Ash Development Association of Australia

Australian Competition & Consumer Commission
23 Marcus Clark Street
Canberra ACT 2601

Thursday, 18 June 2020

Danielle Staltari
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RE: Boral Cement Limited application for authorisation AA1000517—interested party consultation

The Ash Development Association of Australia[1] (the Association) welcomes the opportunity to make a submission to the Australian Competition & Consumer Commission (the ACCC) Boral Cement Limited application for authorisation.

Our Association's primary objectives are to investigate and foster economic market opportunities for the beneficial use of coal combustion products (CCPs). Accordingly, any investment to further the beneficial use of CCPs is welcomed and to these ends we support Boral Cements planned investment.

About Us and CCPs

Formed in 1991 by producers and marketers of power station ash, the Association's objectives are to investigate and foster economic market opportunities for the **beneficial use of coal combustion products**[2] (CCPs) commonly known as power station ash, fly ash or furnace bottom ash.

The combustion of pulverized coal in the furnace of a power station boiler results in the production of several solid by-products which were once regarded as waste but today are more accurately classified as coal combustion products (CCPs). This latter term, CCPs has been adopted globally and positively aligns with the concepts of a 'circular economy' – an approach which seeks to use one industry's by-products as another industry's raw material and ultimately conserving finite resources.

[1] http://www.adaa.asn.au/membership/current-members
[2] Coal combustion products include fly ash, bottom ash, boiler slag, fluidized-bed combustion (FBC) ash, or flue gas desulfurization (FGD) material produced primarily from the combustion of coal or the cleaning of the stack gases. The term 'coal ash' is interchangeable.

Putting our objectives for CCPs into some perspective, coal is likely to continue to be the largest energy source for electricity generation within Australia for the foreseeable future given; abundant low-cost coal reserves; coal fired plant life expectancy (age); coupled with reliable low-cost energy.

The Associations long-term forecasts predict annual production volumes of CCPs will continue to exceed 12 million tonnes beyond 2025[3]. The beneficial use of coal combustion products during 2018[4] resulted in 5.936 million tonnes or 47% being beneficially used, resulting in the conservation of;

- energy;
- finite natural resources; and
- the reduction of carbon emissions through the recovery of CCPs being mineral by-product resources.

Surplus CCPs represent another 650 million tonnes of homogeneous secondary resources that are safely stored and managed in ash repositories awaiting economic reuse opportunities to exploit this resource through harvesting.

Putting Australia's annual production of 12 million tonnes of CCPs into context, globally more than 1.2 billion tonnes of CCPs were generated, with 678 million tonnes or 63% being beneficially used in 2017[5]. China and India alone represent more than 62% of total global CCP production. Australia represents less than 1% of global production[6].

The Association facilitates and promotes the responsible utilisation of CCPs as valuable materials; whilst endeavouring to engage and increase potential user/s awareness of the ecologically sustainable benefits arising through increased utilisation of recoverable resources such as CCPs, to benefit industry members, the environment, and the community.

Scope of Our Submission

As outlined above, the Association's primary objectives are to investigate and foster economic market opportunities for the beneficial use of coal combustion products (CCPs), but is limited by its Constitution and adopted 'Anti-Trust' policies ability to address matters related to (1) market share, (2) pricing, (3) supply chain relationship from the ACCC's 'Request for Submissions'.

Our submission will focus on the beneficiating journey for CCPs.

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[3] Submission to Senate Standing Committee on Environment and Communications – Inquiry into the rehabilitation of mining and resources projects and power station ash dams as it relates to Commonwealth responsibilities, April 2018.

[4] http://www.adaa.asn.au/resource-utilisation/ccp-utilisation

[5] Heidrich, C., et al. (2019). Global aspects on Coal Combustion Products. World of Coal Ash 2019. St Louis, USA, CAER & ACAA. Vol 1: pgs 21.

