

15 June 2021

The General Manager  
Singleton Council  
Via email: [council@singleton.nsw.gov.au](mailto:council@singleton.nsw.gov.au)

Dear General Manager,

**Nature Conservation Council Objection to DA183/1993.2 / 5.1993.183.2 at 112 Long Point – West Road, WARKWORTH Lot 450 DP 1119428 for S4.56 Modification to allow use of biomass as a fuel source**

The Nature Conservation Council of New South Wales (NCC) is the state's peak environment organisation. We represent over 160 environment groups across NSW. Together we are dedicated to protecting and conserving the wildlife, landscapes and natural resources of NSW.

NCC opposes this modification and recommends that Singleton Council rejects the application.

The proponent argues that this development is "substantially the same" as the previously approved power station. However the proposed project is a major departure from the conditions upon which the original development was approved. It should therefore undergo a full development approval process, where the significant impacts on forests, truck movements, air quality and greenhouse emissions can be thoroughly considered.

As proposed, the Redbank Biomass Power Station (also known as Verdant Power Station) will rely upon forest derived fuel to produce electricity.

Burning native forest biomaterial for energy is strongly opposed by conservation groups due to its harmful effects on threatened species and the climate. These concerns are laid out in a submission to the Australian Renewable Energy Agency signed by ninety organisations, which is attached as part of this submission.

Specific concerns relating to the Redbank/Verdant Power Station modification are outlined in an open letter signed by thirty organisations, which is also attached to this submission.

Your key contact point for further questions and correspondence is Policy and Outreach Coordinator Ishbel Cullen, available at [icullen@nature.org.au](mailto:icullen@nature.org.au) and 02 9516 4888. We welcome further conversation on this matter.

Yours sincerely,



Chris Gambian  
Chief Executive Officer NCC

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## Summary of recommendations

- That Singleton Council reject the development modification application on the basis that:
  1. The modified development is “substantially different” from the original development and should proceed through a full development application, not a modification.
  2. The modified development is incompatible with the original reasons for consent given in the 1994 Land and Environment case Greenpeace Australia Limited v. Redbank Power Company Pty Limited.
  3. The number of truck trips will increase from an average of 12 per day to 70 per day, and the impacts of this increase on the environment have not been properly assessed by the proponent.
  4. Burning native forest biomass produces more greenhouse emissions than burning coal at the point of combustion. It is incorrect to use accounting methods that claim that recapture of greenhouse gasses by regrowing forests over decades can offset these emissions within the timeframe available to vastly reduce emissions to avoid catastrophic global warming.
  5. The greenhouse gas assessment is incomplete as the greenhouse impacts of truck movements to deliver biomass fuel to the site represent an unassessed impact that would worsen global climate change.



6. Harvesting native forest biomass to supply the proposed development will cause unacceptable environmental harm in the forests of NSW by increasing the intensity of logging.
  7. The modified development would result in an increase of particle pollution, worsening air quality in the region which already suffers from unhealthy air with pollution levels that already exceed the national standards.
- That Singleton Council investigate and consider the average daily truck movements which occurred during the life of Redbank power station to consider if this proposal of an average of 140 daily truck movements poses a significant change in operation of the plant and impact to community.
  - That Singleton Council investigate the impact upon air pollution if Hunter Energy is given approval to burn construction and demolition wood. Ensure that this source of fuel has been considered in the proponent's 'Air quality and Greenhouse Gas impact assessment'.

## 1. Section 4.56 considerations

Section 4.56 of the Environmental Planning and Assessment Act 1979 (EP&A Act) outlines when a consent granted by the Land and Environment Court can be modified and some mandatory considerations of a modification assessment.<sup>i</sup>

### 1.1 The modification is a substantially different development

EP&A Act Section 4.56 (1)(a) requires that the modified development must be “substantially the same” as the approved development.

The original approval by the Land and Environment Court sets out very clear conditions for the Redbank power station, restricting it to function as a power station that burns coal tailings from Warkworth Mine.

The proposed modification will result in a power station that is fundamentally different to the power station that operated under existing approvals and conditions.

