

## **INQUIRY INTO COSTS FOR REMEDIATION OF SITES CONTAINING COAL ASH REPOSITORIES**

**Organisation:** Ash Development Association of Australia

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## Ash Development Association of Australia

The Director  
Public Works Committee  
Parliament House  
Macquarie Street  
Sydney NSW 2000

Thursday, 13 February 2020

Hon. Daniel Mookhey MLC  
Committee Chair

### RE: Inquiry into costs for remediation of sites containing coal ash repositories

The Ash Development Association of Australia<sup>1</sup> (the Association) welcomes the opportunity to make a submission to the *New South Wales Parliament Legislative Council – Public Works Committee* (the Committee) *inquiry into and report on the costs for remediation of coal ash repositories in New South Wales*.

The Association was formed in 1991 by producers and marketers of power station ash, with the objectives to investigate and foster economic market opportunities for the **beneficial use of coal combustion products**<sup>2</sup> (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.

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.

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<sup>1</sup> <http://www.adaa.asn.au/membership/current-members>

<sup>2</sup> 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.

The Association's long-term forecasts predict annual production volumes of CCPs will continue to exceed 12 million tonnes beyond 2025<sup>3</sup>. The beneficial use of coal combustion products during 2018<sup>4</sup> 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 dams awaiting economic reuse opportunities to exploit this resource.

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

The Association facilitates 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 the Association's 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). Accordingly, our submission will be limited to addressing the following matters from the Committee's 'Terms of Reference', with a focus on our beneficiating journey for CCPs.

ToR	Response
(a) prospective or current quantum of government liability for remediating contamination at sites associated with: (i) Mount Piper power station, (ii) Bayswater power station, (iii) Liddell power station,	N/A

<sup>3</sup> 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.

<sup>4</sup> <http://www.adaa.asn.au/resource-utilisation/ccp-utilisation>

<sup>5</sup> 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.

<sup>6</sup> ibid

(iv) Vales Point power station, (v) Eraring power station, and (vi) any other relevant power station.	
(b) prospective timing of government expenditure in relation to remediation at those sites,	N/A
(c) economic and employment opportunities associated with coal ash re-use, site remediation and repurposing of land,	Yes
(d) adequacy and effectiveness of the current regulatory regime for ensuring best practice remediation of coal ash repositories,	Yes
(e) mitigation of actual or perceived conflict of interest arising from the state having ongoing liability for remediation costs the quantum of which will be impacted by government policy and regulatory action,	N/A
(f) risks and liabilities associated with inadequate remediation including community and environmental health impacts, and	Yes
(g) any other related matters.	Yes

Matters not addressed in this submission, e.g. remediation, are not part of our Association's charter and purpose and may be addressed by our members directly impacted, or by the Australian Energy Council.

#### **Economic and employment opportunities associated with coal ash re-use, site remediation and repurposing of land**

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

The beneficial use of CCPs during 2018 resulted in 5.936 million tonnes or 47% contributing 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.

#### **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.

### **An abundant mineral resource**

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 short construction timeframes. Harvesting of the currently stored CCPs (> 650 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<sup>7</sup>.

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) have emerged, requiring unprecedented additional logistics and associated handling costs. These are mainly attributed to unsuitable geology, conflicting or incompatible land uses and

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<sup>7</sup> Heidrich et al 2017, Coal Combustion Products: Global Operating Environment, WOCA 2017, Lexington Kentucky USA

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.

### **Adequacy and effectiveness of the current regulatory regime for ensuring best practice remediation of coal ash repositories**

*Regulatory regime to manage the beneficial use of CCPs has evolved based on wide consultation, sound science, coupled with ongoing monitoring and evaluation – building confidence in the resource.*

The development of sound legislation, regulations and other necessary measures designed to provide industry with the level of ‘legal certainty’ are a minimum requirement for capital investment in modern economies. These investments provide for the efficient and effective recovery or value-adding and ‘best use’ of CCPs for beneficial ends.

The identification of actual, potential and ultimate removal of unnecessary ‘contingent liabilities’ attributable to the generation, processing or sale of coal combustion products must be a key goal for all stakeholders<sup>8</sup>. Working closely with the NSW EPA, the Association has encouraged fundamental changes to the Protection of the Environment Operations Act 1997 to facilitate the development of mechanisms to drive innovative and progressive Resource Recovery Exemptions<sup>9</sup>, using sound science and critical evaluation, to change the waste paradigm to resource recovery one through providing legal certainty for investment.

This concept of ‘legal certainty’ and its importance should not be underestimated. Fundamentally, it underpins all corporate commercial decision-making processes where investments lead to secure associated ‘property rights’ arising from investment to develop resources. Where a substance accrues property rights, they become tradeable goods or commodities based on changed perceptions of value. Ambiguity associated with the material’s classified as ‘wastes’ result in ‘contingent liabilities’ or hesitancy for further investment into future utilisation technologies.

The concept of ‘contingent liabilities’ can be broadly applied to the generation, processing and or use of materials defined as wastes, and relates to the potential use of these materials under the relevant regulation. Ultimately, any substance defined as a ‘waste’, regardless of its economic, social or environmental value, continues to be subject to strict

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<sup>8</sup> Heidrich, C., et al. (2013). Coal Combustion Products: A Global Perspective. World of Coal Ash 2013. Lexington, Kentucky USA, CEAR & ACAA. Vol 1: pgs 17

<sup>9</sup> <http://www.epa.nsw.gov.au/your-environment/recycling-and-reuse/resource-recovery-framework/current-orders-and-exemption>

controls and reporting requirements<sup>10</sup>. Therefore, exposing participants to the use of CCPs leads to legal uncertainty.

