



**Done &**

**Dusted?**

**Cleaning up coal**

**ash in Port Augusta**

# Contents

---

Section 1: <b>Executive Summary</b> .....	3
Section 2: <b>Introduction</b> .....	5
Section 3: <b>The Augusta Power Stations</b> .....	9
Section 4: <b>Dust in the Wind</b> .....	14
Section 5: <b>Best Practice Rehabilitation</b> .....	17
Section 6: <b>Conclusions and Recommendations</b> .....	21
References .....	22

---

## Disclaimer

This report was prepared by Greenpeace Australia Pacific staff with technical advice provided by Murrang Earth Sciences. The research is based solely on publicly available information. Both the South Australia Environment Protection Authority (SA EPA) and Flinders Power were given an opportunity to comment on a draft of the report. The SA EPA provided useful feedback and clarified a number of important issues. Flinders Power responded only to reject the findings of the report and did not identify any specific factual errors.

**For more information contact: [support.au@greenpeace.org](mailto:support.au@greenpeace.org)**

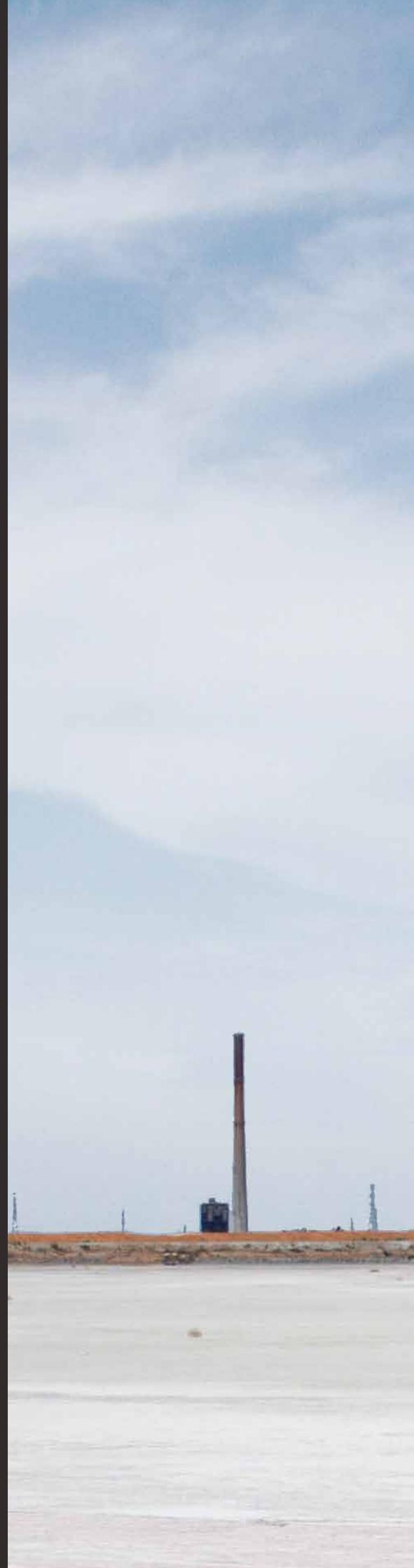
**Published March 2018 by:**  
Greenpeace Australia Pacific  
Level 2, 33 Mountain Street  
Ultimo NSW 2007  
Australia

© 2018 Greenpeace

[greenpeace.org/australia](http://greenpeace.org/australia)

Front cover image © Zoe Deans / Greenpeace

Printed on 100% recycled post consumer paper.



# Executive Summary

On 22 April 2016, Australia signed the Paris Climate Agreement, which was designed to strengthen the United Nations Framework Convention on Climate Change (UNFCCC). To meet the objectives of this agreement, Australia will need to organise a phase out of both coal production and consumption assets. The speed of the transition to renewables is the subject of ongoing political contestation, but the fact that a transition is already occurring, and is ultimately inevitable (as the costs of renewable energy technologies fall), is not open for serious debate. However, as the Centre for Social Change argues, what is not inevitable is whether the transition “happens in a way that protects the welfare of workers and captures the benefits of the energy transformation for the affected communities and Australia as a whole.”<sup>1</sup>

This report highlights the experience of one community—Port Augusta, South Australia—in the aftermath of the closure of a coal-fired power station and mine. The transition has not been an easy one for the community, as a result of poor planning by the State Government and the mismanaged rehabilitation of the site by Flinders Power. In exposing these failings and highlighting what can be done to improve the situation, Greenpeace Australia Pacific hopes to support local demands for full and proper site rehabilitation to ensure that the community has a clean and healthy future. Additionally, although it shines a light on only one municipality, the report aims to raise awareness about the costly legacy of coal that many other cities and towns will have to address in the near future. The report focuses on the disposal and management of coal ash, which despite being one of the most significant forms of waste in the world, has received little attention within Australia to date.



**“When the coal-fired power plant closed, it felt like we were wiped off Australia’s map—like they’d pulled the plug on us. We were left floundering, wondering what will happen. Nobody wanted to listen to us, and that was the most frustrating thing.”**

**Nicolette Fitzgerald**

(recently retired nurse and midwife at Port Augusta hospital, resident of Port Augusta for 49 years)

# Introduction

On 1 January 2017, many Australians woke up with a hangover after their New Year's Eve celebrations. However, for the residents of one town in South Australia, the feeling of ill-health was of a very different nature.

Port Augusta was facing a hangover brought on not by a night of festivities, but by more than sixty years of coal mining and coal-fired power generation at their doorstep. Coal dust from the recently closed Northern Power Station was blowing over the town, and into the lungs of Port Augusta's fourteen thousand residents. It was not the first time that locals had to close up their windows and doors and consider donning a face mask when venturing outside, and unfortunately, it would not be the last.

This report tells the story of what happened in the following year and what the future may hold for the town if further action by the South Australian Government is not taken. While some aspects of Port Augusta's story are unique (e.g. the dry, hot and windy climate makes it a particularly challenging place to rehabilitate a coal ash dam) in many respects it can be seen as one in a long list of communities that will have to deal with the harsh reality that the negative impacts of coal combustion do not end when a power station is closed. The residents of Port Augusta are acutely aware of this. Dr Amanda Bethell, a local resident and Royal Australian College of General Practitioners GP of the Year 2017, notes that how the transition away from coal is managed in Port Augusta "will set a precedent" for other communities in the country. Similarly, Brett Prentis, who worked at the Northern Power Station for 29 years, suggests: "As more coal-fired power stations are decommissioned, we [Port Augusta] are going to set a benchmark for what is required to rehabilitate a power station site."

In recent years, a number of coal-fired power stations in Australia have closed based on the commercial decisions of their corporate owners. Factors that contribute to the decision to close a station include: its age; looming maintenance costs; the capacity factor at which the station is operating; and corporate strategy including managing reputation.<sup>2</sup> According to a briefing by the energy company AGL, one can assume an average design life of thermal coal power stations of 25–30 years.<sup>3</sup> On this basis, the majority of Australia's operating stations (see Table 1) are close to or past their useful life. This means that there will be a number of closures in the next decade regardless of any developments in the government's climate policy. Advance planning is required to ensure that workers and communities are not left in the lurch when companies announce, on very short notice, that they will close a power station or mine.