Redbank Power Station's existing approval states under Condition 16 that coal tailings are the only fuel source to be used at the power station:

*“At least the majority of the fuel burnt at the power plant in any one year after commercial operation, on a dry tonnes basis, is to be coal washery tailings obtained either directly from the Warkworth and/or Lemington mine washeries or indirectly from tailings storage dams on the Warkworth and/or Lemington mine leases. Coal washery tailings are not to be obtained from mines other than the Warkworth and Lemington Mines without the further approval of Council.”*

The proponent's proposed amendment to this approval condition is a significant departure from the original condition:

*“At least the majority of the fuel burnt at the power plant shall be coal tailings and/or biomass, up to and including the potential use of 100% biomass in any one year, on a dry tonne basis. Coal tailings derived from coal washery tailings shall be obtained directly from the Warkworth mine washery or indirectly from existing tailing storage dams on the Warkworth mine leases. Coal washery tailings are not to be obtained from mines other than Warkworth without the further approval of council.”*

The proponent's SEE outlines “the fuel requirement is substantially the same” as the current Redbank plant approvals and that the burning of biomass will result in an “improved environmental outcome” over the burning of coal<sup>ii</sup> This is misleading.

Changing from burning 700,000 tonnes of coal tailings to burning 850,000 tonnes of biomass per annum poses a significantly different impact for the Singleton LGA community.<sup>iii</sup>

Biomass fuel must be considered an Eligible Waste Fuel as defined by the EPA’s Eligible Waste Fuel Guidelines and/or biomass fuel as otherwise approved or exempted for use by

the EPA and/or such that it meets the EPA emissions requirements for the power plant as established or varied from time to time.<sup>iv</sup>

Such a fundamental change to Redbank cannot be considered minor, and will not result in a power station that is 'substantially the same'.

**Redbank running as a biomass power station will result in major functional changes that should see this proposal ruled ineligible for modification as it is not "substantially the same" as the original development.**

## **1.2 The modification is incompatible with reasons given by the original consent authority**

Section 4.56 (1A) provides that the consent authority must take into consideration the reasons given by the consent authority for the grant of the consent that is sought to be modified.

The original development assessment was determined by Judge Pearlman of the NSW Land and Environment Court. During *Greenpeace Australia Ltd v. Redbank Power Company Pty Ltd.* (1994), Redbank representatives argued:

*"(1) The principal reason for the project is to implement an environmentally responsible method of tailing disposal."*<sup>v</sup>

They went on to state that:

*"Redbank's "primary mission" is not the production of power, but the utilisation of tailing in order to reduce its environmental consequences and to recover energy value lost in discarded tailing."*<sup>vi</sup>

The change of fuel source to biomass from coal tailings is a huge departure from this approved use. The proponent is proposing to abandon Redbank's '*raison d'être*', which is of great significance given the original decision made through the Land and Environment Court.

In her judgment to approve the Redbank Power Station, Pearlman J noted the following reasons for the grant of the consent:

*Redbank pointed to the beneficial environmental effects of the project. It will use tailing as fuel, thereby avoiding the detrimental environmental effects of tailing disposal in dams. It will produce lower emissions of SO<sub>2</sub> and NO<sub>x</sub> in comparison with the coal-fired power stations which it is likely to displace.*

*There are other beneficial effects as well. The project will reduce the amount of land sterilised by tailing dams. It will convert a waste product into a useable one. It will permit more efficient use of energy resources by recovering coal currently discarded in tailing.*

Pearlman J also noted the following reason for the grant of the consent, in regard to the need for the project:



*"...that there are problems generally perceived in the coal industry in relation to tailing disposal"*

None of these environmental benefits apply to the modified development.

**Given that many of the reasons relied upon by Judge Pearlman for granting consent are invalidated by the modification application, NCC recommends that Singleton Council refuse consent.**

## 2. Section 4.15 considerations

Section 4.15 of the Environmental Planning and Assessment Act 1979 outlines the matters a consent authority is to consider in evaluating a development application or modification.<sup>vii</sup> These include environmental impacts on both the natural and built environments, social and economic impacts in the locality, and the public interest.

