



**Ash Development  
Association of Australia**

# Ash Development Association of Australia

## Annual Production and Utilisation Survey Report

**January - December 2020**

Prepared by  
HBM Group Pty Ltd

**ADAA National Office** Unit 5, 41 - 47 Five Islands Road, Port Kembla NSW 2505  
T. 02 4228 1389 • F. 02 4258 0169 • W. [www.adaa.asn.au](http://www.adaa.asn.au) • E. [info@adaa.asn.au](mailto:info@adaa.asn.au)  
**Postal Address** PO Box 85, Port Kembla NSW 2505

# Membership Survey Results: Jan to Dec 2020

## Summary

The beneficial use of coal combustion products (CCPs) during 2020 resulted in 6.070 million tonnes or 50% being beneficially used, resulting in the conservation of; energy; finite natural resources, the reduction of carbon emissions through the recovery of CCPs being mineral by-product resources.

The survey results for CCP production and end uses for the period January to December 2020 discussed in this report are shown in Table 1. Over the survey period more than 87 million tonnes of thermal coal was consumed to generate vital energy to support the Australian economy. Some 12 million tonnes of all CCPs were produced with 50% being effectively utilised<sup>1</sup> within various civil and construction applications throughout Australia.

Total CCPs produced reduced slightly over the reporting period, with the longer-term trend continuing to decrease. This decline is consistent with ongoing closures of coal fired power stations and reduced demand for thermal coal as an energy source, coupled with ongoing energy reforms, renewable energy targets (RET) and state government privatisation agenda for electricity over the past several years. For example since 2006 total megawatt available generation capacity has reduced 22% from 30,159 MW to 23,434 MW.

## Methodology

Annually members and non-members are surveyed for CCPs generated, stored and sold during the reporting period January to December 2020. Information provided by members<sup>2</sup> and non-members<sup>3</sup> is collated, compared with other data sources for verification purposes and then aggregated into national data set. The import and export of CCPs were included, however sources and destinations are not identified.

## Discussion of results

Total CCPs generation for the period decreased slightly from 12.6 (2019) million tonnes to 12 (2020) million tonnes. Over the period CCPs used also increased slightly from 5.9 million tonnes (2019) to 6.07 million tonnes during 2020. This increased use is largely from large scale projects offering some beneficial use (e.g. on-site mine remediation, local haul roads etc.) and partly from continued demand within the supply chains for construction materials (e.g. cement and concrete manufacture).

High value utilisation end uses in Category 1 continue to be attributable to 'graded' (See AS 3582.1 and AS 2758) materials used in cement and concrete manufacture. The largest increase occurred in structural/civil, mining and mine site remediation in Category 2 and 3. 'Harvesting' of CCPs has increased international, particularly within well established markets such as the USA where access to CCPs has become restricted due the station closures.

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<sup>1</sup> "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.

<sup>2</sup> <http://www.adaa.asn.au/membership.htm>.

<sup>3</sup> Power stations.

Ongoing regulatory reform advocated by the Ash Development Association of Australia continues its focus on new end use market opportunities for 'ungraded' material applications, when coupled with changes to AS3582.1 and AS 2758, these end-use applications are expected to grow. The use of CCPs, in particular fly ash has been proven to significantly contribute to further reducing the carbon footprint of the cement and concrete sector<sup>4</sup>, however additional processing capacity to produce 'graded' fly ash to meet growing demand, coupled with supply chain inventory capacity are essential. Further research needs to be undertaken to investigate harvesting the large volumes of 'homogenously' stored materials within ash dams to buffer natural material supply chain demands. Ongoing monitoring of cumulative storage with ash repositories estimates there is more than 650 million tonnes of CCPs stored nationally. For example, at current consumption rates of fly ash in the cement and concrete sectors the Association estimates there are more than 250 years of recoverable material.

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 more than 190 million tonnes annually of natural virgin material. Extractive resources are generally widespread and remain in adequate supply nationally, however, shortages in important large-scale markets (Sydney, Melbourne and Brisbane) have emerged, 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 ungraded CCPs.

Considerable interest from extractive industries to supplement natural sand and gravel resources with recovered resources such as CCPs continues to grow, which is an area of considerable focus.

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<sup>4</sup> 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.

## Key results of survey

The survey results include all generators<sup>5</sup>, marketers<sup>6</sup> 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<sup>7</sup> sources for accuracy purposes.

