# SUSTAINABILITY OF ENERGY SUPPLY AND RESOURCES IN NSW

**Organisation:** Hunter Community Environment Centre

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# **SUPPLEMENTARY SUBMISSION**

Sustainability of energy supply and resources in NSW 18 May 2020



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# Terms of Reference

That the Committee on Environment and Planning inquire into and report on the sustainability of energy supply and resources in NSW, including:

1. The capacity and economic opportunities of renewable energy, including for workforces, industries and the wider economy impacted by COVID-19.

2. Emerging trends in energy supply and exports, including investment and other financial arrangements.

3. The status of and forecasts for energy and resource markets.

4. Effects on regional communities, water security, the environment and public health.

5. Opportunities to support sustainable economic development in regional and other communities likely to be affected by changing energy and resource markets, including the role of government policies.

6. Any other related matters.

### Background

The Hunter Community Environment Centre (HCEC) wishes to thank the Committee for the opportunity to make a supplementary submission to the Inquiry into *Sustainability of energy resources and supply in NSW.* 

Our organisations original submission<sup>1</sup> addresses Terms of Reference 4 and 5 presenting an overview of water pollution stemming from the Vales Point and Eraring power station coal-ash waste dams situated on Lake Macquarie.



Map of Lake Macquarie and coal-ash waste sites

Additionally, in it we outline the opportunties to support regional economic development of sustainable industry while mitigating on-going pollution of a significant lake ecosystem, presented by a coal-ash reuse industry, including the challenges associated with the establishment of the industry in NSW on chemical, policy and commerical fronts.

<sup>&</sup>lt;sup>1</sup> <u>Sustainability of energy supply and resources in NSW, Hunter Community Environment Centre, SUBMISSION,</u> <u>Sept 2019</u>

This supplementary submission will primarily address points 1 and 5 in the expanded terms of reference, further detailing pathways to regional employment in sustainable industry presented by coal-ash reuse at Lake Macquarie power stations in the context of COVID-19 economic impacts.

To do this, our supplementary submssion will reference submissions made to the Legislative Council Public Works Committee Inquiry into the *Costs of remediation of sites containing coal-ash* waste repositories<sup>2</sup>.

The Public Works Inquiry was established in mid 2019, to determine the required expenditure and approaches to the remediation of coal-ash waste sites at power stations, for which the NSW government retain liability.

The HCEC will present its submission<sup>3</sup> to the Public Works committee at hearings in May or early June 2020, addressing recommended amendments to NSW power station environmental regulation, pathways for decontamination of coal-ash waste sites and how a coal-ash reuse industry could play a role in reducing on-going water pollution from huge expanses of capped coal-ash, causing groundwater pollution and exceeding water quality limits.

Prompt actions and incentives to establish an industry to re-use coal-ash in the manufacture of construction materials would benefit the NSW economy through new employment opportunites in the production of cost-effective, high-quality and sustainable construction materials, alleviating some the present economic strain of the COVID-19 pandemic in the short-term, as well as the longer-term impacts of an imminent transition away from thermal coal, yet to be fully experienced by the electricity generation sector.

 <sup>&</sup>lt;sup>2</sup> <u>https://www.parliament.nsw.gov.au/committees/inquiries/Pages/inquiry-details.aspx?pk=2556</u>
<sup>3</sup> <u>Costs of remediation of sites containing coal-ash repositories, Hunter Community Environment Centre, SUBMISSION, Feb 2020</u>

ToR 1. The capacity and economic opportunities of renewable energy, including for workforces, industries and the wider economy impacted by COVID-19

ToR 5. Opportunities to support sustainable economic development in regional and other communities likely to be affected by changing energy and resource markets, including the role of government policies.

The reuse of coal-ash waste comes with commerical, environmental and climate benefits and can be utlised in the manufacture of affodable, high-quality lightweight aggreagates such as Lytag and a range of other building and cement products, including geopolymer cement.

The utilization of coal-ash in the production of cement can significantly reduce carbon emissions<sup>4</sup> typically generated by a carbon-intense portland cement making, while also reducing the volume of a heavy metal laden material stored in unlined landfills at sites across NSW and Australia.