### 2.1 Vehicles, emissions, and noise

The proponent's SEE states that there will be an improved environmental outcome partially due to lower air pollution resulting from traffic movement. It also states that the change to vehicular delivery of biomass will not result in any major changes to the way the plant operates and its impacts on the community. However, this was based on the assumption that there were 100 truck trips (200 truck movements) per day to and from the site for the delivery of supplemental fuel to the plant.<sup>viii</sup> This is the maximum allowed by the consent.

However, Redbank primarily received its fuel via conveyor belt. The proponent's suggestion that the change to vehicular delivery of biomass will not result in major changes to noise, air quality, traffic and road degradation for the community very likely incorrect.<sup>ix</sup>

The proponent's SEE outlines that 200 truck movements per day never regularly occurred because:

*"the fuel source is predominantly delivered to site using the conveyor system [from Warkworth mine]."*<sup>x</sup>

In reality, truck movements to deliver fuel to the site were occasional given its connection via conveyor belt to the Warkworth mine. As delivery of biomass by conveyor belt is not an option, the shift to 70 truck trips (140 truck movements) per day will pose a massive increase in local air pollution and impact to the local community.

The environmental impact assessment of the original project was done on the basis that truck movements would be occasional. For example, the plant operating noise levels assessment in the November 1993 EIS states that delivery of start-up fuel would involve 1.3 trips per day on average, while delivery of supplemental fuel would "probably take place seven to eight times a year":

*Such operations would include delivery of start-up fuel to the site which would involve approximately 500 trips per year or 1.3 trips per day on*



*average. Noise emissions from these trucks on public roads would be a minor component of the total noise from traffic on the Jerrys Plains Road. Delivery of supplemental fuel to the site would not occur on a regular basis but would probably take place seven to eight times a year and involve an additional 100 trips per day (12.5 trips per hour in the daytime) over a five day period.*

EIS page 4-19<sup>xi</sup>

Together, this totals an average of 12.26 truck trips per day envisaged by the original EIS and assessed by consent authorities.

As delivery of biomass by conveyor belt is not an option, the change to 70 truck trips (140 truck movements) per day will pose a significant increase in local air pollution and impact to the local community.

**NCC recommends that Singleton Council reject the modification on the basis of increased truck trips from 12 per day to 70 per day, the impacts of which have not been properly assessed.**

## **2.2 Air pollution**

Biomass has negative and unjust health impacts including releasing deadly air pollution.

Burning biomass releases:

“Hazardous air pollutants (HAPs) that... “are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects”... The HAPs emitted in the greatest quantities by burning biomass include the organic HAPs styrene, acrolein, and formaldehyde, and the acid gases hydrofluoric acid and hydrochloric acid. Biomass burners commonly emit ten tons or more of the acid gases and from one to five tons of organics each year. Even “clean wood” – that is, forestry-derived wood, as opposed to construction and demolition debris – emits these chemicals when burned. Burning clean wood also emits non-negligible amounts of heavy metals. Burning “urban wood” – a friendly term for construction and demolition debris (CDD) – significantly increases emissions of arsenic, chromium, copper, lead, and mercury, as well as dioxins/furans and pentachlorophenol (PCPs).”<sup>xii</sup>

There is evidence that coal fired power harms the health of populations around power stations. However, burning biomass can have even more significant public health impacts. Data from the Drax power station in the UK shows that biomass burning has increased particulate pollution by 400 percent since switching four of six boilers from coal to forest derived biomass, while power output has remained constant.<sup>xiii</sup>

The table below from the SEE clearly shows that for solid particles, nitrogen oxides, and type 1 substances, the proposed biomass plant will have worse emissions than the coal plant. It is not possible to claim conclusively that there will be an improved environmental outcome

from burning of biomass at Redbank, even utilising the modelling found within the SEE.