[6] ibid

Request for submissions	Response Provided
Is the 10 year term of authorisation sought by Boral Cement necessary to support the proposed investment? What impact is a 10 year term likely to have on the ability of other market participants' (both buyers and sellers) to obtain access to fly ash?	N/A
For each power station in Queensland including Tarong, Tarong North, Millmerran, Kogan Creek, Stanwell in Rockhampton, Callide A, B, and C, and Gladstone: a. How much fly ash is currently produced per year? b. What grades of fly ash are currently produced? What are the specifications of the fly ash produced for properties relevant to its use in concrete production e.g. particle size, chemical composition, colour. c. What are the commercial applications for each grade of fly ash produced? d. How much of the fly ash produced is suitable for use in concrete production, with or without additional processing such as milling? e. What parties are supplied with fly ash, in what grades and quantities, and at what price? f. What changes, if any, are anticipated to the above over the next 10 years?	Partly
Details of each supplier of fly ash to end users in Queensland and/or other east coast locations, what processing of fly ash they do, what type/grade of fly ash do they supply to end users, how much do they supply per year, and to which end users is the fly ash supplied.	N/A
Please explain any geographical challenges or realities in relation to the supply or acquisition of fly ash. For example, does the location of a prospective purchaser of fly ash limit the suppliers from whom they can acquire fly ash? Are there practical or economic limits on how far fly ash can be transported?	N/A
In the absence of the arrangements between Stanwell and Boral Cement, how is fly ash from Tarong PS likely to be managed in the future? Would it be sold? If so, how, by and to whom?	N/A
What are the uses for fly ash and is the expected demand for fly ash likely to change in the future.	Partly
Which suppliers supply concrete in Queensland and/or other east coast locations? Which current suppliers of concrete use fly ash in production? From whom do these concrete suppliers acquire fly ash, where is that fly ash produced, and how much fly ash do they acquire per year?	N/A
Is the total usage of fly ash acquired by the concrete suppliers in Queensland and/or other east coast locations expected to increase in the future, either through increased usage of fly ash in concrete or by increased production of concrete? If so, over what timeframe? Will this change if the arrangements between Stanwell and Boral Cement are	N/A

Request for submissions	Response Provided
implemented? Please outline any difficulties which may exist in acquiring concrete grade fly ash.	
To what extent is it feasible to store fly ash once it is produced? Are there practical or economic limitation on how much fly ash can be stored, and/or the locations where it can be stored?	Partly

Matters not addressed in this submission, e.g. (1) market share, (2) pricing, (3) supply chain relationship may be addressed by others directly impacted, or by other 'Parties Consulted' identified by the ACCC.

Production, Grades, Uses and opportunities associated with coal ash re-use

The economic and employment benefits arising from the use CCPs are significant and substantial to the construction materials industry.

Annually the Association conducts a national survey into production and beneficial uses of CCPs. The Association adopted policy is not to report disaggregated (State) data due to confidentiality agreements. Nationally during 2018, 5.936 million tonnes of CCPs or 47% contributed to a significant economic value add of approximately $200 million at the first tier, driven by market demand for the resource.

Other positive contributions are from employment through the investment, resource management, processing, handling, transportation, and end-use applications of CCPs. Other less tangible aspects are the conservation of energy through reducing the mining of finite natural resources (displacement) and the reduction of carbon emissions through the use of CCPs to displace emission and energy-intensive manufactured materials including cement.

National snapshot of 2018 results:

- Approximately 12.6 Mt (million tonnes) of CCPs were produced within Australasia. On a per capita basis, this equates to approx. 502 kg/person. (12.6Mt/25.09M population)
- Some 5.936 Mt or 47% 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. 236 kg/person recycled or reused. (5.936Mt/25.09M population)
- Approximately 1.983 Mt or 33% of fine grade fly ash was used beneficially in high value-added applications such as cementitious binders, concrete manufacture or mineral fillers.
- About 0.42 Mt or 7% of CCPs were used in non-cementitious applications such as flowable fills, structural fills, road bases, coarse/fine aggregates.

