arrium Mining and Materials Newcastle Wire Mill “zinc skimmings” are recycled on-site through zinc recovery furnaces to create zinc ingots. These are then re-used in the wire galvanising process. Any material that is not made into an ingot is sold for zinc recovery.

Spent Acids - 3200 t pa of spent acids from Arrium Mining and Materials Newcastle Pipe and Wiremill operations are sold for use in water treatment. Spent Pickle Liquor from BlueScope Steel Springhill operations is sold for sewage treatment.

BlueScope Steel Bug Sludge – A Biomass by-product (a mixture of different bacteria and microorganisms) is used in the treatment of water. The biomass consumes hydrocarbons and harmful contaminants in waste water. Due to excess numbers as a result of multiplication, over 3.5 thousand tonnes of biomass is recycled into the Coke Ovens to produce Coke and Coke byproducts.

BlueScope Steel Gypsum – Combustion waste gases produced at the Sinter Plant are cleaned before discharge into the atmosphere to minimise environmental impacts. Gypsum is produced as a result of this cleaning process and is sold as a cement additive.

BlueScope Steel Benzene/ Toluene/Xylene – in 2012 nearly 23,000 tonnes of BTX were sent to Japan from Port Kembla Steelworks, where it is separated into Benzene, Toluene and Xylene. These are used in the Plastics Industry as a feedstock and to manufacture Styrene / polystyrene.

BlueScope Steel Waste Paint and Solvent – Waste Paint and Solvent from the painting process are sold as fuel for making cement.