| Pollutant                     | In-Stack concentration (mg/m3) |                     |           |
|-------------------------------|--------------------------------|---------------------|-----------|
|                               | Proposal                       | Current Performance | EPL Limit |
| Solid particles <sup>a</sup>  | 14                             | 10                  | 82        |
| Nitrogen oxides               | 243                            | 155                 | 799       |
| Fluoride                      | -                              | 1.4                 | 50        |
| Sulphur dioxide               | 28                             | 455                 | 649       |
| Type 1 substance <sup>b</sup> | 0.046                          | 0.016               | 2.5       |

a. Assessed using PM<sub>10</sub>

b. Elements or compounds containing antimony, arsenic, cadmium, lead or mercury

(Fig. 4: Stack Emission Assessment, SEE, p.26)

In Europe, where biomass is a far more prevalent source of energy, researchers have assessed the health impacts of biomass on populations. They found:

*“epidemiological studies in the developed world have documented associations between indoor and outdoor exposure to biomass combustion products and a range of adverse health effects. A conservative estimate of the current contribution of biomass smoke to premature mortality in Europe amounts to at least 40 000 deaths per year...As the evidence from studies in the developed world is still limited, further studies are necessary to more precisely quantify the adverse health effects of biomass combustion. This should include comparative studies to document similarities and differences between effects of combustion products from biomass and fossil fuels.”<sup>xiv</sup>*

Concerningly, the proponent has detailed plans on their website to seek additional approvals to use “construction and demolition timber” as fuel.<sup>xv</sup> This source of biomass has significantly worse impacts to human health and the local air quality. It is unclear if Hunter Energy’s SEE air quality assessment factored in this source of fuel or if it was assessing on basis of purely ‘clean’ forest derived biomass.

The proponent’s air quality assessment notes the ambient air pollution levels in the local environment<sup>xvi</sup>:



**Table 4-2 Ambient air quality monitoring results –2019**

| Pollutant         | AQMS      | Concentration ( $\mu\text{g}/\text{m}^3$ ) |                     |                      |             |
|-------------------|-----------|--|---------------------|----------------------|-------------|
|                   |           | 1-hour <sup>a</sup>                        | 8-hour <sup>a</sup> | 24-hour <sup>a</sup> | Annual ave. |
| SO <sub>2</sub>   | Singleton | 248.1                                      | n/a                 | 31.4                 | 4.29        |
| NO <sub>2</sub>   | Singleton | 67.6                                       | n/a                 | n/a                  | 13.0        |
| PM <sub>2.5</sub> | Singleton | n/a  | n/a                 | 69.3 (24.9)          | 10.9        |
| PM <sub>10</sub>  | Warkworth | n/a  | n/a                 | 181.5 (49.8)         | 33.4        |
| CO                | Newcastle | 2,226                                      | 1,770               | n/a                  | n/a         |

a. maximum values

The [National Environment Protection Measure for Ambient Air \(Air NEPM\)](#) sets national standards for ambient levels of particle pollution. These are set out in the table below<sup>xvii</sup>:

| Pollutant         | Averaging period | Maximum concentration or standard | Goal (maximum allowable exceedences)   |
|-------------------|------------------|-----------------------------------|--|
| PM <sub>10</sub>  | 1 day            | 50 $\mu\text{g}/\text{m}^3$       | None, excluding exceptional event days |
|                   | 1 year           | 25 $\mu\text{g}/\text{m}^3$       | None                                   |
| PM <sub>2.5</sub> | 1 day            | 25 $\mu\text{g}/\text{m}^3$       | None, excluding exceptional event days |
|                   | 1 year           | 8 $\mu\text{g}/\text{m}^3$        | None                                   |

Comparing the two tables above shows the Air NEPM standards were breached for both PM<sub>2.5</sub> and PM<sub>10</sub> particles in 2019, both on a 24 hour and annual basis. Indeed, these air quality standards are regularly breached in the Singleton region.

Increasing the already unhealthy levels of particulate air pollution in the Singleton region will have negative impacts on human health.