There is an estimated 500 million tonnes of coal-ash waste is contained in unlined dumps across the continent, with huge reserves (approximately 61million tonnes) contained on the shores of Lake Macquarie, adjacent to and generated by Delta Electicity's Vales Point and Origin Energy's Eraring coal-fired power stations.



Eraring coal-ash waste

<sup>&</sup>lt;sup>4</sup> BZE -Beyond Zero Emissions, 2017. Zero Carbon Industry Plan: Rethinking Cement.

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Vales Point coal-ash waste

There is sufficient material, technology and business interest in NSW to begin benefically reusing this coal-ash on far more ambitous, economic and effective scales than what is currently undertaken.

With specific regulatory amendments and Government support this industry could play an innovative role in the transition of coal-energy workforces and see a sustainable waste-to-resource manufacturing industry emerge.

A reuse industry for Lake Macquarie's coal-ash reserves could provide employment for retrenched power station workers upon the decomissioning of Eraring and Vales Point (tentative decomissioning dates of 2032 and 2029, respectively) but it also presents a 'shovel-ready' opportunity for other workers and an ecnonomy impacted by the COVID-19 pandemic.

The heavy metal pollution present in surface and groundwater stemming from the Lake Macquarie coal-ash waste dumps substaniates the need for amedments the Vales Point (EPL 761) and Eraring (EPL\_1429) Environment Protection Licences (EPL) in the short-term.

To further address Lake Macquarie's heavy metal pollution issue and create economic and environmental co-benefits, there is growing support for an investigation and feasibility studies to be undertaken into the establishment of a coal-ash reuse industry in the medium to long-term.

The work required to launch this new industry could be accelerated to alleviate strains on regional employment and the wider NSW economy in the context of COVID-19.

There are global precendents for successful coal-ash reuse, and while rates of economicallybeneficial coal ash utilisation in Australia have been rising, it still remains at about 20 percent of the volume of ash generated each year.<sup>5</sup>

<sup>&</sup>lt;sup>5</sup> HCEC, Out of the Ashes: Water pollution and Lake Macquarie's aging coal-fired power stations, 2019

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For example, between 1995 and 2011 Japan increase its utilisation of coal ash from 67 percent to 97 percent, during a period when coal ash generation almost doubled. Of the 97 percent utilisation by Japan in 2011, 67.3 percent was used for cement and concrete. <sup>6</sup>

In the year 2018, an estimated 102.3 million tonnes of coal-ash was produced in the United States.<sup>7</sup>

In April 2020, the U.S Department of Energy and Office of Fossil Energy announced a series of grants to "...increase the beneficial use and advance the management of CCR [coal combustion products], thereby reducing the volume of CCR needed to be disposed of in impoundments while protecting the environment and the health and safety of the public."<sup>8</sup>

These approaches to increasing and ecnomising coal-ash waste management are instructive for Australia, where mounting reserves of largely un-regulated coal-ash waste accounts for approximately 20% of our entire domestic waste stream and support for its reuse is emerging in more and more places from various stakeholders.

Below, a series of submissions received by the NSW Inquiry into *Cost of remediation of sites conatining coal-ash repositories* are quoted to convey the growing appetite for such an industry in NSW and particularly in the Lake Macquarie region.

In Lake Macquarie City Council's (LMCC) submission, the Deputy CEO writes:

"Council staff consider that finding an efficient, cost effecive reuse of coal ash material will likely obviate legacy and rehabiliation issues for coal ash repositories. Council staff are very supportive of actions that would acheive reuse of his material as we see many befefits for our LGA, the Hunter and the State of NSW. Coal ash can be used in a variety of products that would directly results in less virgin material extracted from mines and quarries. Keeping resources in the economy is a focus of LMCC and we are currently working to maximise the benefits of shifting to a circular economy.

