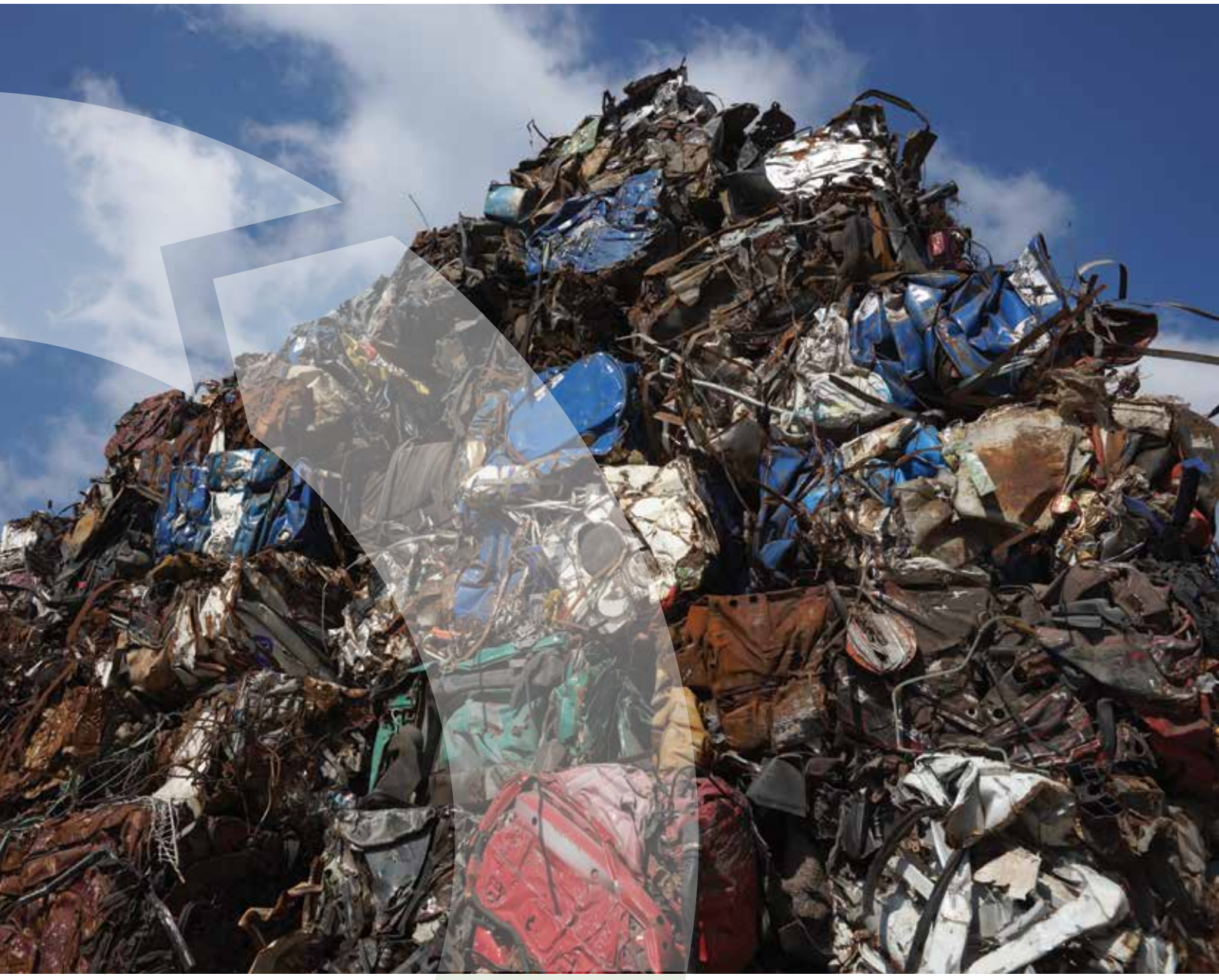
Economic and Environment Benefits
from an Australian

Unprocessed Ferrous Scrap Metal Export Ban



NWRIC
National Waste and Recycling Industry Council

Contents

Executive Summary

Recently the National Waste and Recycling Industry Council (NWRIC) and the Australian Steel Institute called for a national ban on the export of unprocessed scrap metal. The call for change is premised on the onshoring of Australian company processing of ferrous scrap metal is an important economic and environmental opportunity for Australia – creating both direct and indirect economic and employment opportunities as well as a range of superior environmental benefits.

AEAS, through this economic impact assessment provides objective and independent analysis that is designed to help enable the new Australian Government to understand the economic and environmental impacts of ensuring the processing of ferrous scrap metal in Australia and how this measure maximises economic benefits and minimises environmental harm.

AEAS modelling indicates that the Australian ferrous scrap metal processing industry is a significant contributor to the Australian economy. The direct output of ferrous scrap metal processing businesses in Australia is $1,096 million. The net contribution to the Australian economy after removing the cost of input goods and services used in producing the scrap metal measured in 'value add' is estimated at $339 million. The indirect economic activity created is estimated at $1.22 billion with a total economic contribution towards the Australian economy of $1.55 billion. As a consequence of this economic activity and the valuable role the industry sector plays in the processing of ferrous scrap metal, 2,171 FTE jobs are directly created with a further 9,780 indirect jobs and total employment of 11,951 persons.

Ferrous Scrap Metal Processing Industry and Employment Economic Contribution ($ millions)

	Direct	Indirect	Total
Output ($ millions)	1096.0	3927.5	5,023.5
Value Add ($ millions)	339.0	1,215.6	1,554.6
Employment (FTE jobs)	2,171	9,780	11,951

Based on AEAS modelling, 1,070,575 tonnes of unprocessed ferrous scrap metal is being exported to developing countries annually – mostly in the form of baled cars and white goods. This unprocessed scrap metal includes an estimated 267,600 to 321,200 tonnes of attached waste materials such as glass, plastics, textiles and tyres.

The argument for including unprocessed ferrous scrap material in Australia's waste export ban focuses on four main areas of benefit: capacity, economic, environmental and budgetary.

Capacity

Ferrous scrap metal is a critical input to support the sovereign capability of our national steel manufacturing industry. A ban would potentially result in an increase in the number of 'mill ready' tonnes of ferrous scrap metal for use in Australian steel production. The 1,070,575 tonnes of unprocessed scrap metal being exported annually could be processed and used locally by Australia's steel mills. Following the removal of non-recyclable materials this would result in a net 749,375 to 802,975 tonnes of additional feedstock for Australian steel mills.

Economic

Based on AEAS modelling, a comparison between processed versus unprocessed ferrous scrap metal indicates that processing the metal in Australia provides a higher value add and employment contribution to the Australian economy than the unprocessed export of the same ferrous scrap metal. For every 10,000 tonnes of ferrous scrap metal, scrap metal processors create $4,840,358 in value add and 37.2 jobs. By contrast, unprocessed ferrous scrap metal exporting businesses only create $1,344,544 in value and 10.3 jobs. As a consequence of the smaller value add and employment contribution, unprocessed scrap exports leads to a foregone $374.3 million of value add to the Australian economy and 2,877 fewer Australian jobs.

Economic Activity (Value Add) and Employment created for 10,000 tonnes of ferrous scrap metal

	Processed	Unprocessed
Value Added ($ millions)	4.8	1.3
Employment (FTE jobs)	37.2	10.3

Environment

There are three primary areas of environmental benefit that will arise from an export ban on unprocessed ferrous metal. These are the steel industry will use greater recyclable materials as feedstock, unprocessed ferrous scrap will no longer be shipped considerable distances and Australia will no longer be sending waste residuals to countries with lesser environmental standards. Based on AEAS modelling, the level of transport CO_2e emissions saving from an export ban on unprocessed ferrous scrap metal would be 81,110 tonnes of CO_2e global emissions. Furthermore recycling 802,975 tonnes of ferrous scrap metal would save 1.2 million in Australian greenhouse gas emissions.

Transport GHG emissions comparison Processed vs Unprocessed

	Processed	Unprocessed
Total Tonnes Transported	1,070,575	1,070,575
Average kms travelled	100	7,370
$kgCO_2e$/tonne.km	0.86407	0.86407 & 0.016142
Tonnes of CO_2e	92,505	173,615
Difference		81,110

Budgetary

The 1,070,575 tonnes, when processed in Australia are estimated to have a residual waste loading ranging between 267,600 and 321,200 tonnes that would need to be landfilled in Australia. Assuming waste levies ranging between $125.90 (Victoria Metro) and $151.60 (NSW metro) this would incur $33.7 million to $48.7 million in State Government waste levy revenue that would otherwise be available for reinvestment in environmental initiatives. Expressed alternatively, these amounts can also be described as the extent of levy avoidance by exporters of unprocessed scrap metal and the extent of an unfair competitive advantage in shifting their environmental compliance offshore.

The policy solution to realise greater economic and environmental benefits is a ban on the export of unprocessed ferrous scrap metal bearing waste materials. This ban would align with the Commonwealth's Recycling and Waste Reduction Act, which banned the export of unprocessed glass, plastic, paper and cardboard and tyres. Ironically, these materials make up the bulk of contaminants that are attached to unprocessed ferrous scrap metal. The inclusion of unprocessed scrap metal to the list of banned waste exports will close this inconsistency and further assist in meeting the legislated goals of the Australian Government.

To action this change, the Commonwealth's Recycling and Waste Reduction Act allows the Environment Minister to make rules to prescribe kinds of waste material for the purposes of the Bill. Allowing the Minister to use the rules to set the kinds of waste material that will be regulated gives the Minister flexibility to regulate different kinds of waste material as appropriate from time to time. Accordingly, the Environment Minister has the power without legislative change to include unprocessed ferrous scrap metal in the Australian Waste Export Ban and its full application by July 2024.

In summary, the ban on the export of unprocessed ferrous scrap metal would be consistent with the Federal Government's plan to reduce waste, boost recycling and improve the health of the environment through underwriting innovative manufacturing and creating sustainable jobs. This will boost recycling rates, reduce waste in our environment, lower the global emissions caused by landfill and create sustainable manufacturing opportunities and jobs right here in Australia.

01

Introduction

Australian Economic Advocacy Solutions (AEAS) was engaged by National Waste and Recycling Industry Council (NWRIC) and the Australian Steel Institute (ASI) to analyse the economic and environmental benefits from a national ban on the export of unprocessed ferrous scrap metal.

NWRIC is a not for profit industry association, funded by major waste and recycling businesses operating Australia wide. It brings together national waste and recycling business leaders and affiliated state waste and recycling associations to formulate policies that will advance waste and recycling services in Australia.

The Australian Steel Institute is Australia's peak body representing the entire steel supply value chain from the steel manufacturing mills through to end users in building and construction, heavy engineering and manufacturing.

AEAS, through this economic impact assessment provides objective and independent analysis on the economic and environmental importance of better policy that can underpin the new Australian Government resolve for change and implementation. This economic impact assessment details the economic and environmental case of better regulation of unprocessed ferrous scrap metal, namely a potential restriction around its export through a Australian Government's waste export ban.

02

Scope of Study

The scope of this study is to quantify the economic and environmental benefits of ensuring all ferrous scrap metal is processed in Australia against the current alternative of baling and exporting unprocessed ferrous scrap metal.

Under the export alternative, shredding occurs overseas and shredder generated waste ('floc') is disposed via landfill or incinerators, often in third world jurisdictions with poor environmental standards and controls that would almost exclusively fall short of the expectation of the Australian community.

The implications of implementing such a ban would be significant and have theoretical positive economic, environmental and greenhouse gas emission reduction flow-on benefits. This report seeks to discuss and quantify where possible these benefits.

