Australalasian (iron and steel) Slag Association Inc.

Membership Annual Survey Results

January to December 2020

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Summary

For the calendar period January to December 2020, 3.237 million tonnes (Mt) of iron and steel slag (ISS) was generated within Australian and New Zealand steel operations or imported from overseas sources for national consumption. During this same period 2.5 million tonnes or 77% 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 2021, reports on the aggregated volumes of (1) production, (2) importation and (3) sales for 2020.

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 increased on the previous period (2.854 Mt) mainly resulting from two factors. Firstly, imports for GBFS increased by almost 200,000 tonnes accounting for the 1.795 Mt of GBFS inventory. Overall demand for GGBFS use in the cement and concrete products grew slightly from 1.5-1.6 Mt. Secondly, increased steel manufacturing resulting in slight increase in steel slag production. 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 resources are generally widespread and remain in adequate supply nationally, however, shortages in important large-scale markets (Sydney, Melbourne and Brisbane) continue to

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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

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 1,266,075 tonnes or 400% increase over the past 10 years.

Overall from the combined 3.237 Mt generated and imported iron and steel slags, 2.5 Mt or 77% was effectively utilised within various value-added civil and construction material applications throughout Australasia.

The key results for the calendar period 2020 survey were:

- Approximately 3.237 Mt (million tonnes) of iron and steel slag was available for use within Australasia (Australia and New Zealand)
- From the ISS available, 2.5 Mt or 77 was effectively utilised [sold or reused for some beneficial use]
- On a per capita basis, this equates to approx. 100 kgs per person
- 66% or 1.66 Mt was used in cementitious applications - "high value add" [HVA][5] Note: approx. 1.266 Mt of GBFS was imported.
- 29% or 0.715 Mt was used in non-cementitious or road construction applications - medium value add [MVA][6].
- 5% or 0.126 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; 2020; with comparisons against 2019 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

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2020 Slag Production & Sales Survey

SECTION A Slag Production (tonnes)	BFS	GBFS	SFS	EAFS	KOBM	Other	2020 Combined	2019 Combined	2018 Combined	2017 Combined	2016 Combined	2015 Combined	2014 Combined
A1. Total Produced in 2020 (Jan-Dec)	573,015	529,265	380,134	174,858	41,500	272,303	1,971,075	1,788,244	1,907,509	1,838,842	1,885,481	1,889,246	1,927,688
A2. Total imported in 2020 (Jan-Dec)		1,266,075					1,266,075	1,066,244	1,107,098	787,630	1,047,918	1,006,980	968,585
A3. Total Stored [not used]	0	0	0	0	0	0	0	0	0	18,453	25,800	0	382,746
A4. Total Removed from Storage during 2020	0	0	0	0	0	0	0	0	55,000	4,794	25,800	0	100,020
SECTION B Auto Calculations							Combined	Combined	Combined	Combined	Combined	Combined	Combined
B2. Total for use in 2020 (Auto calc)	573,015	1,795,340	380,134	174,858	41,500	272,303	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
C1. Cement or Binder products	0	1,660,473	0	0	0	0	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	13,335	13,335	60,300	0	0	0	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
C2. Structural Fills/Embankments	0	0	739	0	0	0	739	3,726	12,502	12,646	14,317	13,260	13,260
C2. Road Base/Sub-base	255,113	46,611	0	88,873	0	24,523	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
C2. Mineral Fillers (e.g Asphalt)	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	275	275
C2. Water treatment/filtration products	0	0	0	0	0	0	0	0	0	0	0	0	0
C2. Asphalt & Concrete Aggregates	132,230	0	73,090	0	0	0	205,320	277,932	299,225	347,549	301,429	335,347	335,347
C3. Mining Applications	0	0	0	0	0	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
C3. Miscellaneous/Other	21,621	27,033	77,262	0	0	0	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
D1. Total of all sold in 2020 (Auto calc)	422,299	1,747,451	211,391	88,873	0	24,523	2,494,538	2,311,844	2,372,012	2,521,245	2,447,981	2,372,982	2,344,225
	73.70%	97.33%	55.61%	50.83%	0.00%	9.01%	77.06%	80.99%	77.27%	94.64%	94.64%	95.06%	89.70%

Table 1 - 2020 Slag Sales and Production Survey