- Some 3.56 Mt were 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.
- Some 6.65 Mt were placed into onsite storage ponds awaiting future use opportunities where the material would be harvested for economic use.
- More than 52 Mt of CCPs (mainly fly ash) have been used in cementitious applications or concrete manufacture from 1975 to 2018 i.e 43 years.

The following table offers some insight of the 'high level' data the Association maintains, moreover how the Association has attempted to make certain forecasts out to 2025 to facilitate and encourage investment/use.

The assumptions are complex, but generally based on energy policy (coal fired power station operation), members operations, investment(s) into processing capacity and infrastructure and downstream demand expectations.

The data shows since 2006 there has been a steady decline in total mega watt (MW) generation capacity installed, down from 30,159 MW (2006) to 24,381 MW (2019). This decline is due mainly to planned retirement of ageing coal fired power stations (CFPS). These retirements have created some investment uncertainty to exploit CCPs.

Having said that, the Association forecasts in 2021 over 11 millions of CCPs will be generated, declining by approx 2 million tonnes since 2006. As shown in the table, there are still significant qty's surplus to use which are diverted to ash storage on site which could be harvested as they are now routinely doing in the USA and UK.

A brief comment on grades. For example for QLD there is approx. 1 million tonnes of Grade 1 (fine grade) fly ash processing capability installed. Variable's impacting on capability are; power station operation; classifier availability, maintenance, storage capacity, transport etc. For Grade 2 (medium grade) fly ash there is currently approx. 1.4 million tonnes. Variable's are: storage capacity (silos/bins), plant to divert/recover Grade 2 material. Furnace bottom ash (FBA) production is approx. 560,000 tonnes, with a significant proportion captured, processed and sold.

State	Generation Capacity	Coal (Fuel) Burned	CCP Generated	Fly Ash	Furnace Bottom Ash	Fly Ash Graded Capability	Fly Ash Ungraded Capability	Furnace Bottom Ash Capability	CCP Diverted Storage	Total CCPs Stored
	MW	tonnes	tonnes	tonnes	tonnes	tonnes	tonnes	tonnes	tonnes	tonnes
NSW	10,391	24,562,068	6,192,158	5,075,531	941,627	950,000	1,600,000	500,000	3,142,158	224,101,512
QLD	7,386	21,106,575	4,608,886	3,917,553	691,333	900,000	1,370,000	560,000	1,778,886	143,836,599
VIC	5,545	66,716,126	1,435,251	1,219,963	215,288	0	0	0	1,435,251	34,605,945
SA	544	2,408,636	561,212	364,788	196,424	0	0	0	561,212	17,156,827
WA	1,813	4,654,274	475,000	412,000	63,000	90,000	120,000	40,000	225,000	7,921,887
NZ	1,000	603,015	42,211	29,548	12,663	0	5,000	7,000	30,211	114,148
2006	**30,159**	**128,050,000**	**13,369,900**						**10,400,150**	**306,562,500**
2011	**29,704**	**126,461,941**	**14,553,568**	**11,972,761**	**2,349,947**	**2,560,000**	**3,710,000**	**1,200,000**	**9,421,266**	**391,645,908**
2013	**29,718**	**125,302,143**	**14,341,519**	**11,872,515**	**2,294,003**	**2,570,000**	**3,715,000**	**1,207,000**	**8,276,419**	**410,822,653**
2015	**26,679**	**120,050,694**	**13,314,719**	**11,019,384**	**2,120,335**	**1,940,000**	**3,095,000**	**1,107,000**	**8,637,847**	**427,736,919**
2017	**26,135**	**112,507,429**	**12,512,480**	**10,510,483**	**2,001,997**	**2,010,000**	**2,825,000**	**1,045,217**	**8,383,361**	**444,503,642**
2019	**25,351**	**109,132,206**	**12,137,105**	**10,195,168**	**1,941,937**	**2,130,000**	**2,825,000**	**1,013,861**	**8,131,860**	**460,767,363**
2021	**24,590**	**105,858,240**	**11,772,992**	**9,889,313**	**1,883,679**	**2,130,000**	**2,825,000**	**983,445**	**7,887,905**	**476,543,172**
2023	**23,853**	**102,682,493**	**11,419,802**	**9,592,634**	**1,827,168**	**2,130,000**	**2,825,000**	**953,941**	**7,651,268**	**491,845,707**
2025	**23,137**	**99,602,018**	**11,077,208**	**9,304,855**	**1,772,353**	**2,130,000**	**2,825,000**	**925,323**	**7,421,729**	**506,689,166**
2011-2025 Change (+/-)	**(6,567)**	**(26,859,923)**	**(3,476,360)**	**(2,667,906)**	**(577,594)**	**(430,000)**	**(885,000)**	**(274,677)**		**115,043,258**
Change %	-21.8%	-21.0%	-26.0%	-22.3%	-24.6%	-16.8%	-23.9%	-22.9%		**Est. cost 15yrs**
										$ 2,876,081,448