03

Report Background

Banning Unprocessed Ferrous Scrap Metal

NWRIC and the Australian Steel Institute have called for a national ban on the export of unprocessed ferrous scrap metal. The call for change is based on the premise that the retention of Australian ferrous scrap metal for processing locally is an important economic and environmental opportunity for Australia - creating direct and indirect economic and employment opportunities, securing Australia's long term recycling infrastructure and sovereign steel making infrastructure and capacity and providing enhanced and beneficial environmental outcomes.

The Australian Government in 2020 was successful in passing legislation (Recycling and Waste Reduction Act 2020), implementing a timetable to ban the export of waste glass, plastics, tyres, paper and cardboard by 1 July 2024. However, the banning of unprocessed ferrous scrap metal was not included.[1] It is important to note that unprocessed scrap metal carries a very significant non-recyclable waste loading, in some cases this loading is as high as 50% (for example, whitegoods) - this high waste loading alone sets unprocessed scrap metal apart from other exported recyclables.

Based on ABS statistics, AEAS has modelled that 1,070,575 tonnes of unprocessed ferrous scrap metal is being exported to overseas countries annually, many of which are third world economies with significantly lesser environmental standards as compared to Australia. This unprocessed scrap metal includes an estimated 267,600 to 321,200 tonnes of attached waste materials such as glass, plastics, textiles and tyres.[2]

The argument for including unprocessed ferrous scrap material focuses on four main areas of benefit: capacity, economic, environmental and budgetary.

3.1 Capacity

Ferrous scrap metal is a critical input to support the sovereign capability of our national steel manufacturing industry in Australia. A ban would potentially result in an increase in the number of 'mill ready' tonnes of ferrous scrap metal for use in Australian steel production. According to the World Steel Association, around 32% of global demand for steel products can be satisfied by scrap metal sources, however, Australia is not capitalising fully on its own scrap metal supply to feed domestic steel mill demand.[3]

Industry consultation indicates that the Australian steel industry is having to import processed scrap metal to meet its needs as it moves to decarbonise manufacturing processes.

In FY21, Australia imported nearly 100,000 tonnes of scrap metal primarily from New Zealand (42%), India (20%) and the US (20%) to supplement supply to Australian steel mills[4].

Unlike waste plastic, glass, paper or tyres, Australia has significant spare capacity domestically to process more scrap metal. This underutilisation of existing shredder processing capacity as the export of unprocessed metals increases, acts to directly erode the value of existing capital intensive recycling infrastructure and creates significant uncertainty in terms of future investment decisions for Australian recyclers. There is sufficient capacity in the Australian metal shredding market to process all of the material that is currently exported however that may not be the case moving forward if exports are allowed to continue. Recycled scrap inputs into steel manufacturing are critical in our domestic steel industry's strategy to reduce steel GHG emissions intensity and supporting circularity in a decarbonised steel industry.

The 1,070,575 tonnes of unprocessed scrap steel being exported annually could be processed and used locally by Australia's steel mills. Following the removal of non-recyclable materials this would result in a net 749,375 - 802,975 tonnes of additional feedstock to Australian steel mills. To evidence this argument overseas countries and regions as a consequence of fast-growing demand for scrap steel are locking in local supply volumes – a number of countries are all tightening policies and legislation (see Section 7.4).

Processing shredded ferrous scrap metal locally increases the security of scrap supply to local steel mills and the Australian steel value chain and helps shore up the future of Australian scrap metal recycling and steel manufacturing sectors. It directly addresses tangible sovereign risk to Australia at a time when local manufacturing capability has been highlighted as essential to maintaining Australia's sovereignty and security.

3.2 Economic

The export of unprocessed ferrous scrap metal undermines Australia's existing domestic processing industry and discourages future investment in advanced technologies. The extension of the export ban it is argued would help stimulate further investment. Moreover, there is existing capacity in Australia for these materials to be processed locally and to generate 'value-added material outputs' that can be directed to well established (domestic and international) markets.

Based on modelling provided in Section 9.0 of this report, a comparison between processed versus unprocessed ferrous scrap metal indicates that processing the metal in Australia provides a higher value add and employment contribution to the Australian economy than unprocessed export of the same ferrous scrap metal. For every 10,000 tonnes of ferrous scrap metal, the scrap metal processors create $4,840,358 in value add and 37.2 jobs. By contrast unprocessed ferrous scrap metal exporting business only create $1,344,544 in value and 10.3 jobs.

	Processed	Unprocessed
Value Added ($ millions)	4.8	1.3
Employment (FTE jobs)	37.2	10.3

Table 1: Economic Activity and Employment created for every 10,000 tonnes of shredded ferrous scrap processed locally

Expressed alternatively, the value of economic contribution to the Australian economy and jobs created from the exporting of unprocessed ferrous scrap metal presents is approximately one quarter of the value add and employment of processing shredded ferrous scrap metal to the Australian community in an economic context. As a consequence of the smaller value add and employment contribution, unprocessed scrap exports leads to a foregone $374.3 million of value add to the Australian economy and 2,877 fewer Australian jobs.

3.3 Environment

There are three areas of environmental benefit that will arise from an export ban on unprocessed ferrous metal.

Firstly, utilisation of processed Australian ferrous scrap metal enables Australian steel producers to reduce their GHG emissions. Australian steel is already amongst the least emissions intensive steel made in the world, and this will improve as deployment of renewable electricity generation continues to expand (unlike competitor steel manufacturing countries). Building on this position, the Australian steel industry has well stated goals to further decarbonise the industry through the production of 'low carbon steel'. Low carbon steel ambitions are reliant on an increased use of electric arc furnace (EAF) technology that requires a reliable supply of high quality scrap. The traditional blast furnace steelmaking process has been steadily adjusting manufacturing processes and significantly increasing the proportion of scrap metal used in each charge as a direct decarbonising measure. Low carbon steel production in Australia is less likely to occur if scrap metal exports continue.

Secondly, unprocessed ferrous scrap will no longer be shipped considerable distances to overseas jurisdictions and conversely, Australian steel mills will not be required to import processed scrap metal to replace exported feedstock. Based on AEAS modelling, the level of transport CO_2e emissions saving from an export ban on unprocessed ferrous scrap metal would be 81,110 tonnes of CO_2e global emissions. Furthermore, recycling 802,975 tonnes of ferrous scrap metal would save an additional 1.2 million tonnes in Australian greenhouse gas emissions as compared to the use of virgin raw materials.

	Processed	Unprocessed
Total Tonnes Transported	1,070,575	1,070,575
Average kms travelled	100	7,370
$kgCO_2e$/tonne.km	0.86407	0.86407 & 0.016142
Tonnes of CO_2e	92,505	173,615
Difference	37.2	81,110

Table 2: Transport GHG emissions comparison processed vs unprocessed shredder feedstock

Thirdly, the estimated 1,070,575 tonnes of unprocessed ferrous scrap metal exported annually contains 267,600 to 321,200 of waste that is predominately made up of glass, plastics, and tyres - all of which attract export bans singularly. This unprocessed scrap metal emanates from predominantly post-consumer materials, whitegoods and end of life car bodies. These materials may also contain lead acid, NiCad and lithium ion batteries as well as residual quantities of oil, fuel and coolant. According to ABS Export Data, between 50% - 60% of all scrap metal exports go to India, Indonesia and Vietnam, a further 35% to 40% goes to Bangladesh, Taiwan, Thailand and Malaysia with the remaining 10% to 15% going to Kuwait, China, Pakistan and Saudi Arabia[5]. Unfortunately, much of the waste materials that are attached are being exported to developing countries, many of which fail to have appropriate environmental compliance standards and oversight to accept and dispose of these waste materials.

"Floc which is generated and disposed of overseas in SEA export destinations is not managed to the high environmental standards that exist in Australia. The World Bank estimates 75% of the collected waste in South Asia is dumped in open dumpsites. Open dumpsites are effectively large holes in the ground with No planning regulations; No impermeable lining; No landfill gas capture; No leachate capture; and No wastewater treatment

MRA is of the view that the following poor environmental outcomes are likely to occur in overseas jurisdictions.

- Uncontrolled burning of floc.
- Illegal dumping of floc.
- Uncaptured leachate entering the broader environment.
- Floc used as a domestic fuel alternative – floc contains many hazardous substances, including chlorine and arsenic."

Source: MRA Consulting Group - The Waste Levy and NSW Metal Shredders - A Report for Sell & Parker, Sims Metal and InfraBuild

3.4 Budgetary

The 1,070,575 tonnes when processed in Australia are estimated to have a waste residual ranging between 267,600 and 321,200 tonnes that would need to be landfilled in Australia. Assuming waste levies ranging between $125.90 (Victoria Metro) and $151.60 (NSW metro) this would incur $33.7 million to $48.7 million in State Government waste levy revenue that would otherwise be available for reinvestment in environmental initiatives. Expressed alternatively, these amounts can also be described as the extent of levy avoidance by exporters of unprocessed scrap metal and the extent of an unfair competitive advantage in shifting their environmental compliance offshore.

3.5 Needed Policy Change

NWRIC and the Australian Steel Institute have called for a national ban on the export of unprocessed ferrous scrap metal. The explanatory memorandum that accompanies the Commonwealth's Recycling & Waste Reduction Bill (2020) sets out that 'the intention of regulating the export of waste material is to stop the export of untreated and unprocessed waste [that] is likely to have a negative impact on the environment or human health in the receiving country.'

The Commonwealth's Recycling and Waste Reduction Act already has in place export bans for unprocessed tyres, glass and plastic – these materials make up the bulk of contaminants that are attached to unprocessed scrap metal. The inclusion of unprocessed scrap metal to the list of banned waste exports will close this loophole that is detrimental to Australia's national interests.

The Commonwealth's Recycling and Waste Reduction Act allows the Environment Minister to make rules to prescribe kinds of waste material for the purposes of the bill. Allowing the Minister to use the rules to set the kinds of waste material that will be regulated gives the Minister flexibility to regulate different kinds of waste material as appropriate from time to time. Accordingly, the Environment Minister has the power without legislative change to include unprocessed ferrous scrap metal in the Australian Waste Export Ban and its full application by July 2024.

04

The Valuable Role Ferrous Scrap Metal Plays

4.1 Overview

Australia's ferrous scrap metal processors offer local ferrous metal recycling solutions to the municipal, government, agricultural, mining, construction & demolition, manufacturing, infrastructure, waste and resource recovery sectors. Their recycling capabilities and services help Australia participate in the circular economy, providing a pathway from collection to processing and ultimately transforming scrap metal into a valuable resource and providing a socially, environmentally, and economically responsible alternative to landfill.

The metal recycling and shredding industry are subsets of the broader resource recovery industry. Activity exists largely within the private sector and consists of small and large firms that operate facilities across the country that can range from mobile collection services, small suburban collection yards to large centralised resource recovery facilities. The largest processors of scrap metal in Australia include Sims Metal, Sell & Parker, Northstar and Infrabuild.[6] Metal recycling businesses can be broken down into two key areas of function:

- Acquisition / consolidation, collection and transfer (to either local or overseas processors);
- Processing metals to end market specification.

Scrap metal in Australia is either baled and exported unprocessed (sold to overseas pre-processors) or alternatively it is domestically processed into furnace ready materials. This 'waste free' material is then sold to either domestic or foreign steel manufacturers. Local metal recyclers supply furnace ready scrap metal to a number of Australian based steel mills and foundries listed in Table 3.

4.2 Availability of Scrap Metal

Ferrous scrap metal arises as metal-based goods such as old cars, white goods and other post-consumer goods reach the end of their useful lives, through the generation of off cuts from manufacturing, from construction and demolition projects, from infrastructure projects such as rail line replacement and from arisings from agriculture, mining and other heavy industries.

