Australasian (iron and steel) Slag Association Inc.

Membership Annual Survey Results

January to December 2022

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Summary

For the calendar period January to December 2022, 3.374 million tonnes (Mt) of iron and steel slag (ISS) was generated within Australian and New Zealand steel operations and/or imported from overseas sources for Australian consumption. During this same period 2.644 million tonnes or 79% of ISS was beneficially used within various value-added applications of the construction materials sector; resulting in the conservation of; energy; finite natural resources, the reduction of carbon emissions from these co-products.

Methodology

Annually the Australasian (iron & steel) Slag Association (ASA) survey's its members[1] and non-members to capture data on ISS generation, recovery, importation, and sale into value-added applications for the calendar year. This report, compiled during 2023, reports on the aggregated volumes of (1) production, (2) importation and (3) sales for 2022.

The survey results include all generators, (iron & steel plants) marketers, (processing and marketing companies) and users for the total production and sales by each application or end use. Data in the report is supplemented with secondary sources importation data[2] and other secondary data sources for accuracy purposes. Information provided is reviewed, compared, collated before being aggregated into this national report by slag type; BFS; GBFS; SFS; EAFS; KOBM; Others[3] and by end uses for all slag products.

Discussion of results

During the period the volume of ISS generated / imported increased slightly to 3.374 Mt on the previous period of 3.177 Mt. Production of domestic ISS was reasonably stable, whereas imports for GBFS increased slightly by 30,000 tonnes, coupled with increased domestic production accounted for the 1.818 Mt of GBFS total inventory. Overall demand for GGBFS use in the cement and concrete products continues to strengthen which is consistent with the longer term industry trends to reduce the carbon footprint for 1M3 of concrete. Utilisation across other categories correlates well with historical demand within the construction and infrastructure sectors, underpinned by major investments by State Governments within infrastructure. The trend and growth in iron and steel slags use in higher value add applications continues.

Demand for fine and coarse aggregate use in structural/civil applications is closely tied to consumption or growth in the future development of infrastructure in both urban and regional Australia – estimated to be in excess of 200 million tonnes annually[4]. Extractive

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[1] http://www.asa-inc.org.au/membership/members-and-affiliates
[2] ABS [Austats] based on import tariff code data for Granulated Blast Furnace Slag (GBFS).
[3] http://www.asa-inc.org.au/products
[4] Quarrying Overview." Retrieved Sept, 2021, 2021, from https://www.ccaa.com.au/CCAA/Industry/Quarry/Overview/CCAA/Public_Content/INDUSTRY/Quarry/Quarry_Overview.aspx?hkey=03c6b3a0-5148-4ae4-b751-83dec0318519

resources are generally widespread and remain in adequate supply nationally, however, shortages in important large-scale markets (Sydney, Melbourne and Brisbane) continue to emerge, requiring additional logistics and associated handling costs not historically incurred. These are mainly attributed to unsuitable geology, conflicting or incompatible land uses and environmental problems caused by high rates of urban expansion. Natural sand and gravel resources are also being depleted leading to opportunities for substitution by manufactured sands from crushing operations.

Demand for granulated blast furnace slag (GBFS) within the cement and concrete sectors grew over the period. GBFS imports were 1.236 Mt. Overall from the combined 3.374 Mt generated and imported iron and steel slags, 2.644 Mt or 79% was effectively utilised within various value-added civil and construction material applications throughout Australasia.

The key results for the calendar period 2022 survey were:

- Approximately 3.374 Mt (million tonnes) of iron and steel slag was available for use within Australasia (Australia and New Zealand)
- From the ISS available, 2.644 Mt or 79 was effectively utilised [sold or reused for some beneficial use]
- On a per capita basis, this equates to approx. ~100 kgs per person
- 1.877 Mt was used in cementitious applications - "high value add" [HVA][5] Note: approx. 1.236 Mt of GBFS was imported.
- 0.525 Mt was used in non-cementitious or road construction applications - medium value add [MVA][6].
- 0.242 Mt was in general civil or fill applications – low value add [LVA][7].

In summary, the longer-term trend of ISS materials end use applications continues its movement from LVA to MVA and HVA applications. To these ends, the active use of these co-products continues to provide significant positive environmental impacts, including resource conservation and in this case, the reduction of greenhouse gas emissions from the processing of virgin resources.

Table 1 provides more detail for individual category sales of ISS for the periods; 2022; with comparisons against 2022 to 2014.