An abundant mineral resource for use

An important role of the Association is to explore, research and publish information about beneficial opportunities for CCPs. The Association has directly or indirectly conducted research or published information on the use of CCPs in; Mine Backfill; Soil Amendment; Soil Stabilisation, Engineered Fills, and Pavements; Adsorbents, Barrier Materials, Stabilisers and Waste Encapsulation; Rare Earth Metal Recovery; Carbon Products; Composites; Manufactured Aggregates; Glasses; Geopolymers; and Zeolites.

The use of CCPs, in particular fly ash, has proven over the past 30 years to significantly reduce the carbon footprint of the cement and concrete sector as outlined above. However, additional processing capacity (investment) to produce more 'graded' fly ash is essential to meet growing demand and supply chain inventory capacity.

Some of the above larger scale applications, e.g. Pavements, can require large volumes over sort construction timeframes. Harvesting of the currently stored CCPs (> 500 million tonnes) of 'homogenous' materials within ash dams can supplement natural material supply chain demands. This 'harvesting' process is already occurring in countries such as the USA and the UK, but regulation to enable this process is essential. The use of CCPs, as valued resources in these large-scale applications is well established internationally[7].

Another large-scale construction material example where there is considerable opportunities for CCPs to be used relates to supplementing current demand for fine and coarse aggregate use in structural/civil applications. That is, current consumption and growth in the future development of infrastructure in both urban and regional Australia is estimated to be more than 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)

[7] Heidrich et al 2017, Coal Combustion Products: Global Operating Environment, WOCA 2017, Lexington Kentucky USA

have emerged, requiring unprecedented additional logistics and associated handling 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. Continued depletion of natural resources places further emphasis on the opportunity to reduce carbon emissions and reduced costs with the use of 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 significant focus.

Brief International Perspectives

Issues regarding CCPs and long-term storage are not unique to Australia, but lessons can be learned from other Countries in regard to pathways to be avoided and others to be encouraged.

In a white paper published in January 2020, *A Comprehensive Survey of Coal Ash Law and Commercialization: Its Environmental Risks, Disposal Regulation, and Beneficial Use Markets*[8] commissioned by the National Association of Regulatory Utility Commissioners under a grant from the U.S. Department of Energy lessons learned and challenges ahead for public policy are offered.

The white paper found that regulation to comply with Federal and State EPA requirements by utilities [coal fired power stations] or CFPS will be costly. Recovery of compliance costs will usually fall within the purview of utility operators [CFPS] and ultimately be passed onto customers. Estimates for the cost of remediation of ash ponds range from the millions for individual coal ash ponds to billions for some utilities, and up to possibly hundreds of billions of dollars across the country, but true cost projections will be dependent on the closure and clean-up methods that are approved by state legislatures and/or environmental regulators.

This submission has been approved by the Board of the Ash Development Association of Australia. Should you have any questions regarding our submission please do not hesitate to contact the undersigned.

Craig Heidrich
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Ash Development Association of Australia

[8] https://pubs.naruc.org/pub/A6923B2D-155D-0A36-31AA-045B741819EC [Accessed Jan 2020]