The long lifetimes for many metal products, together with high growth rates in metal demand, have resulted in scrap quantities that are typically much smaller than the metal demand in production. The relatively short lifetime of steel associated with vehicles and consumer goods compared with the structural steel associated with building and construction explains why the former makes up a significant proportion of obsolete scrap feedstock for recycling. The supply of ferrous scrap metal is discussed more fully in Section 8.0.

4.3 Scrap Metal Linkages with the Australian Steel Industry

The Australian Steel industry produces close to 5.8 Mt per annum from four major companies, with a mix of Integrated / BF-BOF (virgin steel production) and EAF route steel making. Approximately 70% of steel production occurs via Integrated BF-BOF; with 30% of global steel coming from EAF. These routes are described in Appendix 2.

Ferrous scrap metal recycling is a significant contributor to the raw material requirements of Australia's steel industry capturing the full value-in-use of the materials recycled. EAFs are almost totally reliant on recycled scrap metal for their material infeed.

Table 3: Australian Steel Industry – Major Steel Mills & Production Methods

Source: Australian Steel Institute

Company	Manufacturing Locations	Typical Production	Production Process
BlueScope	Port Kembla, NSW	3.2 million tonnes	Integrated steel mill. Iron ore / coal / scrap metal feedstock
InfraBuild	Laverton, VIC	0.7 million tonnes	EAF steel mill - ~90% scrap metal feedstock
	Rooty Hill, NSW	0.6 million tonnes	Integrated: iron ore / coal / scrap steel Coke Ovens, Pellet Plant, Blast Furnace, BOF steelmaking
InfraBuild	Whyalla, SA	1.2 million tonnes	Integrated steel mill. Iron ore / coal / scrap metal feedstock
Molycop	Waratah, NSW	0.25 million tonnes	EAF steel mill - ~90% scrap metal feedstock

4.4 Economic Value of Underpinning Australia's Steel Industry

Based on AEAS modelling, the steel industry's need for steel scrap is catalyst for major job creation, directly supporting more than 2,171 scrap recycling jobs and generating more than $339 million in economic activity (see Section 9.0). Equally importantly is that the scrap industry underpins the operation of the Australian Steel Industry. Steel is a key enabler for most of the National Manufacturing Priorities. As such, it underpins the sovereign capability to manufacture many products that are of long-term strategic and economic importance to Australia. The Australian Government believes the retention of a modern domestic steel industry is vital to support the broader economy should geopolitical instability or trade disputes threaten access to steel products for Australian businesses that rely on these to operate. Metal recycling businesses assist with steel manufacturing viability by offering an alternative local source of raw materials with an alternative cost structure to mining. A strong metal recycling industry and the supply of scrap metal provides domestic steelmakers with a hedge against price increases of key steel making inputs, such as iron ore or supply disruption as a result of trade disputes or global pandemics etc.

The economic contribution of the Australian Steel Industry is significant. Based on recently completed analysis conducted by BIS Oxford Economics it is estimated that for every $1 million invested 5 workers are employed in the steel and closely related industries; $2.8 million output is contributed to the economy, and $1.1 million of value is added to Australian GDP.[7]

4.5 Environment

The Australian Steel Industry is committed to the role played by steel in the circular economy, including the promotion of the recovery, reuse and recycling of steel and other products. The industry is committed to reducing its environmental footprint by reducing consumption, reusing materials and recycling. Scrap steel remains a very important raw material for its steelmaking operation. Australian steel mills recycle scrap from downstream product manufacturing processes and end-of-life products, to conserve energy, emissions and natural resources. Worldsteel defines 'low-carbon steel' as steel that is manufactured using technologies and practices that result in the emission of significantly lower CO_2e emissions than conventional production.

Metal recycling is important to the circular economy as it conserves valuable resources and diverts useful materials from going to landfill. Millions of tonnes of metal are diverted from waste streams to recycling streams every year and provides a direct replacement for excavated virgin materials such as iron ore and coal.

The four principles of a circular economy as they relate to steel are:

Reduce Less material, water, energy and other resources used to create steel, and reduced weight of steel used in products.

Reuse Use of an object or material again, either for its original purpose or for a similar purpose, without significantly altering the physical form of the object or material. This includes re-purposing co-products to minimise the amount of waste sent to landfill, and preserve the use of raw materials in sectors beyond the iron and steel industry.

Remanufacture Restore durable used steel products to as-new conditions.

Recycle Melting steel products at the end of their useful life to create new steel, and creating a new application from the recycled material.

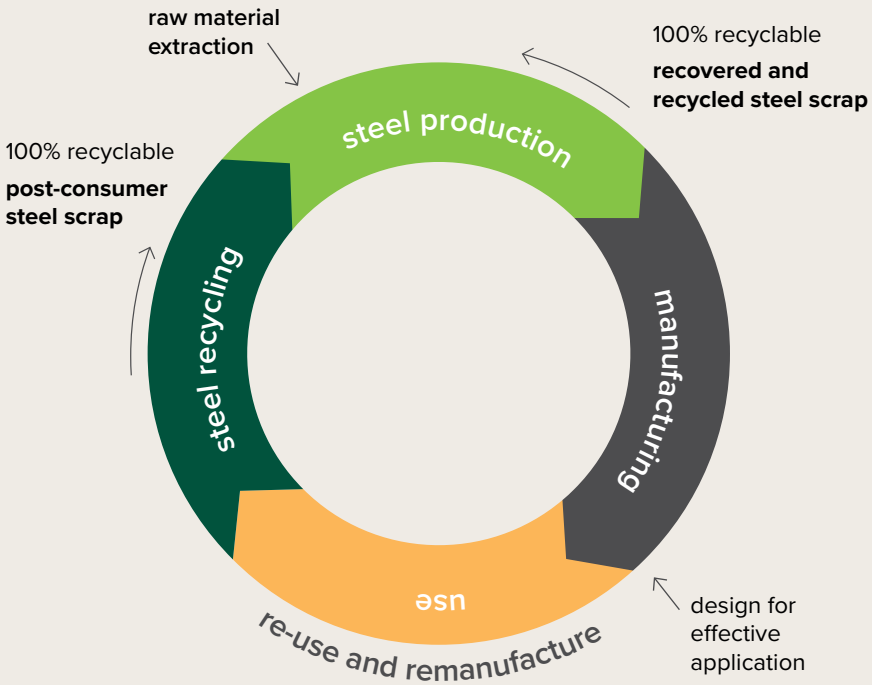


Figure 1: The Four Principles of Steel being central to a circular economy

Source: Bluescope Sustainability Report 2020-21

Metal recycling is a prime example of a contributor to the circular economy, embodying many of the core principles of the concept. There are various benefits to adopting a circular economy model, which include:

- **Reduction in energy use** – less energy is used to refine and remake scrap metal rather than energy required to extract raw materials to make new steel products;
- **Reduction in waste** – a benefit that exists both when a metal good is not immediately disposed of at the end of its useful life but also in terms of avoided indirect waste generated as part of the manufacturing process;
- **Minimising the transportation task** - Recycling metal presents a different transport profile than the production of steel products from virgin material. Generally, newly extracted inputs are shipped considerable distances from mine to furnace to manufacturer via either road transportation and/or ocean shipping. In the case of domestically produced steel, transport distances between Australian east coast shredders business locations and Port Kembla are much shorter than iron ore production areas in WA; and
- **Reduction in capital and labour costs associated with mining** – Considerable labour and capital (other than those mentioned above) are required to extract virgin raw material. Whilst it is acknowledged that metal recycling also requires labour and capital (such as shredding machines), the presence of recycled inputs offers steel manufacturers a potentially lower cost alternative.

As a result, steel manufactured using higher volumes of recycled scrap requires considerably less energy and provides lower greenhouse gas emissions than steel made from virgin raw materials. Accordingly, scrap plays a key role in reducing industry emissions and resource consumption. Every tonne of scrap used for steel production avoids the emission of 1.5 tonnes of carbon dioxide, and the consumption of 1.4 tonnes of iron ore, 740 kg of coal and 120 kg of limestone.[8]

05

Australian Scrap Metal Processing – Statistical Overview

5.1 Overview

In 2018-19 Australia generated an estimated 74.1 million tonnes (Mt) of waste materials of which 5.6 Mt were metals (approximately 7.6% of generated waste). Scrap metal has the highest recovery rate of all waste streams at 90% and recycling is well-established in every state. Based on industry estimates ferrous scrap metal is estimated to represent approximately 85% of all scrap metal.

Figure 2: Resource recovery rates by material category 2018-19

Source: National Waste Report 2020

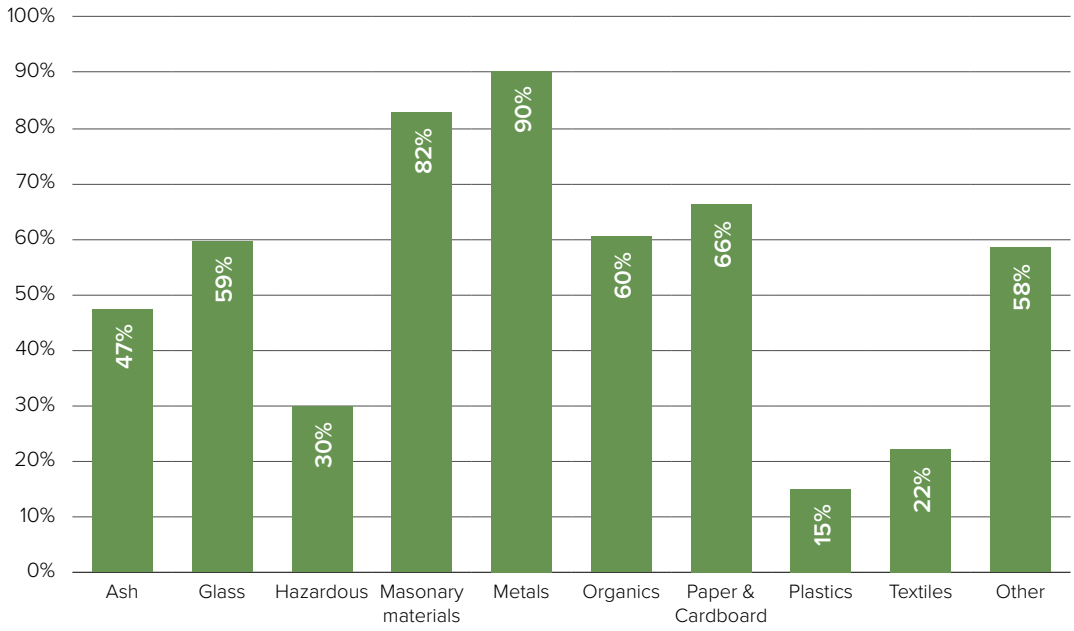
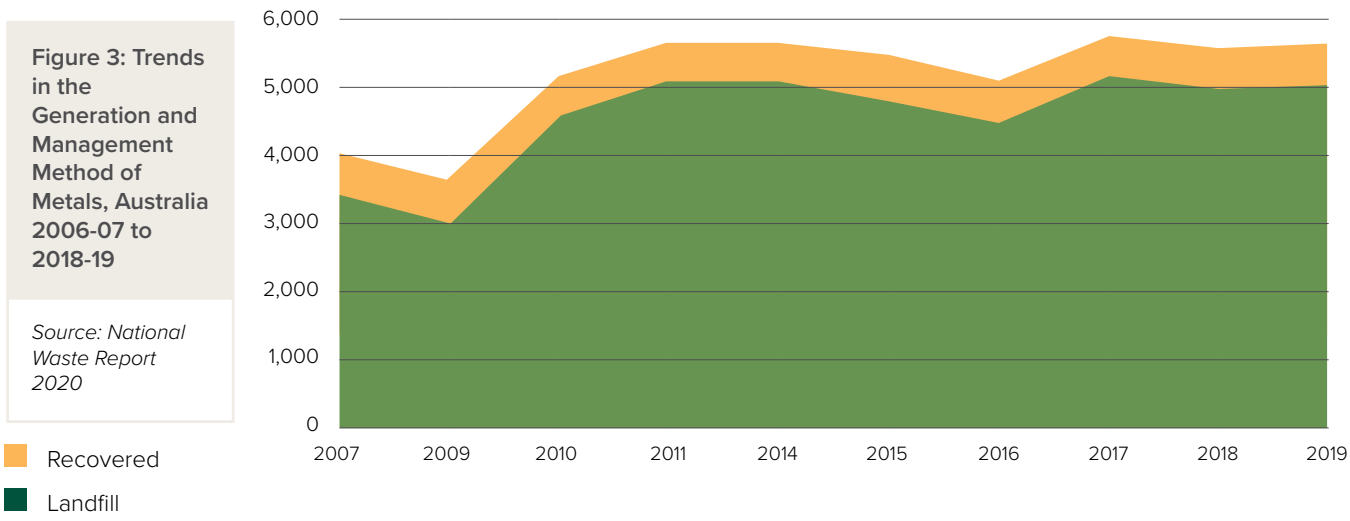


Figure 3 shows the trend in metal generation and management method from 2006-07 to 2018-19. Waste generation increased by 39% and the recycling rate increased from 86% to 90% (3.46 Mt to 5.04 Mt). Expressed alternatively, scrap metal generation has been increasing on average over this period by 2.8% each year and the recovery rate has correspondingly increased by 3.2% each year.