- Approximately 12 Mt (million tonnes) of CCPs were produced within Australasia. On a per capita basis, this equates to approx 467 kg/person. (12Mt/25.69M population)
- Some 6.07 Mt or 50% 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 approx 237 kg/person recycled or reused. (6.07Mt/25.69M population)
- Approximately 2.016 Mt or 32% of fine grade fly ash was used beneficially in high value-added applications such as cementitious binders, concrete manufacture or mineral fillers.
- About 0.612 Mt or 10% of CCPS was used in non-cementitious applications such as flowable fills, structural fills, road bases, coarse/fine aggregates.
- Some 3.718 Mt was used in projects offering some beneficial use (e.g. on site remediation, local haul roads etc.). These uses typically generate no economic return, that is, cost avoidance or recovery only.
- 6.027 Mt were placed into onsite storage ponds awaiting some future use opportunity where material would be harvested for economic use.
- More than 58 Mt of CCPs [fly ash] have been used in cementitious applications or concrete manufacture from 1975 to 2020 [45 years].

In summary, the use and recovery of CCPs provide positive and significant environmental impacts, including resource conservation, the reduction of greenhouse gas emissions through the conservation of energy and processing emission from conservation of virgin resources through displacement or substitution by CCPs.

The following table provides more detail for individual category sales of CCPs for the 2020 calendar year.

Ash Development Association of Australia Inc  
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<sup>5</sup> 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.

<sup>6</sup> 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].

<sup>7</sup> Company annual reports and other published data sources.

## Ash Development Association of Australia

### 2020 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)	45,867,865	24%	10,817,405								
A2: Sub-bituminous	4,531,568	8%	362,525								
A3: Lignite (Brown Coal)	36,910,634	2%	878,867								
Total Coal Burned (Auto-calc)	87,310,067	14%	12,058,798								
SECTION B. CCPs Beneficial Use Calculations (Tonnes)	Fly Ash	Furnace Bottom Ash	Cenospheres	Combined 2020		Combined 2019		Combined 2018		Combined 2017	
B1. Total Produced (Jan-Dec)	10,732,878	1,289,713	75,347	12,097,938		12,594,827		11,965,085		12,210,944	
B2. Total not used [Stored]	5,562,489	437,641	27,001	6,027,131		6,658,193		6,201,286		7,160,328	
Total of All Used (Auto-Calc)*	5,170,389	852,072	48,346	6,070,807	50%	5,936,634	47%	5,763,799	47%	5,050,616	41%
SECTION C. CCP Use (Tonnes)	Fly Ash	Furnace Bottom Ash	Cenospheres	Combined (Auto-Calc)		Combined (Auto-Calc)		Combined (Auto-Calc)		Combined (Auto-Calc)	
C1. Cement/Concrete Products /Grout	1,590,357	58,837	13,512	1,939,571		1,912,233		1,816,621		1,736,068	
C1. Cement/ Raw Feed for Clinker	-	5,902	-	5,902		21,872		20,778		107,247	
C1. Mineral Fillers	-	36,341	34,834	71,175		41,650		39,568		17,845	
Category 1	1,590,357	101,080	48,346	2,016,648	32%	1,975,755	33%	1,876,967	33%	1,861,160	37%
C2. Flowable Fill CLSM	4,409	-	-	4,409		4,409		4,189		92,427	
C2. Structural Fills/Embankments	-	20,000	-	20,000		20,000		19,000		20,000	
C2. Road Base/Sub-base	53,519	436,031	-	489,550		293,012		278,361		180,000	
C2. Soil Modification/Stabilization	-	-	-	-		-		-		-	
C2. Mineral Filler in Asphalt	-	-	-	-		-		-		-	
C2. Agriculture	-	459	-	459		918		4,590		17,676	
C2. Aggregate	-	98,000	-	98,000		98,000		88,200		116,423	
Category 2	57,928	554,490	-	612,418	10%	416,339	7%	394,340	7%	426,526	8%
C3. Mining Applications (e.g. Backfill)	3,502,157	100,100	-	3,602,257		3,530,660		3,460,047		2,683,930	
C3. Waste Stabilization/Solidification	11,644	1,281	-	12,925		25,850		24,558		78,000	
C3. Miscellaneous/Other	8,303	95,121	-	103,424		8,303		7,888		1,000	
Category 3	3,522,104	196,502	-	3,718,606	59%	3,564,813	60%	3,492,492	60%	2,762,930	55%
Total Use (C1, C2, C3)*(Auto-calc)	5,170,389	852,072	48,346	6,347,672		5,956,907		5,763,799		5,050,616	
SECTION D. Summary Results	Fly Ash	Furnace Bottom Ash	Cenospheres	Combined (Auto-Calc)		Combined (Auto-Calc)		Combined (Auto-Calc)		Combined (Auto-Calc)	
7. Total of All Beneficially Used (Auto-Calc)*	5,170,389	852,072	48,346	6,070,807		5,936,634		5,763,799		5,050,616	

**Table 1 - 2020 CCP Sales and Production Survey<sup>8</sup>**

<sup>8</sup> 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.