



**Ash Development
Association of Australia**

Ash Development Association of Australia

Annual Membership Survey Results

January - December 2014

Prepared by
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Membership Survey Results: 2014

The beneficial use of coal combustion products (CCPs) during 2014 resulted in 5.9 million tonnes or 48% being effectively utilised, resulting in 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.

The survey results for CCP production and categorised end uses for the period January to December 2014 are shown in Table 1.

From the 12.7 million tonnes of all CCPs produced 48% of were effectively utilised¹ within various civil and construction applications throughout Australasia. This compares well, given the uncertainty experienced during 2013 with post Carbon Tax impost, wide ranging environmental reforms, Renewable Energy Target and State Government privatisation agenda over the past several years.. The previous periods of 2009, 2010, 2011, 2012 and 2013 with effective utilisation being 34%, 41%, 48%, 42% and 52% 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 2014. Information provided by members² and non-members³ 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 increased slightly from 12.3 (2013) million tonnes to 12.7 (2014) million tonnes an increase of 400,000 tonnes.

Some contributing factors are partly related to; increased use of higher ash content coals; returned units from unplanned maintenance, and based load demand issues.

The 5.9 million tonnes utilised during 2014 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 materials used in cement and concrete, structural/civil applications and mining applications such as mine site remediation, with significant growth on in Category 2 and 3 sales for ungraded materials.

Ongoing regulatory reform being undertaken by the Association continues our focus on new end use market opportunities for ungraded applications. Coupled with impending changes to AS3582.1, these end use applications may become a reality.

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 AGL and Bluewater 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 sector⁴, 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 generators⁵, marketers⁶ and users for the total production and resulting sales by each end use. Where required, data was supplemented with importation data and other secondary data⁷ sources for accuracy purposes.

- Approximately 12.7 Mt (million tonnes) of CCPs were produced within Australasia. On a per capita basis, this equates to about 530 kg/person.
- Some 5.9 Mt or 48% 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 250 kg/person recycled or reused.
- Approximately 1.8 Mt or 67% of effectively utilised coal ash was used in high value-added applications such as cementitious binders, concrete manufacture or mineral fillers.
- About 0.70 Mt or 24% 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 2.2 Mt or 18% 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 8.6 Mt are typically placed into onsite storage ponds awaiting some future opportunity for economic reuse.
- More than 44 Mt of CCPs [fly ash] have been used in cementitious applications or concrete manufacture from 1975 to 2014 [38 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 almost 2.0 million tonnes of greenhouse gases.

The following table provides more detail for individual category sales of CCPs for the 2014 calendar year.

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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.

Ash Development Association of Australia

2014 Membership Survey - CCP Production & Use Survey

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SECTION A. Fuel or Coal Used	Tonnes Consumed	Avg % Ash Content	Ash (Auto-Calc)	Ash (Manual-Calc)											
A1: Bituminous (Black Coal)	44,977,142	23.43%	10,536,778												
A2: Sub-bituminous	5,257,289	7.53%	395,627												
A3: Lignite (Brown Coal)	55,821,752	3.19%	1,778,830												
Total Coal Burned (Auto-calc)	106,056,183	11.99%	12,711,235												
SECTION B. CCPs Beneficial Use Calculations (Tonnes)	Fly Ash	Furnace Bottom Ash	Cenospheres	Combined 2014	Combined 2013	Combined 2012	Combined 2011	Combined 2010	Combined 2009						
B1. Total Produced (Jan-Dec)	10,966,495	1,409,620	8,026	12,384,140	12,264,395	12,797,331	13,680,219	14,076,233	13,755,682						
B2. Total not used [Stored]	7,739,517	891,141	7,190	8,637,847	8,276,419	9,755,479	9,421,266	10,365,700	9,053,178						
Total Production Used (Auto-Calc)	3,226,978	518,479	836	3,746,293	3,987,975	3,041,852	4,258,953	3,710,533	4,702,504						
B3. Amounts removed or diverted from storage	2,187,408	0	0	2,187,408	18%	2,365,284	2,343,291	2,368,626	2,101,983	2,037,200					
Total of All Used (Auto-Calc)*	5,414,386	518,479	836	5,933,701	48%	6,353,259	52%	5,385,143	42%	6,627,579	48%	5,812,516	41%	4,702,504	34%
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)					
C1. Cement/Concrete Products /Grout	1,718,624	17,784	2,182	1,738,590	67%	1,647,317	66%	1,893,613	79%	2,029,563	73%	1,889,991	77%	1,571,495	71%
C1. Cement/ Raw Feed for Clinker	10,000	0	0	10,000		10,000		0		61,174		0		0	
C1. Mineral Fillers	0	50,000	20,000	70,000		25,000		10,000		35,879		0		0	
Category 1	1,728,624	67,784	22,182	1,818,590	67%	1,682,317	66%	1,903,613	79%	2,126,616	73%	1,889,991	77%	1,571,495	71%
C2. Flowable Fill CLSM	0	9,000	0	9,000		0		0		180,715		35,000		22,180	
C2. Structural Fills/Embankments	92,108	37,000	0	129,108		135,813		123,108		95,515		103,505		12,820	
C2. Road Base/Sub-base	58,718	130,000	0	188,718		229,615		115,300		295,899		320,334		476,360	
C2. Soil Modification/Stabilization	0	0	0	0		31,000		41,000		0		11,725		10,936	
C2. Mineral Filler in Asphalt	0	20,000	0	20,000		0		0		0		8,787		8,787	
C2. Agriculture	0	76,117	0	76,117		1,259		600		600		0		0	
C2. Aggregate	0	224,000	0	224,000		181,000		123,000		20,000		5,708		708	
Category 2	150,826	496,117	0	646,943	24%	578,687	23%	403,008	17%	592,729	20%	485,059	20%	531,791	24%
C3. Mining Applications (e.g. Backfill)	153,615	0	0	153,615		166,979		81,000		166,775		83,000		107,500	
C3. Waste Stabilization/Solidification	106,000	0	0	106,000		106,500		34,500		15,913		6,446		6,443	
C3. Miscellaneous/Other	1,500	0	0	1,500		1,500		2,000		0		1,500		0	
Category 3	261,115	0	0	261,115	10%	274,979	11%	117,500	5%	182,688	6%	90,946	4%	113,943	5%
Total Use (C1, C2, C3)*(Auto-calc)	2,140,565	563,901	22,182	2,726,648		2,535,983		2,424,121		2,902,033		2,465,996		2,217,229	
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)					
7. Total of All Sold (Auto-Calc)*	2,140,565	563,901	22,182	2,726,648		2,535,983		2,424,121		2,184,018		2,184,018		2,217,229	
8. Total of All Beneficially Used (Auto-Calc)*	5,414,386	518,479	836	5,933,701		6,353,259		5,385,143		6,627,579		5,812,516		4,254,429	

Table 1 - 2014 CCP Sales and Production Survey⁸

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