Figure 3: Trends in the Generation and Management Method of Metals, Australia 2006-07 to 2018-19

Source: National Waste Report 2020



The Commercial and Industrial (C&I) sector typically generates more metal waste than Municipal Solid Waste (MSW) and Construction and Demolition (C&D) sectors. During processing, approximately 29% (419,000 tonnes) is landfilled as residual waste. The residual waste (shredder floc) is generally a mix of plastics (up to 55%), rubber, textiles, glass and soil.

Table 4: Recovery, Landfill and Generation of Metals, Australia 2006-07 to 2018-19 ('000 tonnes)

Source: National Waste Report 2020

	2007	2009	2010	2011	2014	2015	2016	2017	2018	2019
Recovered	3,460	3,026	4,604	5,092	5,106	4,832	4,517	5,147	5,004	5,038
Landfill	559	604	575	525	554	601	564	561	548	565
Total	4,019	3,630	5,482	5,617	5,660	5,433	5,081	5,709	5,551	5,603

Table 5: All Scrap Metal by State 2018-19 ('000 tonnes)

Source: National Waste Report 2020

	Generation		Recovered		Landfilled	
	Tonnes	% of Total	Tonnes	% of Total	Tonnes	% of Total
ACT	38	0.7%	32	0.6%	6	1.1%
NSW	1,571	28.0%	1,420	28.2%	152	27.0%
NT	9	0.2%	1	0.0%	8	1.4%
QLD	1,256	22.4%	118	2.3%	138	24.5%
SA	353	6.3%	329	6.5%	24	4.3%
TAS	20	0.4%	7	0.1%	14	2.5%
VIC	1,629	29.1%	1,474	29.3%	155	27.5%
WA	725	12.9%	657	13.0%	68	12.1%
AUS	5,602	100.0%	5,038	100.0%	564	100.0%

Table 5 indicates Victoria is the largest generator of scrap metal (1,629,000 tonnes or 29.1% of the total) followed by NSW (1,57,000 tonnes or 28.0%) and Queensland (1,256,000 tonnes or 22.4%).

5.2 Scrap Metal Processing Material Streams

Scrap metal recycling can broadly be categorised into two main material streams:

- Ferrous metals, including steel, iron, cast iron and tin plated metals ;
- Non-ferrous and mixed metals, including aluminium, copper, stainless steel, brass, lead and lead acid batteries and other non-magnetic metals.

Ferrous Metals

Ferrous metals are processed either locally or exported.

1. Export

- Light gauge materials are baled, loaded in to shipping containers and exported to overseas processors inclusive of non-metallic contaminants;
- Heavier grade materials are size reduced by large industrial shears or by manually oxy cutting the metal. Materials are then loaded either in bulk marine cargos or containerised and exported to overseas steel mills.

2. Processed within Australia

- Light gauge materials are processed locally, with ferrous and non-ferrous metals separated by large, industrial shredders equipped with sophisticated and best practice downstream separation plants;
- Heavier grade materials are size reduced by large industrial shears or by manually oxy cutting the metal.
- Processed ferrous scrap metal is then used as furnace ready feedstock in large electric arc or blast furnace steel mills to produce various types of steel. Non-ferrous metals resultant from shredding are separated by metal type, consolidated and sent to secondary non-ferrous smelters for refining and re-use.

Light gauge materials make up ~75-80% of ferrous scrap metal volume in Australia.

Non-ferrous and mixed metals

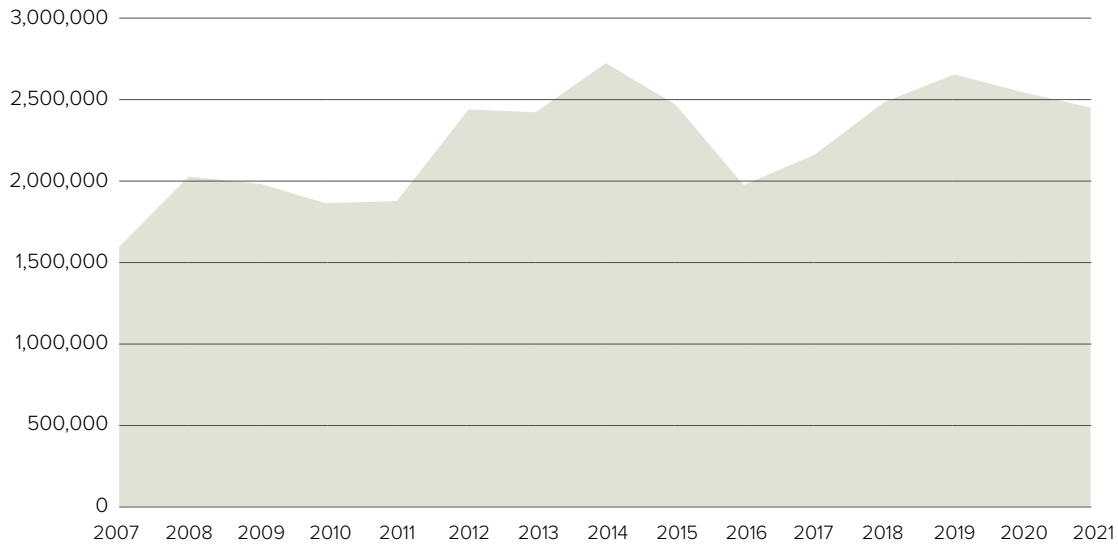
Non-ferrous metals have varied reprocessing methods and markets. The majority of recovered non-ferrous metals are separated by commodity type and exported, with some recovered metals refined or reused within Australia in manufacturing and in smaller specialised foundries.

5.3 Exports

While nearly 90 per cent of metals, or some 5 million tonnes, are recycled, almost half of used metals are exported. Exports of scrap metal stood at 2.79 million tonnes in 2006-07, climbed to a peak in 2013-14, then fell back to 2.45 million tonnes in 2020-21.

Figure 4: Exports of scrap metal from Australia , 2006-07 to 2020-21 (Tonnes)

Source: Blue Environment

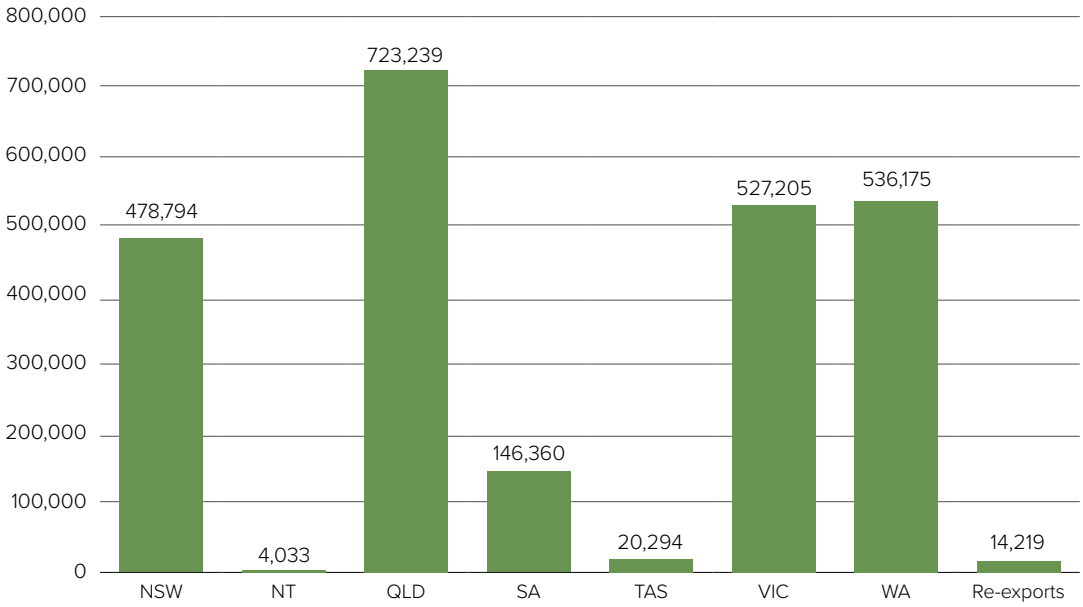


There has been a recent increase in scrap metal export volumes. This is linked to increasingly high market prices offered most types of scrap metals between 2016 and 2021. Volumes reduced in 2020/2021 due to a worldwide contraction in shipping and shipping container availability and a subsequent significant increase in sea freight charges.[9]

Most waste is exported from a port within its jurisdiction of origin. NSW exported 79% through Sydney, Queensland exported 70% through Brisbane, Victoria exported 87% from Melbourne, WA exported 74% through Fremantle, and SA exported 93% through Port Adelaide. Tasmania is the exception. Only 42% was exported through Launceston and Burnie and the remainder went through Melbourne (47%) and Sydney (11%). It is understood that exported materials generated in the Australian Capital Territory are typically exported from Sydney.[10]

Figure 5: Exports of Metal Waste by State 2020-21 (kt)

Source: National Waste Report 2020



5.4 Ferrous Scrap Metal Exporters

The export of scrap metal in Australia is unregulated and highly fragmented with many smaller players. This makes it difficult to know the size of the industry and who the main players are. Industry sources indicate most exporters are dealers that have invested in low-tech baling equipment to facilitate overseas transport to South-East Asian (SEA) markets.

The export of unprocessed material has grown exponentially over the last decade. A report commissioned by the NSW EPA (Marsden Jacobs Associates – Evaluation of Shredder Floc Reduction & Concessional Waste Levy 2019) notes that the export of unprocessed material makes up 15-20% of market share, from virtually zero in the preceding decade. Industry indicates these market share numbers are conservative and believes the number to be in the order of 25 - 30% in some markets.