**NCC recommends that Singleton Council rejects the application on the grounds that it will result in an increase of particle pollution, worsening air quality in the region which already suffers from unhealthy air with pollution levels that exceed the national standards.**

### 2.3 Climate impacts of burning biomass fuel

Forest derived biomaterial is not carbon neutral and is not clean.

It also undermines investment in genuine low emissions, clean energy sources like wind and solar as it competes for limited government incentives.

The proponent's SEE indicates that biomass as the fuel source for this plant generates 17,748 tonnes of Carbon Dioxide (CO<sub>2</sub>) per annum, 98 percent lower than if powered by coal. This is based on flawed assumptions and incorrect carbon accounting.

| Parameter                                  | Approved Fuel (coal) | Proposed fuel (biomass) |
|--|----------------------|-------------------------|
| Energy content (GJ/t)                      | 16.01                | 15.21                   |
| Consumption rate (t/h)                     | 81.6                 | 112.2                   |
| Annual consumption (t/y) <sup>a</sup>      | 652,800              | 897,600                 |
| <b>GHG emissions (tCO<sub>2</sub>-e/y)</b> | <b>943,023</b>       | <b>17,748</b>           |

(Fig. 1: Green House Gas Emission Assessment, SEE, p. 27)

Wood biomass can actually emit up to 50 percent more CO<sub>2</sub> than coal when burnt, yet carbon accounting used by the proponent classes it as zero carbon, because trees absorb CO<sub>2</sub> when they grow.<sup>xviii</sup> This is reflected in the proponent's SEE (Figure 2 below).

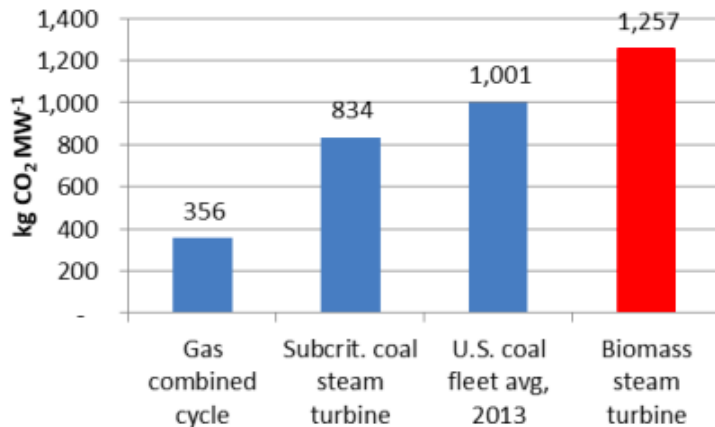
This approach to carbon accounting is contested by the scientific community because:

- logged forests store less carbon than old growth forests, old trees store much more carbon than young trees<sup>xix</sup>
- carbon absorption through regrowing forests lags the combustion, meaning that the absorption happens many years after emissions are released, causing global heating in the meantime
- we have a very short period to drastically reduce emissions to avoid the impacts of catastrophic global warming, a timeframe that does not allow for the regrowth of trees to the extent that they make up for the emissions from biomass power<sup>xx</sup>

| Fuel Type                | Energy Content (GJ/t) | Emission Factor (kg CO <sub>2</sub> -e/GJ) <sup>a</sup> |                 |                  |
|--------------------------|-----------------------|---|-----------------|------------------|
|                          |                       | CO <sub>2</sub>   | CH <sub>4</sub> | N <sub>2</sub> O |
| Green and air dried wood | 15.21                 | 0   | 0.1             | 1.2              |
| Coal                     | 16.01                 | 90  | 0.03            | 0.2              |

a. relevant oxidation factors incorporated.

(Fig. 2: Scope 1 Emission Factors (Solid Fuels) SEE, Appendix 1-A, p.25)



(Fig. 3: The chart above is derived from data from various sources for units burning biomass for fuel, assembled by Mary S Booth, Partnership for Policy Integrity [www.pfpi.net](http://www.pfpi.net))

To avoid catastrophic global warming, we need to reduce emissions sharply and increase the uptake of carbon into natural ecosystems. Intact, mature and recovering native forests are our best hope for taking carbon out of the air.