**As noted by the Electrical Trades**

**Union of Australia:**

**"Whether you think Australia's fleet of coal-fired power stations will or should be shut down over the next 5 years, 15 years, or 30 years, one thing is clear. The foundations of a post-coal future must be put in place today if affected workers and communities are to thrive through the transition."**<sup>4</sup>



**...mines and power stations also  
leave a large environmental footprint  
and the issue of site rehabilitation  
must be taken into consideration  
in transition planning.**

Photo: Bird Lake in Port Augusta.  
© Zoe Deans / Greenpeace

Much of the discussion around the need for a “just transition” for communities focuses on issues of employment. However, mines and power stations also leave a large environmental footprint and the issue of site rehabilitation must be taken into consideration in transition planning.

In Port Augusta, there are two major sites requiring rehabilitation. The first is Bird Lake, which has rapidly dried out in the absence of flow of discharge water from the power station. This has created offensive odours and mass breeding of insects. While of serious concern, this report does not cover the Bird Lake rehabilitation, as the local council has already commissioned expert advice on how it should be dealt with.<sup>5</sup> The second site requiring reclamation is a large (273 ha) ash dam.

Coal ash is a specific type of tailings produced as a by-product of the combustion of coal in power stations. Coal ash is one of the most significant forms of waste in the world, with 780 million tonnes of coal ash generated globally in 2010.<sup>6</sup> Ash from coal power stations is typically disposed of in tailings dams (ash dams) in the form of wet slurries or as dry ash.<sup>7</sup> Fly ash (ash derived from exhaust gas) is a significant component of coal ash and is typically the dominant source of dust due to its homogenous consistency and fine particle size. It is very susceptible to becoming airborne if allowed to dry and be exposed to windy conditions. Issues with dust control around ash dams are not uncommon. In 2016, ash from the Eraring power station at Lake Macquarie blew into nearby neighbourhoods.<sup>8</sup> Coal ash dust has also caused

environmental incidents in towns and cities in other parts of the world, including Ankara (Turkey),<sup>9</sup> the Firth of Forth (Scotland),<sup>10</sup> Lovett (New York),<sup>11</sup> Eden (North Carolina), Bokoshe (Oklahoma),<sup>12</sup> Jesup (Georgia), the State Correctional Institution Fayette in Pennsylvania,<sup>13</sup> Beijing (China),<sup>14</sup> and the Hexi Corridor (China).

Failure of ash dams and the associated contamination of rivers and wetlands is another issue of increasing concern nationally and internationally. In Australia, Environmental Justice Australia (EJA) has documented ash management failures at Yallourn and Mount Piper power stations, which included an incident that resulted in 8.6 megalitres of ash slurry flowing into the Morwell River.<sup>15</sup> In the US, the Tennessee Valley Authority’s Kingston Dam breach of 2008 triggered the development of new coal ash dam regulations by the Environmental Protection Agency.

As noted in the EJA report, “the poor and unregulated management of coal ash dams and ponds during the operating life of power stations gives little hope for rigorous pollution control during the decommissioning and rehabilitation of closed power stations.”<sup>16</sup> While the issue of mine site rehabilitation has received some attention in Australia in recent years, including being the subject of a Senate Inquiry, the large ash dams that exist at coal-fired power stations have not received the same level of scrutiny. Ash dam regulation in Australia warrants further investigation.

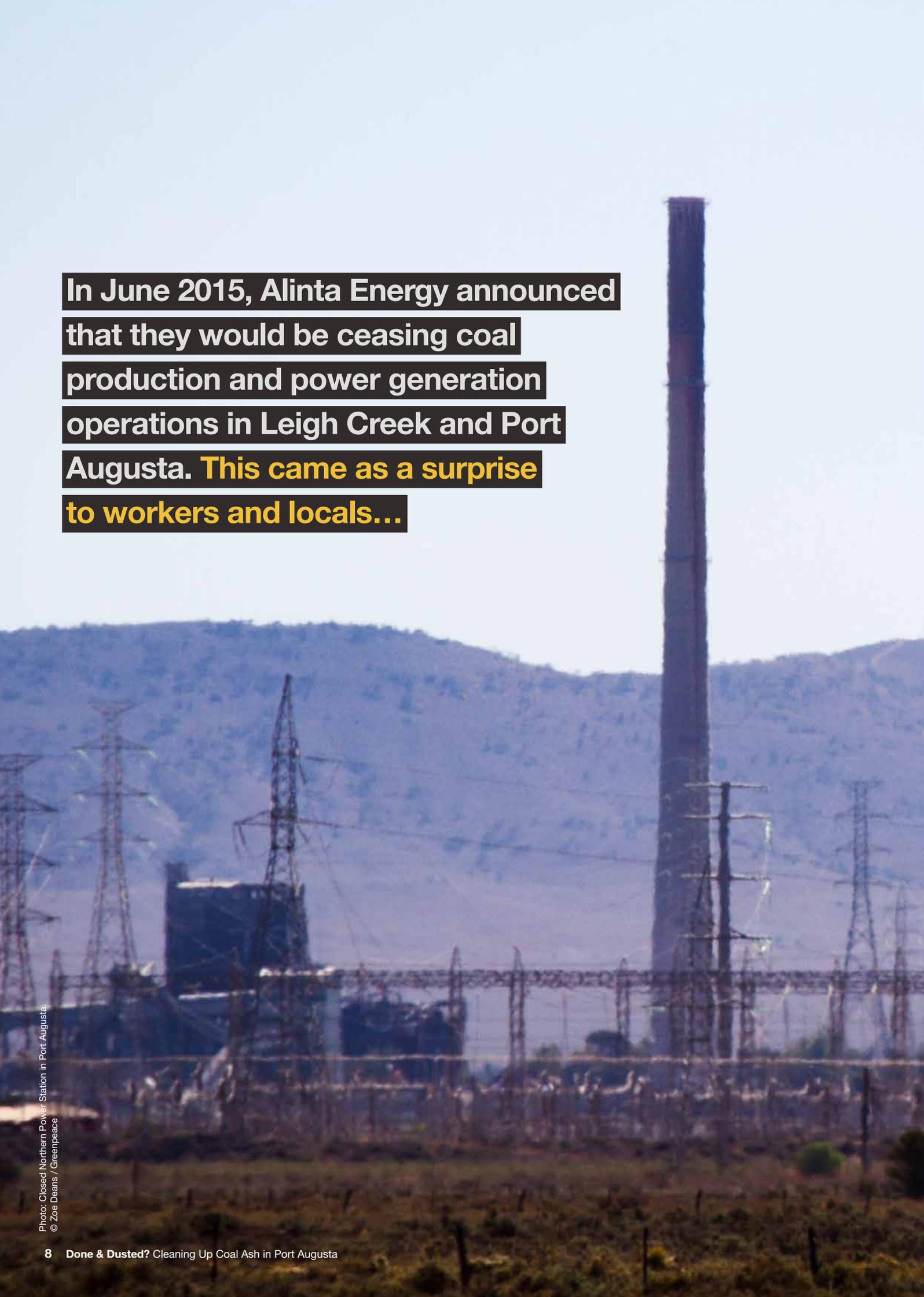
## Table 1: Operating and Closed Coal Power Stations in Australia