At present, the cost of disposing of waste in Australia due to Australia's best practice environmental standards is greater than shipping costs to many overseas countries. The cost of State based waste levies make up the most significant portion of waste disposal cost in Australia. In most States, the waste levy far exceeds the actual landfill gate fee. Waste levies are an instrument designed to reduce the market competitiveness of landfill and to provide headroom and a competitive advantage for recyclers. These levies are now in place in all Australian state jurisdictions, with revenues now in excess of $1.2billion per annum. Waste levy costs can make up approximately 23% of the operational cost of a shredder in NSW.[11]

Australian based metal recyclers and steelmakers compete on a global stage and a have their price and commercial terms dictated by global trade rather than domestic competition. The simple consequence of trading at 'global price parity' means that artificial cost increases unrelated to global demand and supply determinants occurring in the domestic market (such as State based waste levies) affect the ability for that party to operate commercially.

In 2022, Marsden Jacob Associates (MJA) was engaged by NSW EPA to produce a report – Carbon Abatement Opportunities for Circular Economy. The report was commissioned to identify circular economy opportunities and to provide advice on future government and industry actions to help achieve these goals. The report indicates exporting of unprocessed scrap is used to bypass the landfill levy applied to waste 'floc' generated from the processing of scrap steel.

Export data does not allow for the breakdown of ferrous metal exports into whether it has been processed or unprocessed. However industry estimates indicate around 25%[12] of available unprocessed scrap metal is currently baled and exported. Industry estimates the total tonnes of non-processed ferrous scrap metal exported each year are in the order of order 1,070,575 tonnes.

The ferrous scrap that remains on shore is used as feedstock to Australia's $29 billion steel industry, which produces around 5.8 million tonnes of steel annually, and according to the Australian Bureau of Statistics, employs 110,000 Australians (2020-21).[13]

06

Increasing and Future Demand for Recycled Metal

Demand for steel and in turn ferrous scrap metal is driven primarily by levels of construction activity underpinned by government and private sector infrastructure building and construction projects. As stated Australia currently produces approximately 5.8 million tonnes of steel annually. According to the Infrastructure Australia the demand outlook for steel is significant. Major points from Infrastructure Australia's Infrastructure Market Capacity 2021 Report include:

- The increasing and significant concentration of mega-projects, transport and rail investment has created unprecedented demand for steel materials. Infrastructure Australia has estimated that demand for steel will increase by 160% over the next three years.
- Public infrastructure pipeline activity is driving strong growth in steel products demand –these rates are even higher when considering materials that are specialised to the rail or road industries. Rail track demand growth is projected to surge in 2022-2023 as activity on a number of rail projects ramps up. Over the next three years, this equates to an increase of more than 300,000 tonnes of rail track steel.
- Remaining steel products are projected to see strong growth in demand in the near term (averaging a growth of just under 40% and 50% per annum over the next two years respectively for reinforcement and structural) but not to the same degree as those resources which are more closely tied to transport sectors.
- In addition a major source of demand will be wind turbines (average demand 215,000 tonnes, with a peak of 383,000 tonnes. Solar farms use significant amounts of structural steel (e.g. mounting structures), averaging 97,000 tonnes with a peak of 170,000 tonnes, which was manufactured locally in the early stages of the industry but is now imported.[14]

In addition, the Office of the Chief Economist[15] indicates that world production of steel will continue to grow with parallel growth for the Australian Steel Industry anticipated.

Global steel consumption is projected to grow at an average annual rate of 1.2%, increasing from 1.96 billion tonnes in 2021, to around 2.11 billion tonnes by 2027. Construction — representing about 50% of global steel demand — is expected to see solid growth over the outlook. This expansion will be spurred by considerable levels of infrastructure investment, pledged across many major nations in the last two years to support the global transition to low carbon emissions.

Source: publications.industry.gov.au/publications/resourcesandenergyquarterlymarch2022/index.html

Based on this conservative 1.2% annual growth rate, AEAS estimates annual production of Australian steel is expected to rise from its current 5.8 MT in 2021 to 6.25 MT by 2027.

Global steel consumption is projected to grow at an average annual rate of 1.2%, increasing from 1.96 billion tonnes in 2021, to around 2.11 billion tonnes by 2027. Construction — representing about 50% of global steel demand — is expected to see solid growth over the outlook.

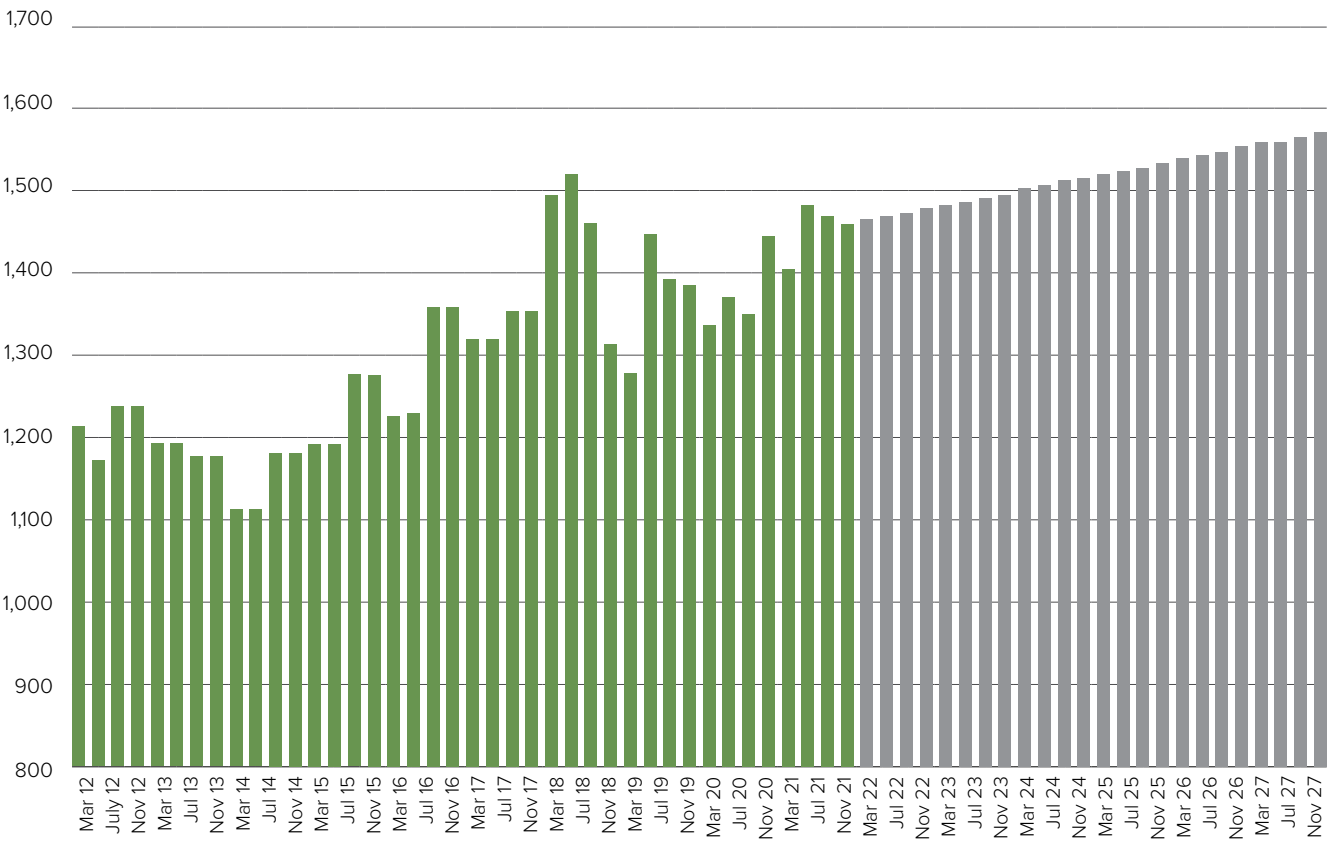


Figure 6: Australian Steel Industry Production and Forecasted Outlook

Source: AEAS & Office of Chief Economist, Department of Industry, Science, Energy and Resources

Accordingly demand for processed ferrous scrap metals as feedstock to Australian steel mills will remain very high and likely to increase considerably given Australia's record infrastructure pipeline and construction demand. Section 8.3 discusses in more detail domestic ferrous scrap metal shortages requiring the import of scrap metal to meet steel industry demand.

07

Australian Government Policy

There is a considerable momentum by all tiers of Australian Government collectively implementing a range of new policies underpinning environmental sustainability and how as a country it will achieve net zero emissions by 2050.

7.1 National Waste Policy

The National Waste Policy and Action Plan provides a national framework for action by governments, the business sector, the waste and resource recovery industries, and communities to achieve sustainable waste management and recycling in Australia until 2030. The policy responds to the challenges facing waste management and resource recovery in Australia, the China Sword Policy and reflects the global shift towards a circular economy – including the need for better resource-efficient systems, products and services to avoid waste, conserve resources and maximise the value of all materials used. It also acknowledges the need to improve our capacity to better design, reuse, repair and recycle goods used.

The policy responds to the challenges facing waste management and resource recovery in Australia, the China Sword Policy and reflects the global shift towards a circular economy

7.2 Export Ban on Recycled Materials

In August 2019, a decision was made by the Council of Australian Governments (COAG) to establish a timetable to ban the export of waste plastic, paper, glass and tyres, while building Australia's capacity to generate high value recycled commodities. Transforming waste material into high value materials was hoped to create jobs, build a more sophisticated industry, and provide positive outcomes for the environment and community wellbeing. The Recycling And Waste Reduction Act 2020 was passed and the Commonwealth, state and territory governments and the Australian Local Government Association agreed to a response strategy at the 13 March 2020 COAG meeting.[16]

The response strategy presents a coordinated package to implement the COAG waste export ban. Action by all levels of government are required in the following key areas: driving demand for recycled content; public education to reduce contamination at its source; investment in recycling and waste infrastructure; improving access to and quality of waste tracking data; improving product design and fostering innovation and commercialisation of new technology; and accelerated development of standards for use of recycled material in civil works.

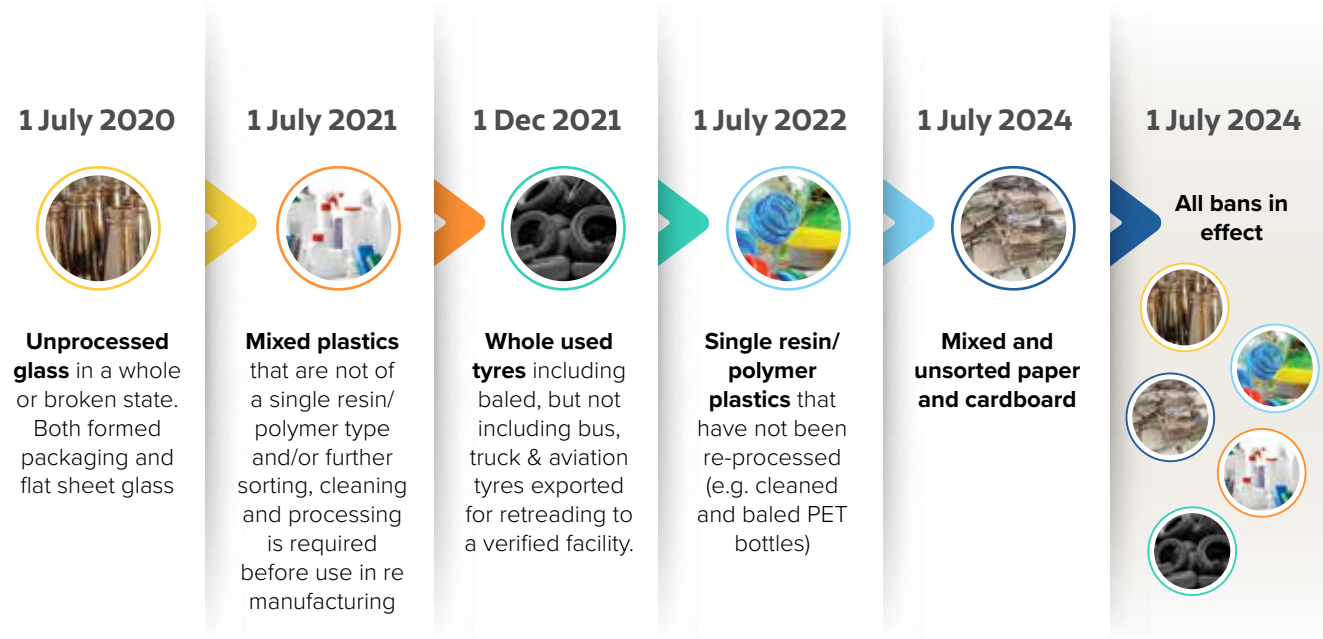


Figure 7: Australian Waste Export Ban Timetable

The Recycling & Waste Reduction Bill 2020's explanatory memorandum document says it will "replace the framework in the Product Stewardship Act 2011" regarding "the shared responsibility for reducing the environmental, health and safety footprint of manufactured goods and materials across the life cycle of a product stream (including material streams)." The memorandum adds, "The intention of regulating the export of waste material is to stop the export of untreated and unprocessed waste [that] is likely to have a negative impact on the environment or human health in the receiving country."