Coal ash should be viewed by the NSW Government as a resource rather than waste and the NSW Government should be prioritising opportunites to reuse this material..."<sup>9</sup>

The support of the LMCC for the beneficial reuse of coal-ash is echoed in many submissions by local residents who reiterate the untapped potential of a circular economy surrouding coal-ash waste. There is also strong support from the Independent Member for Lake Macqauire, Greg Piper MP for regulatorgy changes that will incentivise higher rates of coal-ash reuse.<sup>10</sup>

The concise submission from global engineering company Ramboll written by Lead Consultant, Dr Annette Nolan states:"

"...in addressing these contamination issues, the Government needs to investigate sustainable approaches to the remediation to minimise social, economic and

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<sup>&</sup>lt;sup>6</sup> <u>Kenichi Sato iand Takuro Fujiakawa, 2015. Effective use of coal ash as ground materials in Japan.</u> <u>International Workshop on Geotechnics for Resilient Infrastructure. The Second Japan-India Workshop in</u> <u>Geotechnical Engineering. Japanese Geotechnical Society Special Publication.</u>

 <sup>&</sup>lt;sup>7</sup> Research for innovative emission reduction technologies related to coal combustion residuals, Funding Opportunity Announcement (FOA), Department of Energy (DOE), Office of Fossil Energy (FE)
<sup>8</sup> Ibid

 <sup>&</sup>lt;sup>9</sup> Lake Macquarie City Council, Cost of remediation of sites containing coal-ash, SUBMISSION, Feb 2020
<sup>10</sup> Mr Greg Piper MP, Cost of remediation of sites containing coal-ash, SUBMISSION, Feb 2020

environmental impacts. One aspect that should be investigated is options for the beneficial reuse of the coal combustion residuals (CCRs)."<sup>11</sup>

And follows:

"Enourmous amounts of CCR materials in landfills and repositories reporesent utapped resources for beneficial reuse in various concrete applications."<sup>12</sup>

Dr Nolan's submission concludes with "Ramboll believes this option could provide a win-win solution to the remediation of sites containing coal ash repositories, providing a more sustainable remediation option with benefical reuse of CCRs."<sup>13</sup>

The grassroots and expert support for the decontamination of coal-ash landfills and its beneficial reuse is also present in the business community.

One business with a keen interest in accessing NSW coal-ash reserves is *Vecor Australia Pty Limited*, described on their website as "...a green technology company working passionately to keep the world's largest industrial solid waste out of the air, waterways and landfill" and manufacutre porcelain tiles incorporating "fly ash"<sup>14</sup>.

Vecor's founding technology was developed at the University of New South Wales with the company now registered in Hong Kong with operations in Australia, China, India, Italy, and the Philippines.

In Vecor's detailed submission to the Public Works Inquiry they emphasise and outline the economic and environmental benefits of coal-ash reuse with their primary recommendation being that the NSW Government "...conduct a feasibility study into the economic viability of manufacturing sand and aggregates from fly ash..."<sup>15</sup>, involving the construction of a pilot plant to further test products and technologies.

Vecor have completed a study of their own which estimates that "...one plant could convert over 500, 000 tonnes of fly ash per annum into sand and aggreagate..."<sup>16</sup>, and claim there are "...50 years worth of ash stored in seven ash dams across NSW which has the potential to be utilised for decades to come."<sup>17</sup>

Additonally, they cite that a full-scale Vecor ash recylcling plant may employ up to 414 full time employees, stating that the development of "...the fly ash recycling industry is therefore an opportunity to boost regional employment in NSW..."<sup>18</sup> and pointing out that these plants would be located in close proximity to power station workforces with impending rentrenchments.

In the context of COVID-19 the investigation and construction of a pilot plant could provide econonmic stimulus in the near future, years in advance to be useful to a power station workforce not yet in transition. Therefore, to faciliate the future employment of retrenched power station

<sup>&</sup>lt;sup>11</sup> Ramboll,

<sup>&</sup>lt;sup>12</sup> Ibid.

<sup>13</sup> Ibid.

<sup>&</sup>lt;sup>14</sup> "Fly ash" is the waste material captured directly from fabric filters installed in power station stacks and is "un-contaminated" requiring little-to-no processing prior to re-use. What is generally referred to as "coal-ash" has been dumped in a storage dam/landfill. "Bottom ash", distinct from fly-ash is a coarser material which seperates from the lighter "fly-ash" settling at the base of boilers.

<sup>&</sup>lt;sup>15</sup> <u>Vecor, Cost of remediation of sites containing coal-ash, SUBMISSION, Feb 2020</u>

<sup>&</sup>lt;sup>16</sup> Ibid

<sup>17</sup> Ibid

<sup>18</sup> Ibid

workers at coal-ash reuse plants, cooperation and planning bewteen operators and Unions to identify fitting policies and/or mechanisms would need to take place.

