



Review of Liddell Coal Project Environmental Impact Statement: Appendix T

Economic Assessment

Prepared by

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## Contents

Introduction/Summary.....	4
Lack of transparency.....	5
Scope .....	5
Non market values .....	6
Greenhouse gas emissions.....	8
Input-output model results.....	9
Conclusion.....	12
References .....	13

## Introduction/Summary

Economists at Large welcome the opportunity to make a submission on the Environmental Impact Statement (EIS) of the Liddell extension project, particularly relating to Appendix T: Economic Assessment (Gillespie Economics 2013). The economic impact assessment contains a number of shortcomings that make it unsuitable for decision making purposes. The key shortcomings are:

- **Lack of transparency.** The economic assessment fails to discuss assumptions about the most important economic aspects of the project – coal price, production schedule, coal quality and marketing, royalty rates and deductions, tax rates and deductions. Without disclosure of these assumptions it is impossible to have confidence in the results of the assessment.
- **Scope of assessment.** The cost benefit analysis fails to present the costs and benefits to the state of NSW, despite this being one of the Director General's Requirements for assessment of the project and the recommended approach of the NSW Treasury.
- **Understated external costs.**
  - The economic assessment assumes that all mitigation and offset measures will perfectly compensate for environmental impacts. This approach has been rejected by the NSW Planning and Assessment Commission.
  - Some non-market values are based on studies which have been rejected by the NSW Land and Environment Court.
  - Greenhouse gas emissions associated with the project have been underestimated.
- **Use of input-output modelling.** These models create inflated estimates of impacts such as employment. The claim of 1,128 jobs being created is contradicted by more realistic modelling commissioned by other Hunter coal mines. Based on other coal mine models, we suggests this figure would be closer to 320, 1 percent of the local workforce. 80 percent of these jobs would be filled by people commuting from outside the region, according to the EIS.

As a result of these shortcomings, decision makers are unable to get a clear picture of the economic effects of the project. This is of concern due to the increased scrutiny that economic assessment of projects have been facing in planning and court decisions and the increased weight that project economics is to be given under new state government regulations. Increasing the quality of economic assessment is important for public confidence in the planning system. We recommend the rejection of this project until suitable economic assessment has been conducted.

## Lack of transparency

Gillespie Economics neglect to discuss their assumptions around the most important assumptions for economic analysis of a coal project:

- Thermal coal price
- Semi soft coking coal price
- Production schedule
- Yield of product coal from run of mine coal
- Marketing expectations – portion to be sold as thermal or metallurgical coal
- Royalty rates and deductions
- Tax rates and deductions
- Exchange rates

As the most important economic benefit for NSW decision makers is the potential royalty earnings, the lack of data around estimates should be of great concern. It is impossible to replicate or verify any of Gillespie Economics calculations. The non-disclosure of price assumptions should be of particular concern due to the uncertainty facing the coal market at present.

It is worth noting that NSW Treasury have also been critical of the non-transparency of Gillespie Economics' work on other projects:

*The characteristics of a good quality CBA include transparency and repeatability, with assumptions and methodology clearly identified, and rigorous sensitivity testing. Unfortunately in the paper available to us, the Gillespie Economics analysis does not clearly detail the inputs and assumptions used in its calculations, making the testing of assertions more difficult.<sup>1</sup>*

## Scope

An important step in any BCA is setting the scope of the assessment and ensuring that scope is used consistently<sup>2</sup>:

*Let us now turn to ... issues that challenge and bedevil practitioners of social benefit-cost analysis. The first challenge is deciding "whose benefits and costs count" .... It sometimes is called the issue of standing--that is, who has standing in the analysis of benefits and costs? This is an issue of scope. Should the analysis include only those costs and benefits affecting residents of the local community? The state or province? The nation? The world? Whether the net benefits of a project are positive or negative often depends on how narrow or broad the scope of the study is.*

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<sup>1</sup> (NSW Treasury 2013)p6

<sup>2</sup> Eggert (2001) (p27)