7.3 Federal Election 2022 – Australian Labor Party Policy

The Australian Labor Party's plan is to reduce waste, boost recycling, improve the health of the environment, through underwriting innovative manufacturing and creating sustainable jobs. It intends to use the Government's purchasing power to help drive an increase in demand for recycled materials. This will boost recycling rates, reduce waste in our environment, lower the emissions caused by landfill, and create sustainable manufacturing opportunities and jobs right here in Australia. ALP policy says "In 2021, the CSIRO released the National Circular Economy Roadmap, which indicates "if Australia increased its recycling rate by 5% this would add an estimated $1 billion to Australia's GDP."[17]

The policy says that "by supporting industry to increase the use of recycled content in government projects this will mean more recycled material gets used in big government contracts, driving up demand for recycled content and making it easier and cheaper for the private sector too." The new Australian Government will also invest $60 million into additional recycling infrastructure through the Recycling Modernisation Fund.

The new Australian Government has indicated that it will "work with industry to improve arrangements for key materials like plastics and packaging, and lead collaboration with local, State, and Territory governments to make greater progress in standardising high-quality kerbside collection, phasing out harmful single-use plastics, and harmonising state-based container deposit schemes."

Finally ALP election policies also include $3 billion already announced for green metals clean energy component manufacturing, hydrogen electrolysers and fuel switching, as part of Labor's Powering Australia Plan. AEAS notes the sourcing of 'Low carbon steel' would be very much consistent with the new Australian Government's stated election commitment.[18]

ALP Election Policy includes the following statement"

"Australia must be a country that makes things. After almost a decade of sending manufacturing offshore and neglecting Australian workers, we've seen the consequences: fewer jobs, missed opportunities, and a nation left exposed when coronavirus hit. An Albanese Labor Government will rebuild our proud manufacturing industry, and build a future made right here in Australia. Australia is blessed with natural resources, but under this government we're missing out on an opportunity to value add and employ Australians in manufacturing."

Source: www.alp.org.au/policies/a-future-made-in-australia

7.4 Overseas Government Action

January 2018 was the start of China's total ban on solid waste imports. New definitions of certain reprocessed or scrap materials have been finalised, including ferrous and non-ferrous metals and recycled pulp. Imports of high-quality reprocessed materials are noted as important to China's zero carbon goals. Certain high quality reprocessed materials are not considered waste under the legislation's definitions including scrap metals

Malaysia has announced plans to introduce restrictions on scrap metal imports. Negotiations between the metal industry and government are continuing. The metals industry argues that its strong reliance on recycled scrap needs to increase further to comply with emissions reduction commitments, and import restrictions could jeopardise this transition. The draft restrictions cover minimum metal content, contamination limits, as well as pre- and post-shipment inspections. An industry representative claimed these exceed the Basel Convention requirements on hazardous waste. Exporters are concerned that the restrictions could set a precedent leading to global restrictions on the scrap metal trade.

India has proposed a new policy seeking to increase local scrap metal processing and reducing reliance on imports, for Bangladesh metals and glass are allowed for bona fide industrial units and in Vietnam Scrap metal waste needs to be 99% metal to be allowed in.

Table 6: Metal Import Restriction Status by Country

Source: Blue Environment Exports of Australian waste and recovered materials in 2020-21

Country	Status
Indonesia	Restricted
India	Considering
Vietnam	Restricted
China	Restricted
Malaysia	Considering

In late 2021, the European Commission proposed to ban the export of certain wastes (including unprocessed ferrous scrap metals) to non-OECD countries unless those countries could demonstrate that they are capable of handling the wastes appropriately and conversely, the exporting country can prove that their facilities have the capacity to process the wastes appropriately. This precedent aligns with the recommendation to ban the export of unprocessed ferrous scrap metal put forward by NWRIC and the Australian Steel Institute

Section 7.0 confirms that a ban on the export of unprocessed ferrous scrap metal would directly align with the new Australian Government's waste and future made in Australia election policies as well as existing waste and environmental policies of State and Territory Governments.

08

Economics Behind Export of Unprocessed Ferrous Scrap Metal

This section outlines the economics behind the export of unprocessed ferrous scrap metal and why the export of 1,070,575 tonnes of unprocessed ferrous scrap metal occurs.

8.1 Determinants of the availability of domestic ferrous scrap metal

The largest determinant of the availability of domestic ferrous scrap metal is the end of life of existing ferrous metal products and its recovery rate. In 2019-20 there was an estimated 4,282,300 tonnes of ferrous scrap metal recovered in Australia. Supply is projected to grow to 5,962,900 by 2037-38.[19]

Despite this growth, the IEA predicts that scrap steel sources will only satisfy 45 per cent of future demand due to limited scrap availability.20 Steel production today is higher than when the products that are currently being recycled were produced. Scrap availability is therefore limited by the rate at which steel products reach the end of their life (lead times up to 100 years for buildings and infrastructure) and the efficiency of scrap collection and sorting systems.

Following the actual availability of recovered ferrous scrap metal, competition for scrap (and therefore whether the metal is processed domestically or overseas) is determined by the "buy price" offered to the scrap generator. The buy price for metal (whether offered by processors or exporters) is influenced by a combination of factors including:

- the global scrap metal price;
- global shipping rates;
- exchange rates;
- the expected floc content of the scrap metal and the cost of disposal in the buyers jurisdiction;
- local processing and logistics costs.

Accordingly, Australian scrap metal prices are highly exposed to global price movements and sale prices to Australian steel mills are based on Global price parity and not on local market costs and conditions.

In addition there are some limits to the potential role that scrap metal can play in supplying inputs to the Australian steel industry. These include:

- There is a geographical limit to the viability of scrap collection;
- Australia coastal bulk shipping costs and vessel availability are prohibitive;
- An increase in the percentage of floc (waste contamination) content of items to be shredded;
- Cost of removing and disposing of contamination; and
- Price increases from government fees and regulation (most of which is made up of landfill levies) and the inability of local processors to recover these costs in the 'sell price'.

8.2 Determinants for the export of domestic ferrous scrap metal

The alternative to processing scrap metal in Australia is to bale and export the metal stream. The export of scrap metal is additionally influenced by a variety of factors, including:

- Current international scrap metal commodity prices;
- Exchange rates;
- International shipping rates;
- The availability of shipping containers;
- Regional supply and demand factors;
- Trade barriers and effects (eg, Article 232 of China's 'National Sword Policy'); and
- Other duties and taxes of foreign jurisdictions.

8.3 Australian Domestic Market Shortfall

Domestic ferrous scrap metal processors on Australia's east coast sell the bulk of their metal outputs to local steel mills. All Australian steel mills rely on domestic scrap metal as feedstock. While traditionally Australia's scrap industry has been able to meet the steel industry's growing demand for ferrous scrap, with the recent and significant increase in the export of unprocessed metal, the steel manufacturing industry has had to supplement its supply with imported scrap to satisfy existing and additional markets.

Industry advises that due to higher scrap exports steelmakers are importing processed scrap metal as feedstock in bulk (>30,000 tonne) marine cargos in replacement of locally supplied volume. This increases operating costs and decreases employment and investment in the steel making sector. Industry advises that bulk importation of scrap metal is a very recent occurrence for steel mills, only becoming a necessity as local operational costs increase the competitiveness of exporters of unprocessed scrap.

Industry indicates that it is already having to import processed steel scrap metal to meet its needs as it moves to decarbonise manufacturing processes. In FY21, Australia imported nearly 100,000 tonnes of scrap metal primarily from New Zealand (42%), India (20%) and the US (20%) to supplement supply to Australian steel mills.[21]

Without a domestic supply of shredded scrap metal, Australia's electric arc furnace steel mills and blast furnaces would rely exclusively on imported scrap metal or virgin iron ore. This represents a significant supply risk that would make continued investment even more marginal for the steel mills.

According to the World Steel Association, around 32% of global demand for steel products can be satisfied by scrap steel sources, however, Australia is not capitalising fully on its own scrap metal supply to feed domestic steel mills demand.

According to ferrous scrap metal businesses, unlike waste plastic, glass, paper or tyres, Australia has significant spare capacity domestically to process more scrap metal. This underutilisation and erosion of the investment in existing processing capacity as exports increase is hurting Australia's economy and limiting our ability to move quickly towards a decarbonised circular steel industry selling to both domestic and overseas markets. Recycled scrap inputs into steel manufacturing are critical in our domestic industries strategy to reduce steel GHG emissions intensity.

The 1,070,575 tonnes of unprocessed scrap steel being exported annually could be processed and used locally by Australia's steel mills. Following the removal of non-recyclable materials this would result in a net 749,375 - 802,975 tonnes of additional feedstock to Australian steel mills.[22]

32%

of global demand for steel products can be satisfied by scrap steel sources

100,000

tonnes imported annually

1,070,575

tonnes exported annually

09

Economic Benefits of an Export Ban on Unprocessed Ferrous Scrap Metal

This section outlines the process and calculated estimates of the direct and indirect economic benefits of the ferrous scrap metal processing industry and estimates of the economic and environmental benefit of establishing a ferrous scrap metal export restriction.

9.1 Methodology

This report was developed in consultation with NWRIC and the Australian Steel Industry and their members identifying the important economic, and, environmental contribution the industry sector makes as well as a range of other vital statistics that it contributes to the Australian community. The AEAS methodology is described below:

- AEAS identified the processes and expenditure involved in the operation of the ferrous scrap industry through a comprehensive request for information to NWRIC and the Australian Steel Institute. This was coupled with a virtual workshop to discuss these materials.
- Desktop research was undertaken to establish information currently available for the industry sector and government policies for use as benchmarks for AEAS calculated results.
- Estimates utilising AEAS model of the direct and indirect contribution of the industry sector to the Australian economy in terms of gross value add and employment were prepared. Direct impacts were calculated as the first round of effects from direct operational expenditure on goods and services by the industry sector. The flow-on or indirect effects (i.e. the multiplier effects) were estimated in two parts: production-induced and consumption-induced effects. The production-induced effects arose from expenditure by the industry sector on goods and services supplied by other firms in the industry sectors supply chain. The consumption-induced effects arose from expenditure of industry sector workers' income on goods and services supplied by other Australian businesses.

In addition, AEAS has applied value add analysis to foundation materials including 'The Waste Levy and NSW Metal Shredders' prepared by MRA Consulting Group in order to present consistent and nationally applied estimates specific to unprocessed ferrous scrap metal.