In the absence of legal certainty, generators, investors, business owners and customers operating in highly competitive commercial markets typically avoid regulatory uncertainty or risks associated with an activity, resulting in the widespread loss of current and future beneficial utilisation opportunities for CCPs. On the other hand, the securing of legal certainty for CCPs supports sustainable industry development whilst protecting the environment and human health - both of which are implicit in the community license to operate obligations for society today.

Advocated by the Ash Development Association of Australia, regulatory reform continues to provide new end-use market opportunities for 'ungraded' material applications. Coupled with recent changes to AS 3582.1 and AS 2758, these end-use applications are expected to grow.

The Association continues to work closely with NSW EPA to evaluate, categorise, classify and develop sound exemptions to prevent unreasonable economic burden which may affect CCPs beneficial use. Exemptions provide the industry with ongoing 'legal certainty' which are a minimum requirement for securing capital investment in modern economies.

For example exemptions for CCPs use in agriculture was published in 2006<sup>11</sup>, which has undergone various improvements<sup>12</sup> and expanded as end-use markets have established and a widespread understanding of the environmental benefits of using CCPs in construction, manufacturing and carbon emission reduction applications has become more commonly understood<sup>13,14,15</sup>. The last 20 years have revealed that we must act collectively to avoid burdensome regulation which limits beneficial uses of CCPs, relegating them to long-term storage in ponds and costly remediation.

## **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.

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<sup>10</sup> (Heidrich, 2011; Heidrich & Ritchie, 2007; Heidrich, Ward, French, & Bowman, 2007) Papers can be provide on request

<sup>11</sup> The fly ash and bottom ash from burning NSW or Queensland coal exemption 2006 (Dec 2006)

<sup>12</sup> <https://www.epa.nsw.gov.au/your-environment/recycling-and-reuse/resource-recovery-framework/current-orders-and-exemption>

<sup>13</sup> Heidrich, C. (2004). CCP Utilisation - a valuable resource. Strategic Products for Government Infrastructure: Cementitious Materials for Concrete, Sydney, NSW, Australia, NSW Department of Commerce, Sydney.

<sup>14</sup> Yunusa, I. A. M., et al. (2005). Fly-ash: an exploitable resource for management agricultural soils in Australia. World of Coal Ash 2005, Lexington, Kentucky, USA, American Coal Ash Association & University of Kentucky.

<sup>15</sup> Heidrich, C., 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.

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*<sup>16</sup> 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.

### **Risks and liabilities associated with inadequate remediation including community and environmental health impacts**

*When used and managed consistent with industry resource best practices, CCPs represent no additional risks to the community or environmental health impacts.*

The Association has undertaken numerous environmental investigations into CCPs. The common aims of these investigations have been to collate and interpret the analytical knowledge on its members' CCPs through a coordinated sampling, analysis and reporting program. These studies have been independently validated and reported with similar International studies in the *Coal Combustion Handbook 2014*<sup>17</sup>. These reports are published<sup>18</sup>.

Since the early 2000's, investigations into the chemical characteristics of CCPs from sources across Australia have occurred. These investigations have assisted the Association in identifying alternative uses to which CCPs can be used as a secondary resource. Investigations typically analysed a range of metals (total and leachate), dioxins and furans. All investigations demonstrated that trace metals contained in CCPs and leachates results were under the thresholds established by the NSW EPA.

Over the past 19 years, these investigations have demonstrated the responsible and environmentally sustainable use of CCP for applications, but not limited to, civil engineering fills, raw materials for the cement and concrete industries and for agricultural and horticultural purposes.

### **Recommendations for the Committees consideration**

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<sup>16</sup> <https://pubs.naruc.org/pub/A6923B2D-155D-0A36-31AA-045B741819EC> [Accessed Jan 2020]

<sup>17</sup> Heidrich, C., et al., Eds. (2014). *Coal Combustion Products Handbook*. Brisbane, Australia, Cooperative Research Centre for Coal in Sustainable Development.

<sup>18</sup> <http://www.adaa.asn.au/knowledge/technical-literature/environmental-monitoring-reports>

The Association's primary objectives are to investigate and foster economic market opportunities for the beneficial use of coal combustion products (CCPs). Accordingly, our recommendations are designed to address the Committee's 'Terms of Reference' with a focus on the benefits of CCPs.

- Establishment of State chaired working group of key industry bodies to develop a clear action plan towards a focus on resource development, harvesting and encouraging further investment.
- Consult with relevant State bodies to establish a framework for pathways (mandatory use) to increasing utilisation which promote economic efficiencies and conserve finite natural resources
- Foster 'circular economy' principles for more effective opportunities to recover CCPs from ash dams, exploit CCPs homogeneous nature and geographical location for major construction materials markets
- Avoid regulation based on unscientific opinion which may seek to limit future access to stored CCPs resources, e.g. regulation that limits or prohibits the removal of stored material.

The Association welcomes any opportunity to make a verbal submission to the Committee to encourage the recovery and use of CCPs to balance economic, social and environmental objectives.

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.

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