Ash Development
Association of Australia

Ash Development Association of Australia

Annual Membership Survey Results

January - December 2015

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Membership Survey Results: 2015

The beneficial use of coal combustion products (CCPs) during 2015 resulted in 4.8 million tonnes or 40% being effectively utilised. The conservation of energy, finite natural resources, the reduction of carbon emissions and the effective recovery of mineral by-product resources that would otherwise be placed into long term storage were all major benefits.

The survey results for CCP production and categorised end uses for the period January to December 2015 are shown in Table 1.

From the 12.1 million tonnes of all CCPs produced 40% of were effectively utilised[1] within various civil and construction applications throughout Australasia. This decline in CCPs is consistent with, the overall decline in the use of coal as a major energy source arising from wide ranging environmental reforms, renewable energy target and state government privatisation agenda over the past several years. Despite coals decline, CCP utilisation over the periods of 2009, 2010, 2011, 2012, 2013 and 2014 have grown slightly with effective utilisation being 34%, 41%, 48%, 42%, 52% and 48% respectively.

Annual members and non-members were surveyed for CCPs generated, stored and sold during the reported period, which provides results for the calendar year, January to December 2015. Information provided by members[2] and non-members[3] was collated, compared with other data sources for verification purposes and then aggregated into national data. The import and export of CCPs was included, however sources and destinations are not identified.

Discussion of results

Total CCP generation for the period has decreased slightly from 12.3 (2014) million tonnes to 12.1 (2015) million tonnes. Some contributing factors are partly related to; retired power stations, unplanned maintenance, and reduced based-load demand issues.

The 4.8 million tonnes utilised during 2015 is partly a function of the continued demand within the supply chains for cement and concrete. The principle utilisation end uses continue to be attributable to 'graded' (See AS 3582.1 and AS 2758) materials used in cement and concrete, structural/civil applications and mining applications such as mine site remediation, with growth in Category 2 and 3 sales for 'ungraded' materials.

Ongoing regulatory reform being advocated by the Association focuses on new end use market opportunities for 'ungraded' material applications. Coupled with changes to AS3582.1 and AS 2758, these end use applications in 2016.

[1] "Effective utilisation" is the sale or utilisation of recoverable mineral resources into a value added construction application that provides both commercial returns [revenue] return on investment or an economic profit [avoided expense], and use is consistent with the criteria of ecologically sustainable development (EDS) principles.
[2] http://www.adaa.asn.au/membership.htm.
[3] Power stations.

The use of CCPs such as fly ash has been proven to significantly contribute to further reducing the carbon footprint of the cement and concrete sector[4], but only where additional processing capacity can meet demand, coupled with supply chain inventory capacity and exploitation of large volumes of stored materials within ash dams to buffer the supply chain.

Demand for fine and coarse aggregate use in structural/civil applications continues to be closely tied to consumption or growth in future development of infrastructure in both urban and regional Australia – estimated to be in excess of 160 million tonnes annually. Extractive resources are generally widespread and remain in adequate supply nationally, however shortages in important large scale markets (Sydney, Melbourne and Brisbane) are emerging, requiring additional logistics and associated costs. 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 ungraded CCPs.

There has been a considerable increase in interest from extractive industries to supplement natural sand and gravel resources with recovered resources such as CCPs, which is an area of considerable focus within the Association with the Cooperative Research Centre for Low Carbon Living research projects.

Key results

The survey results include all generators[5], marketers[6] and users for the total production and resulting sales by each end use. Where required, data was supplemented with importation data and other secondary data[7] sources for accuracy purposes.

- Approximately 12.1 Mt (million tonnes) of CCPs were produced within Australasia. On a per capita basis, this equates to about 500 kg/person.
- Some 4.8 Mt or 40% of CCPs produced have been effectively utilised in various value-added products or to some beneficial end over the period. On a per capita basis, this equates to about 202 kg/person recycled or reused.
- Approximately 1.6 Mt or 69% of effectively utilised coal ash was used in high value-added applications such as cementitious binders, concrete manufacture or mineral fillers.
- About 0.50 Mt or 21% of effectively utilised coal ash was used in non-cementitious applications such as flowable fills, structural fills, road bases, coarse/fine aggregates and mine site remediation.
- Some 2.3 Mt or 19% was used in projects offering some beneficial use (e.g. onsite remediation, local haul roads etc.). These uses typically generate no economic return, that is, cost avoidance or recovery only.
- Surplus CCPs of 9.6 Mt are typically placed into onsite storage ponds awaiting some future opportunity for economic reuse.
- More than 45 Mt of CCPs [fly ash] have been used in cementitious applications or concrete manufacture from 1975 to 2015 [39 years].

[4] Heidrich, C., I. Hinczak, et al. (2005). Case study: CCP's potential to lower Greenhouse Gas emissions for Australia. World of Coal Ash 2005, Lexington, Kentucky, USA, American Coal Ash Association & University of Kentucky.

[5] Generator – means a company who generates coal powered electricity, produces CCPs as a by-product and has been admitted as a member. CCPs can be supplied to processors, consumers or value adders.

In summary, the recovery and reuse of CCPs provides positive and significant environmental impacts, including resource conservation and in this case, the reduction of Greenhouse Gas emissions from the processing of virgin resources, resulting in the reduction of greenhouse gases.

The following table provides more detail for individual category sales of CCPs for the 2015 calendar year.

Ash Development Association of Australia Inc
May 2016

[6] Marketers (Value adder) – means a company who processes, mixes, blends, or otherwise incorporates CCPs to produce products for supply to consumers or other value adders.
[A value adder typically incorporates owned intellectual property].
[7] Company annual reports and other published data sources.