State	Power Station	Owner	Capacity (MW)	Year Opened	Year of (actual or expected) Closure	Age (years)*
NSW	Eraring	Origin	2,880.0	1982–84	2032	34–36
	Bayswater	AGL	2,640.0	1982–84	2035	34–36
	Liddell	AGL	2,000.0	1971–73	2022	43–47
	Mt Piper	Energy Australia	1,400.0	1993	?	25
	Vales Point B	Sunset Power	1,320.0	1978	?	40
	Munmorah	Delta Electricity (NSW Gov)	600.0	1969	2012	43
	Redbank	Redbank Energy	143.8	2001	2014	13
	Wallerawang C	Energy Australia	1,000.0	1976–80	2014	38
VIC	Loy Yang A	AGL	2,210.0	1984–87	2040s	31–34
	Loy Yang B	Alinta Energy	1,026.0	1993–96	2040s	22–25
	Yallourn W	Energy Australia	1,480.0	1975, 1982	2032	36–43
	Hazelwood	Engie (72%) Mitsui & Co (28%)	1,760.0	1964–71	2017	46–53
	Morwell	Energy Australia	189.0	1958–62	2014	52–56
	Anglesea	Alcoa	160.0	1969	2015	46
QLD	Callide B	CS Energy	700.0	1989	?	29
	Callide C	CS Energy	810.0	2001	?	17
	Millmerran	Intergen Services	851.0	2002	?	16
	Gladstone	Rio Tinto (42.1%) NRG Energy (37.5%) and others	1,680.0	1976–82	2029	36–42
	Tarong	Stanwell Corp.	1,400.0	1984–86	?	32–34
	Stanwell	Stanwell Corp.	1,460.0	1993–96	?	22–25
	Kogan Creek	CS Energy	750.0	2007	?	11
	Tarong North	Stanwell Corp.	443.0	2002	?	16
	Collinsville	RATCH-Australia Corp.	180.0	1968–98	2012	14–44
	Swanbank B	CS Energy	500.0	1970–73	2012	42
SA	Northern	Alinta Energy	546.0	1985	2016	31
	Playford A/B	Alinta Energy	240.0	1960	2016	56
WA	Collie	Synergy	340.0	1999	?	19
	Blueswaters 1	Sumitomo and Kansai Electric	208.0	2009	?	9
	Blueswaters 2	Sumitomo and Kansai Electric	208.0	2010	?	8
	Muja	Synergy	1,070.0	1981, 1986	2017	38

\* In 2018 or at time of closure if already closed. Source: adapted from Australian Energy Council (2016) *Submission to the Inquiry on the Retirement of Coal-Fired Power Stations*.

 Coal power stations that are still open

 Coal power station that has already closed



**In June 2015, Alinta Energy announced that they would be ceasing coal production and power generation operations in Leigh Creek and Port Augusta. This came as a surprise to workers and locals...**

# 3

## The Augusta Power Stations

Port Augusta is a large town and important regional service centre at the tip of the Spencer Gulf, about 320km from Adelaide. Tourism and electricity generation are the main economic activities in the town.

Commercial coal mining began in Leigh Creek near Port Augusta in 1943. The first power station—Playford A—was commissioned by the South Australian Government in 1954 to burn brown coal from the Leigh Creek mine. The site was subsequently expanded to accommodate a larger power station—Playford B—in 1963. In 1985, the Northern Power Station, an even larger plant, was developed at an adjacent site. Collectively the stations are referred to in this report as the Augusta Power Stations. Combined, the stations provided 35 percent of South Australia's electricity for a period (this dropped to around 15 percent in the final years of operation).

For most of their history, the Augusta Power Stations were controlled by the state. However, after the Electricity Trust of South Australia (ETSA) was privatised in 1999 the Flinders Power Partnership was formed with Flinders Operating Services conducting day to day operations and maintenance. Since 2000, the stations have had a number of different owners. Alinta Energy took ownership of the stations in 2007.

In 2012, the Playford Power Station was mothballed. In June 2015, Alinta Energy announced that they would be ceasing coal production and power generation operations in Leigh Creek and Port Augusta. This came as a surprise to workers and locals—in February of 2014, the company had advised Port Augusta City Council that they expected the power station to operate for another 15 years. The Leigh Creek Mine closed in November 2015. Remaining coal stockpiles continued to be hauled to the Northern Power Station until April 2016. All power generation ceased in May 2016.

**As noted by the Port Augusta City Council:**

**“The closure was virtually without notice and without a planned economic or environmental transition. The resulting loss of jobs, income and disruption to the economy of the region, social reeling and environmental problems has left the community of Port Augusta in duress. The community has been left with the burden of environmental problems that impact directly on the health and image of the city without the funding capacity to address the issues.”<sup>17</sup>**

In July 2016, Alinta Energy transferred all of the assets and liabilities associated with the mine and Augusta Power Stations to Flinders Holdco, a company incorporated in the Cayman Islands in 2015 (formerly known as Alinta Energy Flinders Holdings). Responsibility for decommissioning and rehabilitating the power station sites, including the ash dam, lies with the Flinders Power Partnership (hereafter referred to as Flinders Power), a partnership of three subsidiaries of Flinders Holdco.<sup>18</sup> Flinders Power Holding GmbH is incorporated in Switzerland and has a 50 percent stake in the partnership. Flinders Labuan No. 1 and Flinders Labuan No. 2 are incorporated in Malaysia and each have a 25 percent stake in the partnership. As part of the reorganization, Alinta

**If Flinders Power has been insufficiently resourced to conduct a full and proper rehabilitation of the ash dam and other sites, the result will either be that the taxpayer ends up footing the bill or the community is left in the lurch.**



Power Cat Pty Ltd transferred AUD 135.7 million to the Flinders Group, to allow Flinders Power to “fulfil obligations in relation to the closure [of the mine and Augusta Power Stations], on a solvent, stand-alone basis.”<sup>19</sup>

The restructuring was viewed by the ratings agency Moody’s as “positive based on our understanding that it will insulate [Alinta Energy] from unforeseen liabilities associated with the closure.”<sup>20</sup> While it may have been a positive step for Alinta Energy’s shareholders, it can hardly be seen as such from the perspective of Port Augusta’s residents. The AUD 135.7 million that Flinders Power received from Alinta has to cover a wide range of costs (e.g. ongoing leases, salaries, demolition works). The amount that Flinders Power has spent contracting McMahon Services for demolition and rehabilitation work is confidential.<sup>21</sup>