Burning native forest biomass produces more greenhouse emissions than burning coal at the point of combustion. It is incorrect to use accounting methods that claim that recapture of greenhouse gasses by regrowing forests over decades can offset these emissions within the timeframe available to vastly reduce emissions to avoid catastrophic global warming.

NCC recommends that Singleton Council reject the application on the basis of unacceptable impact on the climate through the degradation of native forests and greenhouse emissions at the point of combustion.

## 2.4 Scope 3 carbon emissions

The proponent does not assess the air quality or greenhouse impacts of trucking biomass fuel to the Redbank Power Station, claiming that:

*Reporting of Scope 3 emissions is optional since these emissions are reported as either Scope 1 or Scope 2 emissions from other activities. Accordingly, Scope 3 emissions are not discussed further in this assessment.<sup>xxi</sup>*

However, this argument confuses greenhouse reporting frameworks with assessment of environmental and greenhouse impacts. A large body of case law establishes the need to consider “downstream” and “upstream” emissions in project assessments.<sup>xxii</sup> The proponent is contemplating over 100 truck movements per day to source biomass from up to 400 km away. The trucking emissions caused by this project are material and should be included in any assessment of environmental impacts.

**NCC recommends that Singleton Council reject the application on the basis that its greenhouse gas assessment is incomplete and that the greenhouse impacts of truck**

**movements to deliver fuel to the site would materially change the greenhouse impacts of the modified project.**

## **2.5 Ecological impact of burning forest-derived biomaterial**

Burning forest-derived biomass is harmful to ecological biodiversity.

Fueled by biomass, Redbank would require roughly 1 million tonnes of biomaterial per year. Hunter Energy proposes to access trees and waste from a radius of 400km around the power station. It will source a significant amount of its fuel from the largely unregulated private native forestry sector. An expression of interest for wood was circulated in November 2020 and targeted owners of private native forests. If the proposed development proceeds, it would lead to the pillaging forests on both the north and south coasts.

It is particularly concerning that the proponent intends to fuel the station with "forest residues". Forest residues are small and "defective" trees that are not suitable for sawlogs. The removal of small and crooked living trees from forests as biofuel, along with larger trees cleared for other purposes increases the impact of logging and the consequences for biodiversity would be massive.

The Black Summer bushfires saw many forest-dependent threatened species lose large fractions of their habitat. Remaining forests have become important refuges for these species. Further incentives to clear forests will endanger wildlife and push threatened species closer to extinction.

NCC recommends that Singleton Council reject the application on the basis that it will cause unacceptable impacts on threatened species and biodiversity in NSW by intensifying upstream logging practices, at a time when wildlife in NSW is under strain following the Black Summer bushfires.

## **3. Conclusion**

Biomass harms the climate, harms forests, harms people and harms the clean energy transition. Hunter Energy's SEE proposing to transform the currently moth-balled Redbank Power Station into a biomass fueled power station relies on many disputed and disproven assumptions regarding this source of energy. NCC requests Singleton Council to take this into consideration during assessment.

This project does not meet the 'substantially the same' requirement which would allow it to be assessed as a modification. The very fact that Redbank was initially approved under condition that it would only burn coal tailings from local Warkworth mine and was its primary purpose, should trigger the proponent to undertake a full approval process, not just a modification assessment. This proposal includes many more significant alterations to the original development and the conditions that were attached to it as part of its approval. These include changes to the delivery of the fuel, noise and air pollution impacts related to the delivery of fuel, plus air pollution impacts from the power station.

The climate and biodiversity impacts that would result from this proposal, and that have not been described in the SEE, are unacceptable.