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2015 Membership Survey - CCP Production & Use Survey

SECTION A. Fuel or Coal Used	Tonnes Consumed	Avg % Ash Content	Ash (Auto-Calc)	Ash (Manual-Calc)															
A1: Bituminous (Black Coal)	44,894,178	23.60%	10,594,912																
A2: Sub-bituminous	13,919,956	18.93%	2,634,395																
A3: Lignite (Brown Coal)	53,413,116	2.01%	1,071,413																
Total Coal Burned (Auto-calc)	112,227,250	12.74%	14,300,720																
SECTION B. CCPs Beneficial Use Calculations (Tonnes)	Fly Ash	Furnace Bottom Ash	Cenospheres	Combined 2015		Combined 2014		Combined 2013		Combined 2012		Combined 2011		Combined 2010		Combined 2009		Combined 2008	
B1. Total Produced (Jan-Dec)	10,740,629	1,362,408	9,445	12,112,482		12,384,140		12,264,395		12,797,331		13,680,219		14,076,233		13,755,682		14,638,323	
B2. Total not used [Stored]	8,642,938	983,102	9,412	9,635,452		8,637,847		8,276,419		9,755,479		9,421,266		10,365,700		9,053,178		12,246,852	
Total Production Used (Auto-Calc)	2,097,691	379,306	33	2,477,030		3,746,293		3,987,975		3,041,852		4,258,953		3,710,533		4,702,504		2,391,471	
B3. Amounts removed or dirverted from storage	2,317,416	3,009	2,483	2,322,908	19%	2,187,408	18%	2,365,284		2,343,291		2,368,626		2,101,983		2,037,200		2,192,625	
Total of All Used (Auto-Calc)*	4,415,107	382,315	2,516	4,799,938	40%	5,933,701	48%	6,353,259	52%	5,385,143	42%	6,627,579	48%	5,812,516	41%	4,702,504	34%	4,584,096	31%
SECTION C. CCP Use (Tonnes)	Fly Ash	Furnace Bottom Ash	Cenospheres	Combined (Auto-Calc)		Combined (Auto-Calc)		Combined (Auto-Calc)		Combined (Auto-Calc)		Combined (Auto-Calc)		Combined (Auto-Calc)		Combined (Auto-Calc)		Combined (Auto-Calc)	
C1. Cement/Concrete Products /Grout	1,425,010	142,784	2,182	1,569,976		1,738,590		1,647,317		1,893,613		2,029,563		1,889,991		1,571,495		1,757,379	
C1. Cement/ Raw Feed for Clinker	10,000	0	0	10,000		10,000		10,000		0		61,174		0		0		0	
C1. Mineral Fillers	3,023	0	20,000	23,023		70,000		25,000		10,000		35,879		0		0		30,000	
Category 1	1,438,033	142,784	22,182	1,602,999	69%	1,818,590	67%	1,682,317	66%	1,903,613	79%	2,126,616	73%	1,889,991	77%	1,571,495	71%	1,787,379	79%
C2. Flowable Fill CLSM	0	80,000	0	80,000		9,000		0		0		180,715		35,000		22,180		215,000	
C2. Structural Fills/Embankments	0	37,000	0	37,000		129,108		135,813		123,108		95,515		103,505		12,820		227,821	
C2. Road Base/Sub-base	58,718	130,000	0	188,718		188,718		229,615		115,300		295,899		320,334		476,360		0	
C2. Soil Modification/Stabilization	0	0	0	0		0		31,000		41,000		0		11,725		10,936		30,000	
C2. Mineral Filler in Asphalt	0	21,000	0	21,000		20,000		0		0		0		8,787		8,787		7,209	
C2. Agriculture	0	4,117	0	4,117		76,117		1,259		600		600		0		0		0	
C2. Aggregate	0	154,000	0	154,000		224,000		181,000		123,000		20,000		5,708		708		0	
Category 2	58,718	426,117	0	484,835	21%	646,943	24%	578,687	23%	403,008	17%	592,729	20%	485,059	20%	531,791	24%	480,030	21%
C3. Mining Applications (e.g. Backfill)	132,515	0	0	132,515		153,615		166,979		81,000		166,775		83,000		107,500		275	
C3. Waste Stabilization/Solidification	106,000	0	0	106,000		106,000		106,500		34,500		15,913		6,446		6,443		8,991	
C3. Miscellaneous/Other	1,000	0	0	1,000		1,500		1,500		2,000		0		1,500		0		0	
Category 3	239,515	0	0	239,515	10%	261,115	10%	274,979	11%	117,500	5%	182,688	6%	90,946	4%	113,943	5%	9,266	0.4%
Total Use (C1, C2, C3)*(Auto-calc)	1,736,266	568,901	22,182	2,327,349		2,726,648		2,535,983		2,424,121		2,902,033		2,465,996		2,217,229		2,276,675	
SECTION D. Summary Results	Fly Ash	Furnace Bottom Ash	Cenospheres	Combined (Auto-Calc)		Combined (Auto-Calc)		Combined (Auto-Calc)		Combined (Auto-Calc)		Combined (Auto-Calc)		Combined (Auto-Calc)		Combined (Auto-Calc)		Combined (Auto-Calc)	
7. Total of All Sold (Auto-Calc)*	1,736,266	568,901	22,182	2,327,349		2,726,648		2,535,983		2,424,121		2,184,018		2,184,018		2,217,229		2,276,675	
6. Total of All Benefically Used (Auto-Calc)*	4,415,107	382,315	2,516	4,799,938		5,933,701		6,353,259		5,385,143		6,627,579		5,812,516		4,254,429		4,469,300	

Table 1 - 2015 CCP Sales and Production Survey[8]

[8] Data presented in this table is aggregated based on member and non-member responses. Where appropriate, estimates are given based on published public reports. Coverage of data represents all coal fired power stations currently operating.