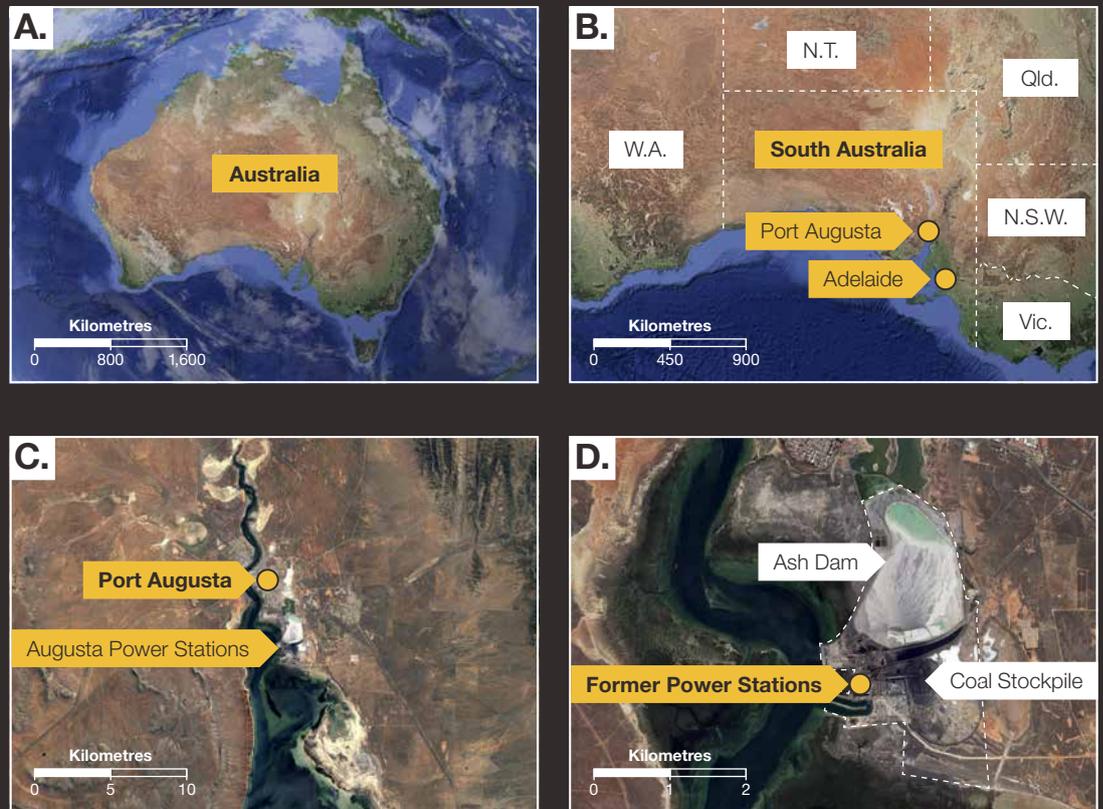
It is beyond the scope of this report to provide an estimate of what full and proper rehabilitation of the Port Augusta ash dam would cost. However, it is worth noting that the owners of the Hazelwood Power Station in Victoria have estimated the cost of rehabilitating that station to be at least \$304

million (close to half of the \$743 million it estimates is necessary to rehabilitate the entire Hazelwood site).<sup>22</sup> If Flinders Power has been insufficiently resourced to conduct a full and proper rehabilitation of the ash dam and other sites, the result will either be that the taxpayer ends up footing the bill or the community is left in the lurch.

According to the 2017 Financial Statements of Flinders Power Holding GmbH, the Partnership will be dissolved and the companies liquidated “as soon as the reorganization measures related to the cease of activities and closure of the operations of the Leigh Creek coal mine township and rail line and the Augusta Power Stations will have been completed.”<sup>23</sup> However, as the following sections detail, there is a need for ongoing monitoring and maintenance of the ash dam site.

The Government of South Australia was consulted on the separation of Alinta Energy from the Flinders Group.<sup>24</sup> The South Australia Environment Protection Authority (SA EPA) confirmed to Greenpeace Australia Pacific that there is no bond or financial assurance mechanism under

**Figure 1**



The Augusta Power Stations Site within which the Ash dam is located, in **A.** Australia; **B.** South Australia; and **C.** Port Augusta. **D.** Sources of dust within the Former Augusta Power Stations Site: adapted from “Fugitive dust trigger action and response plan.” The closest Port Augusta residences are located 750 m north-west of the ash dam. © Google Maps

the *Environment Protection Act 1993* to cover the Port Augusta ash dam rehabilitation should Flinders Power renege on its responsibilities.<sup>25</sup> However, according to the Department of Treasury and Finance, Flinders Power has set up a cash fund for the rehabilitation and the government closely monitors the company’s expenditure and remaining budget.<sup>26</sup> Additionally, the company has provided a letter of credit that will not be returned until the SA EPA signs off on the “completion” of the rehabilitation. However, Treasury is unable to disclose either the amount remaining in the cash fund or the value of the letter of credit because of contractual confidentiality clauses. Flinders Power is at liberty to disclose these amounts should it wish to assuage community concerns that there is insufficient funding for rehabilitation that meets their expectations.

The issue of financial liability for rehabilitation and bonds is one of concern across Australia. Under mining legislation, rehabilitation bonds are a requirement in every state to ensure that the government can cover the costs of rehabilitation if the operator does not fulfil its obligations. Although these bonds are often woefully insufficient,<sup>27</sup>

the situation is worse in the case of power stations, where typically no bonds exist at all. While other financial assurances can be imposed through a State’s environmental protection laws, this does not appear to be a practice adopted in South Australia, New South Wales, Victoria or Queensland.<sup>28</sup> This issue has been raised by the Federal Senate Environment and Communications References Committee, which has noted that:

**“without adequate rehabilitation bonds or provisioning for the costs of rehabilitation there is a real risk that taxpayers will end up bearing the burden of these rehabilitation costs, or alternatively that rehabilitation will not be performed to an adequate standard.”<sup>29</sup>**

# Timeline of events



**For most of their history,  
the Augusta Power Stations  
were controlled by the state.**

# 2010s

2014

## February

Alinta Energy states Augusta Power Station has another 15 years of operation left.

2015

## June

Alinta Energy announces the closure of the Flinders Operations in South Australia.

## October

Council raises ash dam and Bird Lake concerns at Port Augusta Alinta Advisory Committee Meeting.

## November

Coal mining ceases at Leigh Creek Mine.

2016

## April

Last coal haulage of Leigh Creek coal stockpiles.

## May

Power generation at Port Augusta Power stations ceases.

## July

Large scale demolition of the Augusta Power Stations commences.

## July/August

Port Augusta experiences dust events.

## October

SA EPA approves Flinders Power's Closure and Post-Closure Plan.

## November

SA EPA approves Dust Management Plan; commencement of chemical dust suppressant application to ash dam.

2017

## January

A major dust event occurs after strong winds blow dust across Port Augusta; SA EPA issues Flinders Power with and Environment Protection Order; chemical dust suppressant is reapplied.