The reduction in quantities of waste being dumped in expanding coal-ash dumps will ease teh heavy metal pollution in waterways and may also satisfy the requirements of operators like Origin Energy, who recently re-comitted to improving coal-ash utilisation rates as part of the Eraring Long-Term Ash Management Strategy (LTAMS ).<sup>19</sup>

In additon to Vecor, *Polyagg Pty Ltd* are an interested player with developed technology in the NSW coal-ash reuse space, specifically for the manufacture of geopolymer cement.

Finally, the *Australian Manufacturing Workers Union* make recommendations to the Public Works Inquiry about the nature and specifics surrounding hyphothetical employment of its members in a coal-ash reuse industry, writing "...This study should consider the broader opportunities in estalishing a tripartitie approach, engaging community, union and bissiness in developing a proper response to environmental issues and the transiton away from fossil fuels."<sup>20</sup>

#### Summary

Whilst water pollution and coal-ash waste are not totally synchronous with renewable energy production or the sustainibility of supply, the presence of and pollution from coal-ash waste in Australia is one of the major cumulative (and contemporaneous) environmental and public health issues stemming from themal coal generation, overseen by both State Government and the private owners for many decades.

As sustainable sources of energy supply are identifed and established, Government and operators could cooperate to find solutions to the environmental issues for which they are liable presented by the current energy system, while also bringing new economic opportunties to coal-energy regions in transition.

The future of our electricity sector must be responsive to a changing climate, sensitive to the need to rehabilitate, repurose and reconsider polluted ecosystems and land, as well as the sectors workforce and broader communites facing uncertainty.

In NSW, there is strong interest and the neccessary expertise readily available for the establishment of a manufacturing industry capable of beneficially reusing coal-ash waste for the benefit of the economy and environment.

The HCEC believes that with Government support there is scope for coal-ash recycling in NSW to underpin the development of sustainable manufacturing industries across the state, providing economic stiumulus at this key moment bought about by COVID-19 and into the future when employment in electricity generation from thermal coal declines.

# Recommendations

To address the expanded terms of reference relating to COVID-19 economic adaption, the HCEC adds Recommendation 5 to those listed in our original submission and reiterated below:

 The EPA launch a full investigation into coal ash disposal and reuse, including the identification and publication of the concentrations of heavy metals in NSW coal ash to determine the environmental risks and whether all its current applications are appropriate for a hazardous waste.

<sup>&</sup>lt;sup>19</sup> Origin, Eraring Power Station Long Term Ash Management Strategy (LTAMS), March 2020

<sup>&</sup>lt;sup>20</sup> AMWU, Cost of remediation of sites containing coal-ash, SUBMISSION, Feb 2020

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- 2. The NSW Government launch an investigation into possible safe commercial uses of coal ash and look to incentivise new on-site industries around safe coal ash reuse as a means of ridding the heavy metal burden of coal ash landfills, rehabilitating coal ash dams and providing affected workers with alternative employment when the State's coal-fired power stations are decommissioned.
- 3. The EPA revoke the Coal Ash Exemption 2014 and ensure NSW power station operators obtain a 'Waste storage hazardous, restricted solid, liquid, waste licence for ash dams and a 'Hazardous waste recovery licence for its beneficial reuse.
- 4. To reduce the amount of coal ash dumped in ash dams in NSW and encourage its safe reuse, the NSW Government list coal ash as an assessable pollutant in Schedule 1 of the Protection of the Environment Operations (General) Regulation 2009, and the EPA impose a load-based licence fee of at least \$20 a tonne on all coal ash disposed of in ash dams, landfills, and mine voids; and review load-based license calculations and amend them to reflect the pollutants discharged and additional water pollutants including arsenic, cadmium, chromium, copper, lead, and zinc be added to Water Pollutants in Schedule 1 of the Protection on of the Environment Operations (General) Regulation 2009 under the heading "generation of electrical power from coal"
- 5. To stimulate regional, economic development in response to the COVID-19 pandemic, changing electricity markets and to address environmental contaminaton issues from "generation of electrical power from coal", the NSW Government establish policies and a framework to incentivise environmental rehabilitation/remediation works at these sites.

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