



**Ash Development
Association of Australia**

Ash Development Association of Australia

Annual Production and Utilisation Survey Report

January - December 2024

Prepared by
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Revision 2

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Membership Survey Results: Jan to Dec 2024

Summary

The beneficial use of coal combustion products (CCPs) during 2024 resulted in 4.955 million tonnes or 48% being beneficially used, resulting in the conservation of energy, finite natural resources, and the reduction of carbon emissions through the recovery of CCPs as mineral by-product resources.

The survey results for CCPs production and end uses for the period January to December 2024, discussed in this report, are shown in Table 1. Over the survey period, more than 70 million tonnes of thermal coal were consumed to generate vital energy to support the Australian economy. Some 10 million tonnes of all CCPs were produced, with 48% effectively utilised¹ in various civil and construction applications across Australia.

Total CCPs produced increased slightly on the previous reporting period, however the longer-term trend is decreasing production as planned closures out to 2050 come into effect. Forecast 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 federal and state government agendas for electricity over the past several years.

Methodology

Annually, members and non-members are surveyed for CCPs generated, stored and sold during the reporting period January to December 2024. Information provided by members² and non-members³ is collated, compared with other data sources for verification purposes and then aggregated into a national dataset. The import and export of CCPs were included, however sources and destinations are not identified.

Discussion of results

Total CCPs generation for the period was 10.2 million tonnes. Over the period, CCPs beneficial use increased slightly from 4.8 million tonnes (2023) to 4.9 million tonnes during 2024. Large-scale projects offering some beneficial use (e.g. on-site mine remediation, local haul roads, etc.) remained stable overall during the period, with demand within the supply chains for fine grain fly ash in construction materials (e.g. cement and concrete manufacture) increasing slightly but within margin for error.

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 was similar to the previous reporting period and minor movements in structural/civil, mining and mine site remediation in Category 2 and 3. 'Harvesting' of CCPs continues to increase internationally, particularly within well-established markets such as the EU and USA where access to CCPs has become restricted due to CFPS closures.

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.

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 sector⁴, however additional processing capacity to produce 'graded' fly ash to meet growing demand, coupled with supply chain inventory capacity are essential.

Research with support from the NSW Government under the NSW Carbon Recycling and Abatement Fund is investigating 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 700 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 200 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.

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.

Key results of survey

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 10.2 Mt (million tonnes) of CCPs were produced within Australasia. On a per capita basis, this equates to approx ~400kg/person. (10Mt/26M population)
- Some 4.955 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 approx 200kg/person recycled or reused. (5Mt/26M population)
- Approximately 2.58 Mt of fine grade fly ash was used beneficially in high value-added applications such as cementitious binders, concrete manufacture or mineral fillers.
- About 0.139Mt of CCPs was used in non-cementitious applications such as flowable fills, structural fills, road bases, coarse/fine aggregates.
- Some 2.22Mt 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.
- 5.2Mt were placed into onsite storage ponds awaiting some future use opportunity where material would be harvested for economic use.
- More than 65Mt of CCPs [fly ash] have been used in cementitious applications or concrete manufacture from 1975 to 2024 [49 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 2024 calendar year.

Ash Development Association of Australia Inc
June 2026

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.

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.

Table 1 - 2024 CCP Sales and Production Survey⁸

Ash Development Association of Australia											
2024 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)	35,277,331	25%	8,979,287								
A2: Sub-bituminous	5,473,032	5%	275,000								
A3: Lignite (Brown Coal)	30,000,000	2%	746,000								
Total Coal Burned (Auto-calc)	70,750,363	14%	10,000,287								
SECTION B. CCPs Beneficial Use Calculations (Tonnes)	Fly Ash	Furnace Bottom Ash	Cenospheres	Combined 2024		Combined 2023	Combined 2022	Combined 2021	Combined 2020	Combined 2019	Combined 2018
B1. Total Produced (Jan-Dec)	9,138,018	1,097,081	20,246	10,255,344		9,906,462	10,663,170	11,472,562	12,097,938	12,594,827	11,965,085
B2. Total not used [Stored]	4,593,552	686,097	20,246	5,299,895		5,113,514	4,063,854	4,894,673	6,027,131	6,658,193	6,201,286
Total of All Beneficially Used (Auto-Calc)*	4,544,466	410,984	-	4,955,450	48%	4,792,948	6,599,316	6,577,889	6,070,807	5,936,634	5,763,799
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	2,468,215	117,248	-	2,585,463	52%	2,504,635	2,516,277	2,251,934	1,939,571	1,912,233	1,816,621
C1. Cement/ Raw Feed for Clinker	-	2,548	-	2,548	0%	1,740	2,500	2,750	5,902	21,872	20,778
C1. Mineral Fillers	-	-	-	-	0%	-	79,071	49,000	71,175	41,650	39,568
Category 1	2,468,215	119,796	-	2,588,011	52%	2,506,375	2,597,848	2,303,684	2,016,648	1,975,755	1,876,967
C2. Flowable Fill CLSM	-	-	-	-	0%	19,371	8,860	4,409	4,409	4,409	4,189
C2. Structural Fills/Embankments	-	-	-	-	0%	-	-	-	20,000	20,000	19,000
C2. Road Base/Sub-base	1,000	111,346	-	112,346	2%	39,551	42,525	68,100	489,550	293,012	278,361
C2. Soil Modification/Stabilization	1,000	-	-	1,000	0%	1,000	4,562	-	-	-	-
C2. Mineral Filler in Asphalt	-	-	-	-	0%	28	1,028	-	-	-	-
C2. Agriculture	-	-	-	-	-	-	5,401	-	459	918	4,590
C2. Aggregate	-	26,125	-	26,125	1%	26,125	22,420	19,085	98,000	98,000	88,200
Category 2	2,000	137,472	-	139,472	3%	86,075	84,796	91,594	612,418	416,339	394,340
C3. Mining Applications (e.g. Backfill)	2,074,251	153,716	-	2,227,967	45%	2,200,498	3,908,369	4,173,308	3,602,257	3,530,660	3,460,047
C3. Waste Stabilization/Solidification	-	-	-	-	0%	-	-	-	12,925	25,850	24,558
C3. Miscellaneous/Other	-	-	-	-	0%	-	8,303	9,303	103,424	8,303	7,888
Category 3	2,074,251	153,716	-	2,227,967	45%	2,200,498	3,916,672	4,182,611	3,718,606	3,564,813	3,492,492
Total Use (C1, C2, C3)*(Auto-calc)	4,544,466	410,984	-	4,955,450		4,792,948	6,599,316	6,577,889	6,347,672	5,956,907	5,763,799
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 Beneficially Used (Auto-Calc)*	4,544,466	410,984	-	4,955,450		4,792,948	6,599,316	6,577,889	6,070,807	5,936,634	5,763,799

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.