## March

SA EPA approves Ash Dam Rehabilitation Plan; top soil coverage of ash storage area commences.

## June

Native vegetation seeding commences.

## December

High winds result in another dust event.

2018

## February

Soil spreading to recommence.

## April

Vegetation seeding to recommence.

## June

Demolition works expected to be completed.

# 4

## Dust in the Wind

Australians are increasingly aware that operating coal power stations release toxic pollution into the air and that the health impacts of this are particularly severe for the communities surrounding these sites.

People who live within 50km of a coal-fired power station face a risk of premature death as much as three to four times that of people living further away.<sup>30</sup> Doctors for the Environment Australia reviewed air quality data in Port Augusta during the time that the Augusta Power Stations were in operation and concluded that “the community was exposed to excessive amounts of pollution.”<sup>31</sup>

What is less well-known, at least outside of Port Augusta, is that coal power stations can continue to cause health impacts even after they have ceased operations. In the case of Port Augusta, continual wind-erosion of the ash dam has generated dust events which have impacted the community since the closure of the Augusta Power Stations. Initially, seawater was used in an attempt to suppress the dust, but this was deemed ineffective. Chemical dust suppressants were used to control dust events from November 2016 until late 2017. Between 24 and 28 December 2016, severe storms dumped 60 mm of rain on the ash dam and compromised the chemical dust suppressant seal.<sup>32</sup> Aircraft were unavailable for aerial application of dust suppressant at the time. Rapid desiccation of the ash dam followed the storms and led to a major dust event in Port Augusta between 1 and 2 January 2017. This dust event occurred despite:

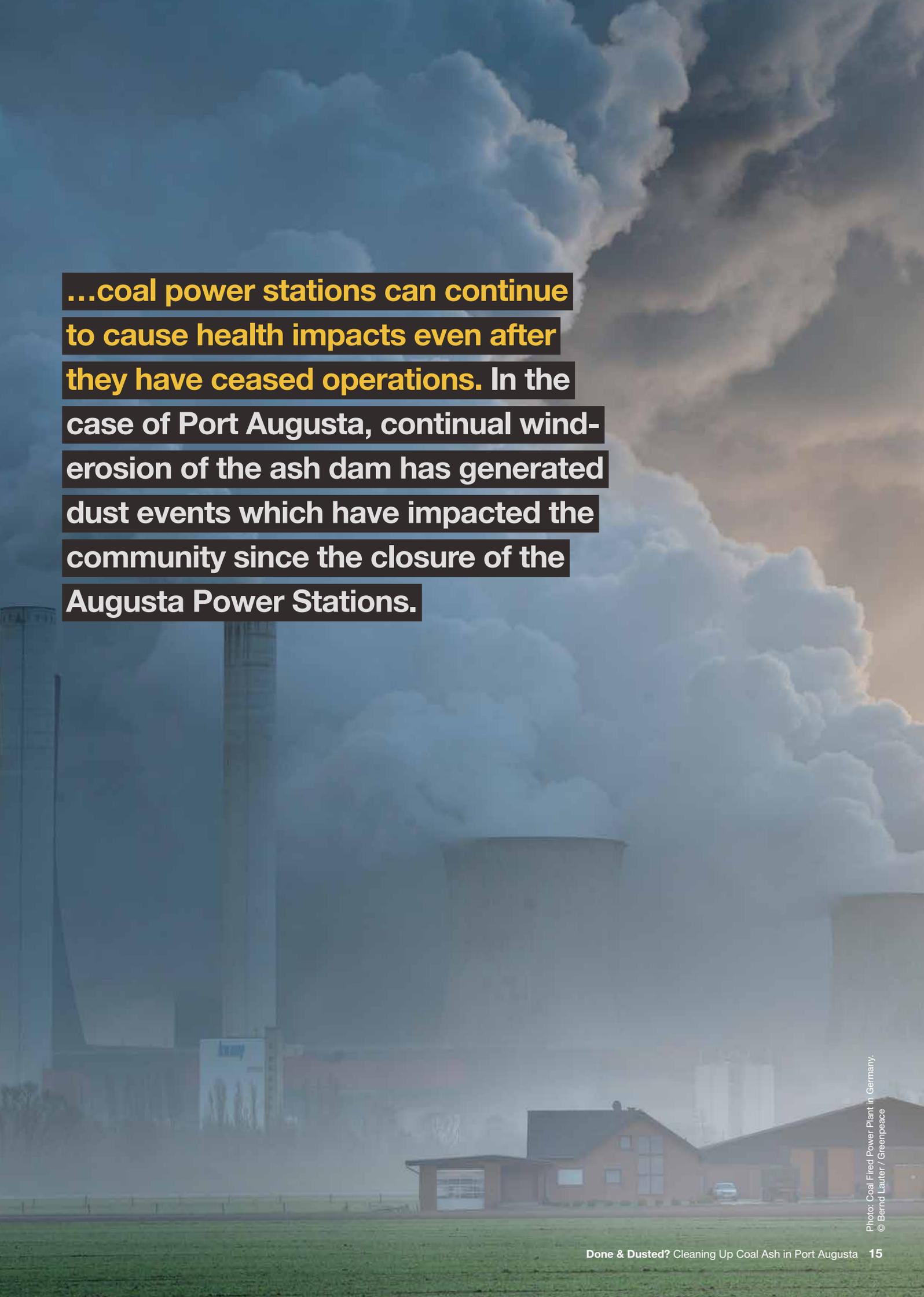
- application of the chemical dust suppressants being supervised by a representative of Vita Chemicals, and their assurance that the seal would last 12 months<sup>33</sup>
- a commitment by Flinders Power to closely monitor forecasts for high winds or severe events and to act upon these forecasts to minimise negative impacts to human health and the environment<sup>34</sup>

- monitoring and reaction processes for public holidays and minimum personnel requirements being outlined<sup>35</sup>
- substantial rain and pooling of water on top of the dam immediately prior to the wind erosion event<sup>36</sup>

Reapplication of dust suppressant to the dam began via truck on 2 January 2017 and via aerial spraying on 4 January 2017. Flinders Power was required by SA EPA to undertake nine additional measures in relation to dust management, including providing them with daily updates, as a result of the 2017 New Year’s dust event.

During the dust event, locals complained of skin irritation, problems breathing and the exacerbation of conditions such as asthma. For many, there was also a bigger concern that with every breath of the foul air, their risk of cancer and other diseases would rise. The community also expressed concerns about the lack of communication from authorities and limited access to data about air quality. The company’s air monitors were only operating one in every six days and some of them not working at all when the dust was at its worst. The SA EPA ensured that Flinders Power improved the monitoring network. Additionally, to assist the community, Greenpeace Australia Pacific brought in an independent air quality monitoring device that could be run by locals.