From the AEAS modelling, estimates were calculated across the following metrics:

Gross output, $millions

Output in this context refers to the total additional production attributable to metal shredder businesses operations. Whilst output alone is useful, it fails to remove the intermediate inputs that were supplied by other industries, which, if summed, would potentially represent a double-count of benefits across the whole economy.

Value add, $millions

Gross value added (GVA) is the measure of the value of goods and services produced in an area, industry or sector of an economy. Value added for a project is comprised of wages and salaries, gross operating surplus of the processor and its indirect taxes.

Employment, jobs

A measure of employment levels (full time equivalents) required to service the demand for economic output per annum.

Table 5: AEAS model Metrics	*Source: AEAS*

9.2 Ferrous Scrap Metal Processing Industry Economic contribution analysis

AEAS modelling indicates that the Australian ferrous scrap metal processing industry is a significant contributor to the Australian economy.

The direct output of ferrous scrap metal processing businesses in Australia is $1,096 million. The net contribution to the Australian economy after removing the cost of input goods and services used in producing the scrap metal is measured through 'value add' to the economy and is estimated at $339 million.

The indirect economic activity created is estimated at $1.22 billion with a total economic contribution towards the Australian economy of $1.55 billion.

As a consequence of this economic activity and the valuable role the industry sector plays in the processing of shredded ferrous scrap metal 2,171 FTE jobs are created with a further 9,780 indirect jobs and total employment creation of 11,951 persons.

	Direct	Indirect	Direct
Output ($ millions)	1,096.0	3,927.5	5,023.5
Value Add ($ millions)	339.0	1,215.6	1,554.6
Employment (FTE jobs)	2,171	9,780	11,951

Table 8: Total Shredded Ferrous Scrap Metal Processing Industry Economic and Employment Contribution ($ millions)

Source: AEAS 2022

9.3 Comparison of economic contribution of processed vs unprocessed ferrous scrap metal

Based on AEAS modelling a comparison between processed versus unprocessed ferrous scrap metal indicates that processing the metal in Australia provides a higher value add and employment contribution to the Australian economy than unprocessed export of the same ferrous scrap metal.

For every 10,000 tonnes of ferrous scrap metal, the scrap metal processors create $4,840,358 in value add and 37.2 jobs. By contrast unprocessed ferrous scrap metal exporting business only create $1,344,544 in value and 10.3 jobs.

	PROCESSED - purchasing of unprocessed metal and processing it to remove waste materials and readying it for sale as feedstock for Australian steel making.	**UNPROCESSED** purchasing of unprocessed metal and bailing it ready for export.
Value Add ($ millions)	4.8	1.3
Employment (FTE jobs)	37.2	10.3

Table 9: Economic Activity (Value Add) and Employment created for every 10,000 tonnes of ferrous scrap metal

Source: AEAS 2022

Expressed alternatively, the value of economic contribution to the Australian economy and jobs created from the exporting of unprocessed ferrous scrap metal presents is approximately one quarter of the value add and employment of processing shredded ferrous scrap metal to the Australian community in an economic context.

This largely is as a result of the value add to the locally processed ferrous scrap metal. For metal processors, once the feedstock has been sourced it is sheared or shredded, cleaned and readied for supply to the Australian steel mill or export. This compares to simply baling of the feedstock and then export of the unprocessed ferrous scrap metal.

9.4 Estimated Economic Cost of Unprocessed Ferrous Scrap Metal Exports

Based on AEAS estimates, the exporting of unprocessed ferrous scrap metal results in inferior economic outcomes for the Australian economy and jobs. As a consequence of the smaller value add and employment contribution, unprocessed scrap exports leads to a foregone $374.3 million of value add to the Australian economy and 2,877 fewer Australian jobs.

10

Environmental Benefits of an Export Ban on Unprocessed Ferrous Scrap Metal

In addition to considerable economic loss to the Australian economy AEAS has calculated inferior environmental outcomes as a result of the exporting of unprocessed ferrous scrap metal. There are significant environmental losses that eventuate from 1,070,575 tonnes of unprocessed ferrous scrap metal being exported. This section outlines the environmental impacts of these unprocessed tonnes being exported rather than processed and used in Australia.

10.1 Environmental benefit calculated from removing international shipping of scrap metal

Based on Australian steel mills currently importing processed ferrous scrap metal, it is anticipated that the majority of the 1,070,575 tonnes of scrap metal would be sold to domestic steel mills. The total number of tonne kilometres travelled for unprocessed ferrous metal scrap is 73.7 times higher than for ferrous metal processed in Australia. Accordingly this results in significantly higher CO_2e emissions even though the $kgCO_2e$/tonne.km emission is higher for a heavy vehicle verses the efficiency of containerised international shipping.

Based on AEAS modelling the exporting of 1,070,575 tonnes of ferrous scrap metal would create 173,615 tonnes of transport CO_2e emissions and compares with just 92,505 tonnes of transport CO_2e emissions if the ferrous scrap metal was instead processed in Australia. Accordingly the level of transport CO_2e emissions saving from an export ban on unprocessed ferrous scrap metal would be 81,110 tonnes of CO_2e global emissions.

	PROCESSED purchasing of unprocessed metal and processing it to remove waste materials and provision to Australian steel mill.	**UNPROCESSED** purchasing of unprocessed metal, bailing and export
Total Tonnes Transported	1,070,575	1,070,575
Average kms travelled	100	7,370
Tonne Kms	107,057,500	7,890,137,750
$kgCO_2e$/tonne.km	0.86407	0.86407 & 0.016142
Kg of CO_2e	92,505,174	173,615,191
Tonnes of CO_2e	92,505	173,615
Difference		81,110

Table 10. GHG emissions comparison Processed vs Unprocessed – Transport Task

Source: AEAS 2022, Department of Environment, Food and Rural Affairs (UK – DEFRA)

10.2 Additional Environmental Impacts

Other environmental impacts arising from the prevention of exporting unprocessed ferrous scrap metal are summarised below including:

- Recycling one tonne of ferrous metal scrap saves 1.5 tonnes of CO_2, 1.4 tonnes of iron ore, 740kg of coal and 120kg of limestone23. Based on the above environmental benefit, recycling 802,975 tonnes (see section 3.1) of ferrous scrap metal would save 1.2 million in Australian greenhouse gas emissions.
- This additionally significantly reduces the use of natural resources. As a result the reduced need for mining for new raw materials reduces the ecological damage and resources required for mine site remediation. Reduced mining of new materials also results in fewer greenhouse gas emissions that originate from various sources. Considerable embodied carbon exists in the manufacture of capital assets. Furthermore operation emissions result from extraction activities as well as shipping of ore to either domestic or international processing locations.
- Ferrous scrap metal residual or floc will no longer be disposed in developing countries with low environmental regulations and controls. This may include uncontrolled burning of floc, illegal dumping of floc, uncaptured leachate entering the broader environment; and floc used as a domestic fuel alternative - floc contains many hazardous substances that may be released when burnt, including chlorine and arsenic.
- The material flow of metal in Australia represents one of the few true examples of the Circular Economy (CE) in action. The export of ferrous scrap metal diminishes this circularity.

These poor environmental outcomes contradict Australia's recent Waste Export Bans, which were legislated in response to China's National Sword laws and the Australian public's rising concern about the export of waste to less developed countries. It must be noted that Australia already has bans in place for glass, tyres and plastics – these items make up the bulk of contaminants attached to unprocessed scrap metal and to allow the export of unprocessed scrap metal appears to be a direct contradiction of the in-place bans.

The material flow of metal in Australia represents one of the few true examples of the Circular Economy (CE) in action. The export of ferrous scrap metal diminishes this circularity.

11

AEAS Recommendation

The export of unprocessed ferrous scrap metal runs contrary and is counterintuitive to the Australian Government's commitment to tackle climate change and reach net zero emissions by 2050. It is argued Australia's CO_2 reduction policies should reduce overall global emissions, thereby avoiding what is known as "carbon leakage." The Australian Government's clear intent—supported by industry—is for Australia to become more self-sufficient in recycling markets in response to global trends that are essentially already limiting the flow of materials.

Government policies should promote the Australian ferrous scrap metal recycling industry's capacity to facilitate its role in reducing CO_2 emissions while proactively contributing towards Australia's domestic low carbon steel production, the economy and employment and in particular.

Australia's environmental and climate policies should not undermine the operation of the Australian businesses and steel producers who compete against international competitors who are not subject to the same high stringent standards. That is, Australian Government must ensure that the recycling and the production of steel is not shifted to areas of the world resulting in global net negative environmental impacts and localised poor environmental outcomes..

The stand out policy instrument that should be adopted is a ban on the export of scrap ferrous metal bearing waste materials. This ban would align with the Commonwealth's Recycling and Waste Reduction Act, which banned the export of unprocessed glass, plastic, paper and cardboard and tyres.

Under the Act "waste materials" are broadly defined to allow the inclusion of unprocessed ferrous scrap metal. The Act defines "waste material" as "any substance or thing that is: discarded, rejected, or leftover from an industrial, commercial, domestic or other activity; surplus to or a by-product of an industrial, commercial, domestic or other activity; or prescribed by the rules."[24]

The Act's explanatory memorandum includes "The definition of waste material is intended to be sufficiently broad to capture all types of waste. However, the bill will only regulate those kinds of waste materials that are prescribed for the purpose of clause 17 and which are referred to in the bill as regulated waste materials." Clause 17, however, does not include listings of any materials but instead states it "will allow the Environment Minister to make rules to prescribe kinds of waste material for the purposes of the bill. Allowing the Minister to use the rules to set the kinds of waste material that will be regulated will give the Minister flexibility to regulate different kinds of waste material as appropriate from time to time."[25]

Accordingly the Environment Minister has the power without legislative change to include unprocessed ferrous scrap metal in the Australian Waste Export Ban and its full application by July 2024.

Including unprocessed scrap metal in the Australian Waste Export Ban will support the economy, minimise harm to human health and the environment, including a reduction in global greenhouse emissions, whilst at the same time increase the security of steel supply and the operation of the Australian steel industry thereby ensuring necessary supply for Australia's future infrastructure, manufacturing and defence needs.

Appendix 1

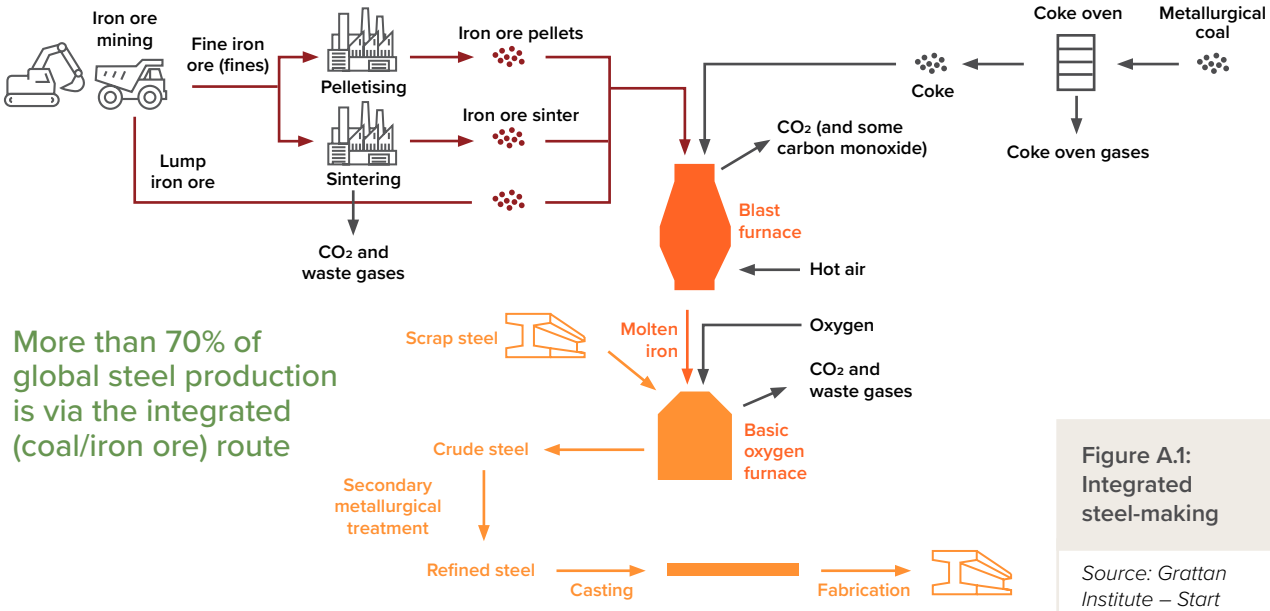
Steel Manufacturing Routes

There are two traditional routes of steel making

Integrated globally > 70%:

1. Iron ore pallets or sinter go into a BF, and Coke is used as a reductant by removing Carbon
2. Molten iron, recycled scrap, oxygen and other inputs go into a BOF for further refinement / reduce impurities to produce crude steel.