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[5] HVA – High Value Add – means where ISS materials are sold for > (more than) $100/tonne
[6] MVA – Medium Value Add – means where ISS materials are sold for between $10-$100/tonne
[7] LVA – Low Value Add – means where ISS materials are sold for < (less than) $10/tonne

Australasian (iron & steel) Slag Association

2022 Slag Production & Sales Survey

SECTION A Slag Production (tonnes)	BFS	GBFS	SFS	EAFS	KOBM	Other	2022 Combined		2021 Combined		2020 Combined	2019 Combined	2018 Combined	2017 Combined	2016 Combined	2015 Combined	2014 Combined
A1. Total Produced (Jan-Dec)	519,157	582,236	565,337	146,705	41,500	283,105	2,138,040		1,919,302		1,971,075	1,788,244	1,907,509	1,838,842	1,885,481	1,889,246	1,927,688
A2. Total imported (Jan-Dec)		1,236,295					1,236,295		1,204,127		1,266,075	1,066,244	1,107,098	787,630	1,047,918	1,006,980	968,585
A3. Total Stored [not used]	246,197	0	273,581	5,627	0	7,811	533,216		53,944		0	0	0	18,453	25,800	0	382,746
A4. Total Removed from Storage	0	0	0	0	0	0	0		602		0	0	55,000	4,794	25,800	0	100,020
SECTION B Auto Calculations							Combined		Combined		Combined	Combined	Combined	Combined	Combined	Combined	Combined
B2. Total for use (Auto calc)	519,157	1,818,531	565,337	146,705	41,500	283,105	3,374,334		3,177,975		3,237,150	2,854,488	3,069,606	2,631,266	2,959,199	2,896,226	2,996,293
SECTION C Slag Use (tonnes)	BFS	GBFS	SFS	EAFS	KOBM	Other	Combined		Combined		Combined	Combined	Combined	Combined	Combined	Combined	Combined
C1. Cement or Binder products	0	1,877,199	0	0	0	0	1,877,199	##	1,704,063	##	1,660,473	1,590,487	1,624,576	1,508,340	1,587,686	1,479,762	1,521,496
C2. Feed stock for Clinker/Glass products	32,860	32,860	70,033	0	0	0	135,753		107,916		86,970	115,714	88,362	94,878	88,919	126,645	56,154
C2. Grit Blasting products	0	0	0	0	0	0	0		0		0	0	0	0	0	0	0
C2. Structural Fills/Embankments	0	0	868	12,606	0	0	13,474		0		739	3,726	12,502	12,646	14,317	13,260	13,260
C2. Road Base/Sub-base	34,549	5,919	0	80,750	0	2,115	123,333		296,697		415,120	204,382	192,901	321,309	219,432	122,728	122,728
C2. Rockwool products	0	0	0	0	0	0	0		0		0	0	0	0	0	0	0
C2. Mineral Fillers (e.g Asphalt)	0	0	0	0	0	0	0		0		0	0	0	0	0	0	0
C2. Agricultural applications	0	0	0	0	0	0	0		0		0	0	0	0	0	275	275
C2. Water treatment/filtration products	0	0	0	3,268	0	83	3,351		0		0	0	0	0	0	0	0
C2. Asphalt & Concrete Aggregates	101,493	0	103,142	33,078	0	2,916	240,629		223,178		205,320	277,932	299,225	347,549	301,429	335,347	335,347
C3. Mining Applications	0	8,600	0	0	0	0	8,600		0		0	0	0	0	0	0	0
C3. Waste Stabilisation/Solidification	0	0	0	0	0	0	0		0		0	0	0	0	0	0	0
C3. Miscellaneous/Other	24,261	12,301	177,170	0	0	28,726	242,458	#	157,236	#	125,916	119,604	154,446	236,523	236,198	294,965	294,965
SECTION D Summary Results	BFS	GBFS	SFS	EAFS	KOBM	Other	Combined		Combined		Combined	Combined	Combined	Combined	Combined	Combined	Combined
D1. Total of all sold (Auto calc)	193,163	1,936,879	351,213	129,702	0	33,840	2,644,797		2,489,090		2,494,538	2,311,844	2,372,012	2,521,245	2,447,981	2,372,982	2,344,225
	37.21%	106.51%	62.12%	88.41%	0.00%	11.95%	78.38%		78.32%		77.06%	80.99%	77.27%	94.64%	94.64%	95.06%	89.70%

Table 1 - 2022 Slag Sales and Production Survey