While improved monitoring was welcomed, ultimately what the community wanted was a permanent solution to the problem of dust. Chemical suppressants were always considered to be a temporary measure. Unfortunately, rehabilitation of the site has progressed much slower than planned (see further next section) and another major dust event occurred during Christmas 2017. Periods where dust exceeded the threshold of 50 µg per cubic metres over 24 hours occurred on 18 and 27 December 2017, and 6 January 2018.<sup>37</sup> Unlike the previous New Years event, dust in the Christmas 2017 event was primarily sourced from topsoil placed on the ash dam and surrounding areas, and from the coal stockpile area.



**...coal power stations can continue to cause health impacts even after they have ceased operations. In the case of Port Augusta, continual wind-erosion of the ash dam has generated dust events which have impacted the community since the closure of the Augusta Power Stations.**



**“We don’t want good enough,  
we want the very best for  
our town and our planet.”**

**Dr Amanda Bethell, Royal Australian College  
of General Practitioners GP of the Year 2017**

## Best Practice Rehabilitation

The 273 ha Augusta ash dam, which is up to 15 m deep in some places, represents a significant challenge in terms of rehabilitation. While, as discussed further below, the hot, arid and windy climate is partially to blame, there has also been a systemic failure in terms of the planning and design of the site.

Critically, having the ash spread over a vast expanse is a fundamental flaw in light of the local climate. Smaller compartmentalised structures built across the wind would have reduced opportunities for erosion and dust creation and also would have facilitated a logical and staged approach to rehabilitation where some structures could be decommissioned and rehabilitated whilst others are commissioned and operated. In addition to minimising the overall exposure footprint for wind erosion events, such a design would have also made the use of chemical suppressants far easier and more effective (e.g. not requiring aerial application over a period of two weeks as is the case with the current site).

Although such a design would have ideally been implemented from the beginning of operations, the Augusta ash dam could also have been retrospectively compartmentalised by construction of rock dam walls across the prevailing winds to create a shorter fetch length for wind to contact the surface and mobilise sediments. This might not have been possible prior to early 2017 because the previous use of seawater at the site rendered much of it unsafe and inaccessible. However, such a plan could have been implemented as part of the rehabilitation works when they commenced.

The rehabilitation plan that is currently being implemented by Flinders Power is to cap the ash dam with a thin layer of soil and seed it with vegetation. Capping layers for tailings dams, including ash dams, need to be tailored to suit

site conditions in order to minimise human health and environmental risks.<sup>38</sup> The design of capping layers must account for site topography, hydrogeology, geotechnical factors, climate, and tailings characteristics.<sup>39</sup> Key hazards in the design of capping layers include rain-induced erosion of the outer face of the dam wall, failure of spillways, overtopping of rainfall runoff, and failure of the cover system.<sup>40</sup>

Sandy soils, such as those in Port Augusta, require at least 50 percent vegetation cover to prevent or significantly reduce soil erosion. The effectiveness of top soil application and success of revegetation over the long term depends on the volume and depth of top soil and especially where salinity is a factor, interactions with previous site and soil conditions.

According to the Ash Dam Rehabilitation Plan, soil nutrients and toxicity were accounted for by Flinders Power and McMahon Services (the contractor in charge of implementing the plan).<sup>41</sup> The planned soil depth across the site was 150 mm and seeding of this soil was expected to be completed by July 2017. By August 2017, only 180 ha of the 273 ha Ash Dam was capped with topsoil. Of this, 140 ha had been seeded with site-specific vegetation.<sup>42</sup>

In addition to proceeding much more slowly with the rehabilitation than indicated to the community, Flinders Power does not appear to have met best practice in terms of considering all of the specific challenges of the site. For example, the location of the ash dam adjacent to the Gulf of Spencer means that the site is subject to powerful winds which have moved along the sea surface with no impediment for perhaps many hundreds of kilometres. Given the site is located in a windy and arid environment, an increase in surface roughness is considered of high importance for slowing wind and decreasing erosion. Little surface roughness appears to occur on the topsoil surface of the ash dam, making it highly prone to wind erosion.



**“I don’t believe  
that their [Flinders]  
best practice is the  
community’s best  
practice.”**

**Brett Prentis**

Former Northern Power Station employee  
(worked at power station for 29 years)

Photo: Wildlife in Port Augusta  
© Lisa Causby

The addition of features such as rocks or rocky material or ponding/water diversion over the topsoil capping layer should be considered to minimise wind erosion of the topsoil. The use of wind-breaks would also protect plants while they grow and provide another line of defense should vegetation fail to thrive.

A further consideration concerns the past use of seawater to suppress dust. This has reduced the structural integrity of soils at the dam site. The soils are less stable at the site compared to ash dams where freshwater has been used.<sup>43</sup> Most significantly however, the addition of saltwater has likely created saline conditions which has implications for revegetation. Capillary rise is the action by which saline groundwater wicks upwards through the soil profile to the surface, where it evaporates leaving salt on the soil surface.<sup>44</sup> Capillary rise is a key driver for dryland salinity in many parts of Australia, including at previous tailings dam sites where ground water containing dissolved salts can be wicked to the surface from depths of up to two metres below the soil surface.<sup>45</sup>

It is questionable whether the 150 mm depth of top soil will be sufficient to overcome the long-term effect of capillary rise. The slow accumulation of salt to toxic concentrations in soils can mean that the impact of salinity on plant growth (in the form of plant die-back) could take many years to become apparent. While the site has been revegetated with a number of alkaline and salinity

tolerant plants,<sup>46</sup> with some plants even established directly in the ash of the dam itself,<sup>47</sup> all plants have salinity and pH limits.<sup>48</sup> Plant mortality can occur with any species once critical thresholds are exceeded. Should the plants die, the soils on top of the ash dam will again become a source of dust to Port Augusta and require further rehabilitation management. Monitoring of the site would be required to ensure that issues with plant die-back are managed promptly. Geotechnical solutions to mitigate the issue of salinity and plant die-back should be considered. The application of a capillary break layer overlaid with a non-shedding, vegetated growth medium would minimise the risk of salinisation in the topsoil capping layer. This is considered to be the optimal capping design for the ash dam.<sup>49</sup>

Although this report has focused primarily on dust, it should also be noted that it is standard practice internationally<sup>50</sup> (it is a requirement in the US) for ash dams to be lined with an impermeable layer in order to prevent contaminants leaching into surrounding groundwater systems.<sup>51</sup> It is unclear from the accessible literature if the Port Augusta ash dam has been lined. If this feature is missing, the dam may become a source of groundwater contamination. According to the SA EPA, an accredited site contamination auditor is currently undertaking an assessment of the site to determine the nature and extent of any soil, surface or groundwater contamination at the site.<sup>52</sup>



Photo: Sunset over the Spencer Gulf in Port Augusta.  
© Zoe Deans / Greenpeace

It is abundantly clear that continual monitoring and management of the ash dam will be required post-capping and re-vegetation, to ensure any potential failure of structures or surface erosion does not lead to further wind erosion and dust resuspension and that contaminants do not move off site via groundwater. According to the SA EPA, a Post-Completion Monitoring and Maintenance Plan has been developed that outlines the monitoring required for the next ten years.<sup>53</sup> However, McMahon Services appears to have only been contracted to conduct monitoring for “a two-month monitoring and maintenance phase” at this point.<sup>54</sup> Furthermore, Treasury could not confirm whether the letter of credit that it holds from Flinders Power would be retained for the post-completion/monitoring period. It would seem unlikely that this would be the case, as Flinders Power anticipates that it will be able to relinquish its licence with the SA EPA on completion of the Environmental Closure and Post-Closure Plan, which could be as early as July 2018.<sup>55</sup> It is valid to raise the question of who will conduct and pay for ongoing monitoring and any future rehabilitation works that may be required, especially in light of the fact that Flinders Power plans to dissolve as a corporate entity as soon as decommissioning and rehabilitation efforts are deemed “completed.”