Overview of integrated route



More than 70% of global steel production is via the integrated (coal/iron ore) route

Note: Scrap steel is added to the basic oxygen furnace to control the temperature

Figure A.1: Integrated steel-making

Source: Grattan Institute – Start With Steel – May 2020

And the EAF route (bottom left box) – much higher proportions of steel scrap go into the EAF with other inputs such as lime and various minerals. Top half illustrates Direct Reduction – where currently natural gas is used to remove carbon to produce Direct Reduced Iron.

Overview EAF route – scrap and DR pathways

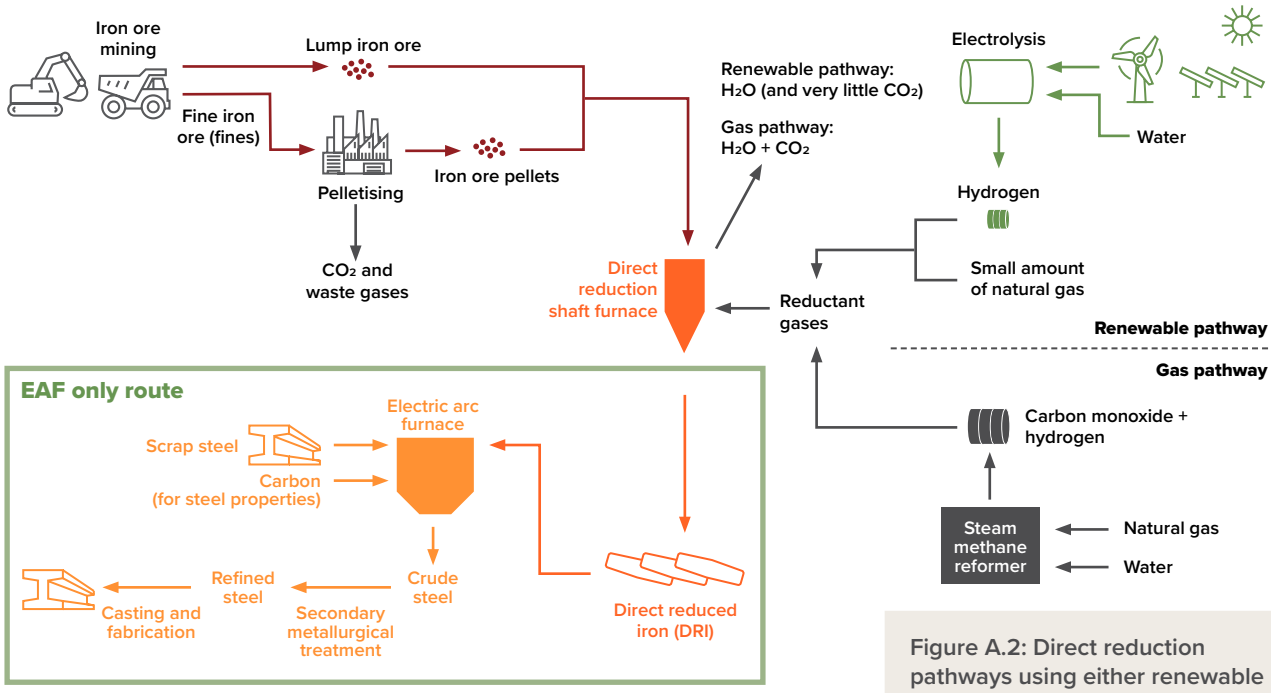


Figure A.2: Direct reduction pathways using either renewable hydrogen or natural gas

Notes: Low-emissions pathways also require that low-emissions electricity be used in each state. Gasified coal can be used in lace of natural gas.

Source: Grattan Institute – Start With Steel – May 2020

Worldsteel's demand forecast for 2022 is +2.2% to 1,855Mt and this demand growth increases the critical need for successful breakthrough technologies. 70% of world production comes from the integrated production route – much work being undertaken on B/T technologies in this area. EAF route is promising considering decarbonisation of electricity grids; however other considerations such as scrap supply are important

CO_2 Emissions – global overview

Global steel industry overview (steel production contributes ~8% CO_2 emissions)

- Demand for steel in 2050 is projected to increase by more than a third from 2020
- More than 70% of steel production is via the emissions intensive integrated route using coal and iron ore to make iron in a blast furnace.

Three major pathways identified for the production of low carbon steel including:

1. STEP stated policies and production efficiencies
2. Increased use of scrap
3. Break through technologies

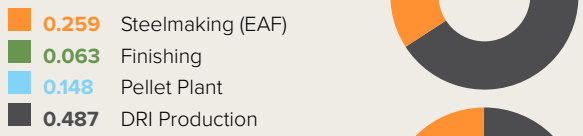
Increase scrap benefits as majority of emissions in crude steel production; reduces emissions intensity

Summary of steelmaking process routes in 2018

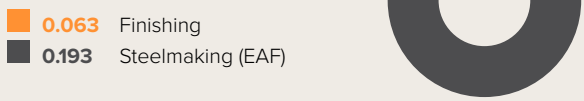
CO_2 emissions (in tonnes CO_2 per tonne hot rooled coil) for the tree main indstrial process routes

BF-BOF Route Total: 2.05
All values are in t CO_2/t HRC.

DRI-EAF Route Total: 0.96



Scrap EAF Route Total: 0.26

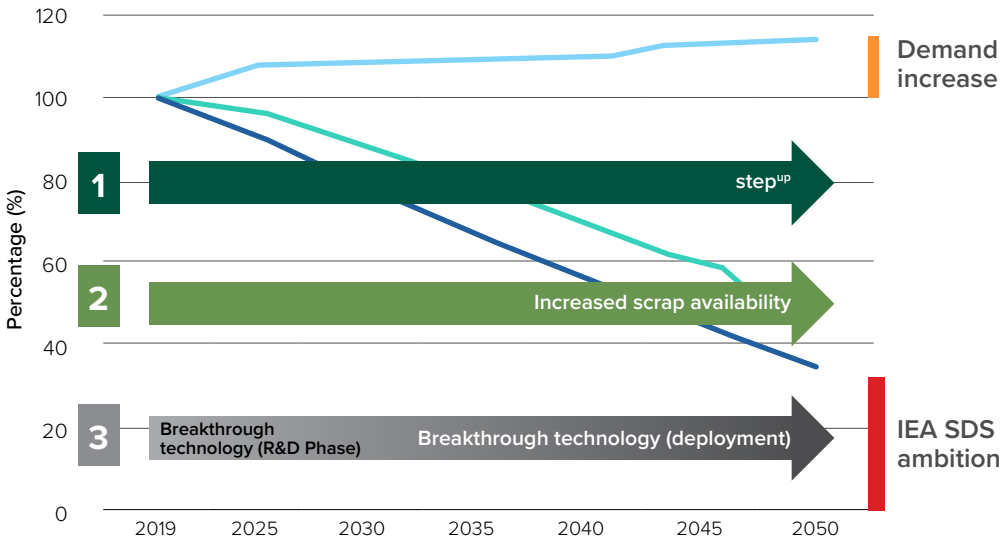


Source: 'Recent Sustainability Developments in the Iron and Steel Industry' – AIST March 2021

Broad solutions pathway to low carbon steel

Steel production, total CO_2 emissions and CO_2 intensity, 2019-2050 under the International Energy Agency (IEA), Sustainable Development Scenario (SDS)

Based on data provided in the IEA's Iron and Steel Technololgy Roadmap, October 2020



Steel production
CO_2 emissions
CO_2 intensity

Appendix 2

AEAS Business Information

Australian Economic Advocacy Solutions delivers services in economic analysis, research and advocacy in Australia and was set up by Nick Behrens following two decades of experience applying these skills in the real world for Australia's business community. More specifically AEAS provides:

- Economic Contribution and Valuation Analysis;
- Data Analysis, Market research and Economic Modelling;
- Stakeholder Consultation; and
- Government Relations and Submissions.

AEAS delivers services nationally to exemplary organisations including Australian Industry Group, Australian Gas Industry Trust, BASF, Brisbane Airport Corporation, CCIQ, Canegrowers, IOR Petroleum, LifeFlight, Master Builders Australia, Natroads, North Queensland Airports, Port of Brisbane, Property Council of Australia, Queensland Resources Council, RACQ, Remondis, Suncorp, VTA, Victorian Waste Management Association, unions, local government authorities, the Commonwealth and State Governments and many others.

We can be engaged for either a special project (for the entire project or just the parts our clients need help with) or on an ongoing basis. We will take the time to understand your unique challenge and create a partnership with you to tailor a solution specific to your budget. We engage with confidentiality and integrity. Choose AEAS for our expertise, professionalism and ability to work with our valued clients to achieve exceptional results.

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Report Author: Nick Behrens

Across his professional career Nick has realised many outstanding outcomes to complex challenges for the business community. He possesses significant experience in gathering and presenting information, and leveraging that information to achieve results across a range of areas including economic, taxation, regulatory environment, workers compensation, employment legislation, population, infrastructure and planning issues. As Director of Australian Economic Advocacy Solutions (AEAS), Nick provides:

- Exceptional understanding of social, political and economic issues impacting on business and the economy;
- Considerable real-world application of project, business and economic research and analysis;
- Significant expertise in advocacy, including government and stakeholder relations;
- In-depth and firsthand knowledge of the workings of Government;
- Extensive networks in political, government, business and community sectors;
- Previous appointments on a number of high level Government committees; and
- Media commentator and public speaker.

Nick's representations are based on extensive research and his preferred approach to economic analysis, research and advocacy is to achieve results by working with stakeholders behind the scenes to secure positive and lasting outcomes. He places much emphasis on having a thorough and convincing evidence that is readily understood and in turn leads to real world application and solutions.

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2 *QEAS modelling based on National Waste Report 2020 and industry estimates of share of ferrous metals and unprocessed scrap metal businesses share of ferrous scrap market*

3 *worldsteel.org/steel-topics/statistics/*

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5 *ABS Catalogue 5368.0.55.024 International Merchandise Trade, Preliminary, Australia*

6 *MRA Consulting Group - The Waste Levy and NSW Metal Shredders - A Report for Sell & Parker, Sims Metal and InfraBuild*

7 *Benefits of a Government Procurement Program for Local Steel Content_Final Report BIS Shrapnel Australian Workers Union 2015*

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NWRIC

National Waste and Recycling Industry Council