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<sup>i</sup> Environmental and Planning Assessment Act 1979 No 203 S4.56

Available: <https://legislation.nsw.gov.au/view/whole/html/inforce/current/act-1979-203#sec.4.56>

<sup>ii</sup> Ibid., p.15

<sup>iii</sup> Hunter Energy, 2020. Statement of Environmental Effects Section 4.56 Application to Modify DA183/93 Redbank Power Station, p.15 available at:

<https://portal.singleton.nsw.gov.au/RedDocServ24/default.aspx?DocID=dcLZu6OIRkw%3D>

<sup>iv</sup> Hunter Energy, 2020. Statement of Environmental Effects Section 4.56 Application to Modify DA183/93 Redbank Power Station, p.12

<sup>v</sup> Greenpeace Australia Limited v. Redbank Power Company Pty Limited [1994] NSWLEC 178 (10 November 1994) Available: <http://www6.austlii.edu.au/cgi-bin/viewdoc/au/cases/nsw/NSWLEC/1994/178.html>

<sup>vi</sup> Ibid.

<sup>vii</sup> Environmental and Planning Assessment Act 1979 No 203 S4.56

Available: <https://legislation.nsw.gov.au/view/whole/html/inforce/current/act-1979-203#sec.4.56>

<sup>viii</sup> Hunter Energy, 2020. Statement of Environmental Effects Section 4.56 Application to Modify DA183/93 Redbank Power Station, p.16

<sup>ix</sup> Ibid.,p.15

<sup>x</sup> Hunter Energy, 2020. Statement of Environmental Effects Section 4.56 Application to Modify DA183/93 Redbank Power Station, p.16

<sup>xi</sup> Amended Environmental Impact Statement for the Redbank Power Project, 1993. National Power Company and ESI Energy Inc

Available: <https://s3-ap-southeast-2.amazonaws.com/eis-pdf-records/AB017356.pdf>

<sup>xii</sup> Partnership for Policy Integrity, 2011. Air Pollution from Biomass Energy, p. 1

Available at: <https://www.pfpi.net/wp-content/uploads/2011/04/PFPI-air-pollution-and-biomass-April-2011.pdf>

<sup>xiii</sup> EU Biomass Legal Case, 2019. *Drax (UK): 1000 tonnes of deadly particulate pollution a year, a 400% increase since they switched from coal to biomass*. Available at:

<http://eubiomasscase.org/2019/03/08/drax-uk-1000-tonnes-of-deadly-particulate-pollution-a-year-a-400-increase-since-they-switched-from-coal-to-biomass/>

<sup>xiv</sup> Sigsgaard, T. et al., 2015. Health impacts of anthropogenic biomass burning in the developed world, *European Respiratory Journal*

Available: <https://erj.ersjournals.com/content/erj/46/6/1577.full.pdf>

<sup>xv</sup> Verdant Technologies Australia Ltd., 2021. Redbank (CFBT) Power Station Warkworth, Hunter Valley. Available at: <https://verdantearthtechnologieslimited.com/wp-content/uploads/2021/02/Redbank.pdf>

<sup>xvi</sup> Table 4.2, Redbank Power Station Air Quality and Greenhouse Impact Assessment, Wilkinson Murray, 2020

<sup>xvii</sup> NSW Government, 2021. Standards and goals for measuring air pollution Available:

<https://www.environment.nsw.gov.au/topics/air/understanding-air-quality-data/standards-and-goals>

<sup>xviii</sup> DeCicco, J. M. & Schlesinger, W. H. 2018. Opinion: Reconsidering bioenergy given the urgency of climate protection, *PNAS*, 115:39:9642-9645 available at <http://bit.ly/37JmXRL> and

<http://bit.ly/2ZGN1IZ>

<sup>xix</sup> Natural Resources Defense Council, 2017. Biomass more polluting than coal, new study finds, *Ecowatch*. Available at: <https://www.ecowatch.com/chatham-house-biomass-study-2288764699.html>

<sup>xx</sup> Stephenson, N., Das, A., Condit, R. *et al.* 2014. Rate of tree carbon accumulation increases continuously with tree size. *Nature* 507:90–93

<sup>xxi</sup> Redbank Power Station Air Quality and Greenhouse Impact Assessment, Wilkinson Murray, 2020. p24

<sup>xxii</sup> See for example Gloucester Resources Limited v Minister for Planning [2019] NSWLEC 7 (Preston CJ), 8 February 2019 and references therein