**In summary,** the Port Augusta ash dam presents a very challenging site for rehabilitation. The existing plan of spreading a very thin amount of soil on the surface and hoping that plants will thrive and thereby prevent further erosion and dust incidents, is inadequate. Furthermore, the extent of contamination of the soil, surface and groundwater at the site is not yet known. If further actions are not taken to improve the rehabilitation plan and ensure that it is fully funded, there is a high risk of negative impacts to human health and/or the environment in the future.

**“Port Augusta is transitioning from an industrial town to more of an innovation town with solar-thermal coming on. My dream is that the community has a cleaner, healthier environment to live in.”**

**Matthew Prentis**

Former Power Station Employee



# Conclusions and Recommendations

Although this report has focused on the challenges currently facing Port Augusta, in other respects the town is facing a bright future. In August 2017, it was announced that a 150-megawatt solar-thermal power plant would be built in the town, providing local jobs and a major source of clean energy for the state. This did not come about by accident, but through the dedicated work of locals who banded together under the banner of RePower Port Augusta to make it happen.<sup>56</sup>

Port Augusta's transition is underway—but faces a significant stumbling block in the crumbling power station sites. Port Augusta needs Flinders Power to commit to the full rehabilitation of the ash dam, to a best practice standard, independently verified and in consultation with the community. If, as seems likely, Flinders Power does not step up, it is incumbent on the next Premier of South Australia to meet the full needs of the community, in light of the government's historical responsibility for the site and the role that it has played in permitting Alinta Energy to insulate itself from liability.

## **Additionally, we recommend the following:**

1. That Flinders Power immediately discloses how much funding it has remaining to complete the rehabilitation of the ash dam and the value of the letter of credit that it has provided the South Australian Government;
2. That Flinders Power clarify to the community what funding has been set aside for the post-completion monitoring period and whether the letter of credit will be retained by the government for this 10 year period;
3. That the following improvements be made to the ash dam rehabilitation plan:
  - a. The addition of rocks and other features to minimise wind erosion of the topsoil;
  - b. The introduction of windbreaks around the site to protect plants while they grow and provide another line of defense should vegetation fail to thrive; and
  - c. The application of a capillary break layer overlaid with a non-shedding, vegetated growth medium to minimise the risk of salinisation in the topsoil capping layer.
4. That federal and state energy ministers undertake a national audit to assess the costs of decommissioning and rehabilitating Australia's coal-fired power stations, including ash dams, consistent with best practice;<sup>57</sup>
5. That all states impose bonds or financial assurance requirements on all coal-fired power stations, their ash dams and associated infrastructure that reflect the costs determined by the national audit, with full transparency so that affected communities and taxpayers can be confident that they will not be left footing the bill for rehabilitation.<sup>58</sup> Alternatively, that a site rehabilitation levy be imposed on all Australian coal to generate funds to cover rehabilitation costs.<sup>59</sup>

## References

---

- 1 Centre for Social Change (2016) *Submission to the Senate Inquiry into the Retirement of Coal-Fired Plants*, <http://www.aph.gov.au/DocumentStore.ashx?id=92410ecc-ff56-4a2d-908c-c16d378313a2&subId=459848>
- 2 Environment Victoria (2016) *Submission to Inquiry into Retirement of Coal Fired Power Stations* <http://www.aph.gov.au/DocumentStore.ashx?id=ba2617a6-0adf-48ce-a493-3fb2f499625f&subId=459945>
- 3 Nelson, T., Reid, C. and J. McNeill (2014) *Energy-Only Markets and Renewable Energy Targets: Complementary Policy or Policy Collision?* AGL Applied Economic and Policy Research Working Paper No.43, <http://agblog.com.au/wp-content/uploads/2014/08/No-43-energy-only-and-renewable-targets-FINAL.pdf>
- 4 Electrical Trades Union of Australia (2016) *Submission to Inquiry into Retirement of Coal Fired Power Stations*, <http://www.aph.gov.au/DocumentStore.ashx?id=4716c755-63a5-4246-b11d-54b6f48d789b&subId=459760>
- 5 Reid, K. "Report suggests filling in parts of smelly lake near former SA power station," *ABC News*, 23 May 2017. <http://www.abc.net.au/news/2017-05-23/future-of-port-augustas-smelly-lake-assessed/8548494>
- 6 Zhang, X. (2014) *Management of Coal Combustion Wastes*, IEA Clean Coal Centre, [https://www.usea.org/sites/default/files/012014\\_Management%20of%20coal%20combustion%20wastes\\_ccc231.pdf](https://www.usea.org/sites/default/files/012014_Management%20of%20coal%20combustion%20wastes_ccc231.pdf)
- 7 Ibid.
- 8 Lipski, B., Rivers, N. and J. Whelan (2017) *Toxic and Terminal: How the Regulation of Coal-Fired Power Stations Fails Australian Communities*, Carlton, VIC: Environmental Justice Australia, [https://envirojustice.org.au/sites/default/files/files/EJA\\_CoalHealth\\_final.pdf](https://envirojustice.org.au/sites/default/files/files/EJA_CoalHealth_final.pdf)
- 9 Çelikkan, E. "Popular national park faces coal-ash cloud threat." *Hurriyet Daily News*, 18 July 2015.
- 10 Nurwan, G. "Fife villagers warned of arsenic dust clouds." *The Times*, 15 May 2017; Stenson, J. "Toxic waste fears over airborne dust cloud." *Scottish Daily Mail*, 15 May 2017.
- 11 Agency for Toxic Substances and Disease Registry (2009) *Lovett Coal Ash Landfill*, Stony Point, Rockland County, New York.
- 12 Lombardi, K. "The EPA could have protected these people from breathing coal dust every day. So why didn't it?" *Huffington Post*, 30 June 2016.
- 13 DeKok, D. "Coal ash blamed for cancer at Pennsylvania Prison." *Scientific American*, 2014.
- 14 Zhang, see note 6 above.
- 15 Lipski et al., see note 8 above.
- 16 Ibid.
- 17 Port Augusta City Council (2016) *Submission to the Parliamentary Inquiry into the Retirement of Coal-Fired Power Stations*, <https://www.aph.gov.au/DocumentStore.ashx?id=a69472dd-4175-476a-b850-1ad462f48b3e&subId=459879>
- 18 Alinta Energy (2016) Sustainability Report 2015/16, <https://www.alintaenergy.com.au/Alinta/media/Documents/Sustainability-Report-2015-16-WEB.pdf>
- 19 Flinders Power Holdings GmbH, Kusnacht, "Financial Statements 2017," in *Statement to Verify Financial Statements of a Foreign Company*, Australian Securities and Investments Commission (ASIC) Form 405.
- 20 Moody's (2017) "Alinta Energy Finance Pty Ltd—Alinta Energy Finance Pty Ltd: Credit Opinion—Update following announcement regarding acquisition by CTFE," <https://www.finanzen.net/nachricht/anleihen/alinta-energy-finance-pty-ltd-alinta-energy-finance-pty-ltd-credit-opinion-update-following-announcement-regarding-acquisition-by-ctfe-53980113>
- 21 McMahon Services, *Project Profile Augusta Power Stations Ash Storage Area Rehabilitation* (n.d.) [https://www.mcmservices.com.au/wp-content/uploads/2017/10/7442\\_pdf.pdf](https://www.mcmservices.com.au/wp-content/uploads/2017/10/7442_pdf.pdf)
- 22 Asher, N. "Hazelwood rehabilitation estimated to cost \$743 million but may rise, Engie says," *ABC News (online)*, 20 January 2017, <http://www.abc.net.au/news/2017-01-20/hazelwood-rehabilitation-to-cost-743-million-engie-says/8197784>
- 23 Flinders Power Holdings GmbH, see note 19 above.
- 24 Ibid.
- 25 Personal communication from Katie Williams, Senior Environment Protection Officer, South Australia Environment Protection Authority, 14 February 2018.
- 26 Personal communication from John Strawbridge, South Australia Department of Treasury and Finance, 23 February 2018.
- 27 Denniss, R. and R. Campbell (2015) *Two Birds, One Little Black Rock: Solving the Twin Problems of Incentives for Retirement of Coal Fired Generation and Funding Rehabilitation Liabilities*, Canberra: The Australia Institute, <http://www.tai.org.au/sites/default/files/P157%20Two%20birds%20one%20little%20black%20rock%20%5BPRINT%5D.pdf>
- 28 Lipski et al, see note 8 above.
- 29 Environment and Communications References Committee (2017) *Retirement of Coal Fired Power stations: Final report*, Canberra: Commonwealth of Australia.
- 30 Lipski et al, see note 8 above.

## References (continued)

---

- 31 Doctors for the Environment Australia (2016) *Submission to the Senate Committee into the Retirement of Coal-Fired Power Stations*, <https://www.aph.gov.au/DocumentStore.ashx?id=387b90c9-2786-4858-a01d-4532a5212e4e&subId=460057>
- 32 South Australia Environment Protection Authority (2017) *Response to Dust Events from the Port Augusta Power Stations Site*.
- 33 Flinders Power & McMahon Services (2017) *Ash Dam Rehabilitation Plan*.
- 34 Flinders Power (2017) *Fugitive Dust Trigger Action and Response Plan*.
- 35 Ibid.
- 36 South Australia Environment Protection Authority, see note 32 above.
- 37 South Australia Environment Protection Authority (2018) "Port Augusta Power Stations Site (Flinders Power)," [http://www.epa.sa.gov.au/business\\_and\\_industry/industry-updates/flinders-power-port-augusta](http://www.epa.sa.gov.au/business_and_industry/industry-updates/flinders-power-port-augusta)
- 38 Victoria State Government (2016) "Management of tailings storage facilities" in *Earth Resources Regulation*, <http://earthresources.vic.gov.au/earth-resources-regulation/licensing-and-approvals/minerals/guidelines-and-codes-of-practice/management-of-tailings-storage-facilities>
- 39 Ibid.
- 40 Williams, D. et al. (2016) *Tailings Management*. Canberra: Commonwealth of Australia.
- 41 Flinders Power & McMahon Services, see note 33 above.
- 42 South Australia Environment Protection Authority, see note 32 above.
- 43 New South Wales Office of Environment and Heritage (2017) *Environment Compliance Report: Coal Ash Dams and Emplacements*.
- 44 Williams et al., see note 40 above; Department of Infrastructure Planning and Natural Resources (2005) *Groundwater Basics for Understanding Salinity*. Sydney: Government of NSW.
- 45 Williams et al., see note 40 above; Victoria State Government, see note 38 above.
- 46 South Australia Environment Protection Authority (2018) Flinders Power Site; Flinders Power (2016) *Revegetation Management Plan*.
- 47 Flinders Power & McMahon Services, see note 33 above.
- 48 Peverill, K., Sparrow, L. & Reuter, D. (1999) *Soil Analysis: An Interpretation Manual*. Canberra: CSIRO Publishing.
- 49 Williams et al., see note 40 above.
- 50 Bongers, G. (2015) *Coal Combustion Products*, Ash Development Association of Australia.
- 51 United States Environmental Protection Authority (2017) *Coal Combustion Residuals State Permit Program Guidance Document: Interim Final*.
- 52 Personal communication from Tony Circelli, Chief Executive, South Australia Environment Protection Authority, 22 February 2018.
- 53 Ibid.
- 54 McMahon Services, see note 21 above.
- 55 Flinders Power Partnership (2017) Environmental Closure and Post Closure Plan, Augusta Power Stations, [http://www.epa.sa.gov.au/files/13246\\_port\\_augusta\\_closure\\_plan\\_sep2017.pdf](http://www.epa.sa.gov.au/files/13246_port_augusta_closure_plan_sep2017.pdf)
- 56 Repower Port Augusta: <https://repowerportaugusta.org/>
- 57 This recommendation echoes that made in Lipski et al, see note 8 above. Note that this recommendation is also consistent with Recommendation 6 of the Senate Environment and Communications References Committee in their Final Report on the Retirement of Coal Fired Power Stations (see note 29 above) which reads: "The committee recommends that the Commonwealth and state energy ministers should undertake a national audit of likely rehabilitation costs for existing coal mines and power stations and assess these costs against the current provisions or bond arrangements."
- 58 Ibid.
- 59 As recommended in Denniss and Campbell, see note 27 above.



Greenpeace is an independent global campaigning organisation that acts to change attitudes and behaviour, to protect and conserve the environment and to promote peace.

## **GREENPEACE**

### **Greenpeace Australia Pacific**

GPO Box 3307, Sydney NSW 2001  
L2, 33 Mountain Street, Ultimo NSW 2007  
ABN: 61 002 643 852  
Ph: +61 2 9281 6100  
Fax: +61 2 9280 0380  
Email: [support.au@greenpeace.org](mailto:support.au@greenpeace.org)

[www.greenpeace.org.au](http://www.greenpeace.org.au)

### **Join Greenpeace**

We do not accept funding from governments or corporations; instead we rely on the goodwill and generosity of people like you to continue our work.

**Call 1800 815 151 or visit**  
[www.greenpeace.org.au/join](http://www.greenpeace.org.au/join)