As this project relates to the extraction of resources which belong to the State of NSW, it is appropriate that the Director General's Requirements (DGRs) and guidelines from Planning and Treasury specify:

*A detailed assessment of the costs and benefits of the development as a whole and whether it would result in a net benefit for the NSW community;*<sup>3</sup>

*[Project] benefits and costs should be estimated where possible as those that accrue for New South Wales. In the first instance, it will generally be most practical to assess all major costs and benefits to whoever they accrue and then adjust to estimate the proportion of these attributable to residents of the State.*<sup>4</sup>

However, The BCA of the Liddell project is conducted from a global perspective and then narrowed down to a national level, as explained by Gillespie Economics:

*BCAs of mining projects are therefore often undertaken from a global perspective i.e. including all the costs and benefits of a project, no matter who they accrue to, and then truncated to assess whether there are net benefits to Australia. A consideration of the distribution of costs and benefits can then be undertaken to identify the benefits and costs that accrue to NSW and other regions. (p7)*

Gillespie Economics do not undertake this consideration of costs and benefits that accrue to NSW, claiming:

*BCA at a sub-national perspective is not recommended as it results in a range of costs and benefits from a project being excluded, making BCA a less valuable tool for decision-makers.(p7)*

While we agree that there can be added difficulties to conducting sub national BCA, and that relying on rigidly state-based analysis may be misleading, these difficulties are not sufficient reason to contravene the DGRs and Treasury guidelines. In fact, the principal of Gillespie Economics was able to produce exactly this kind of state-level analysis when before the Land and Environment Court in the Warkworth case<sup>5</sup>.

## Non market values

Gillespie economics include no value in the BCA for impacts on noise, air quality, visual amenity, ecology and biodiversity beyond those incurred in mitigation measures and offsets. This assumes that these mitigation measures and offsets will perfectly compensate local communities loss of amenity and the impacts on the local environment. We do not believe this is likely to be the case and as such this approach serves to understate the costs of the project to the NSW community and overstate its final value.

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<sup>3</sup> (DGRs reported in Appendix T p5)

<sup>4</sup> (NSW Treasury 2012)p5

<sup>5</sup> See (Bennett & Gillespie 2012)

The same approach was taken by Gillespie Economics in their assessment of the Coalpac Consolidation Project. The NSW Planning and Assessment Commission for that project found<sup>6</sup>:

*[The] assertion in the economic analysis that the biodiversity impacts of the project are fully accounted for in the rehabilitation and offset proposals is clearly wrong. Not only does it not stand up to any level of scrutiny from a biodiversity protection perspective, but there have also been substantial changes to these proposals in response to criticism of the EA. The RTS simply adds \$1m to the project costs and reasserts the Proponent's original position. The problem is that the Commission does not consider that there is any credible evidence available that the rehabilitation will work in the longer term and there is no conclusive evidence that even the revised Biodiversity Offset Package is adequate.*

*It is also arguable whether property offsets can be seriously asserted to 'offset the biodiversity values that will be lost from the Project' and that there 'would be no additional ecological costs for inclusion in the BCA'<sup>7</sup>. This may be a convenient economic fiction, but the fact is that destroying biodiversity in one area cannot be compensated for by 'protecting' it in other areas where it was not under threat.*

We agree with the PAC that this approach serves to understate the costs of the project to the community of NSW and therefore overstates its value. The Department of Planning and Infrastructure recently agreed with the PAC, finding<sup>8</sup>:

*While the Department accepts that the project would undoubtedly result in a range of substantial economic benefits, overall the Department is satisfied that these benefits do not overcome the significant and irreversible impacts on the biodiversity, scenic and geological values of internationally significant pagoda landform complex, and hence the project is ultimately not in the public interest.*

One non-market values – non-market value of employment – has been estimated through “choice modelling” studies conducted by Gillespie Economics for other coal mines. Choice modelling uses the results of a multiple choice survey to estimate environmental and social values. All choice modelling studies by Gillespie Economics use similar methodology. One of these studies was conducted for the Warkworth coal project. Preston CJ found<sup>9</sup>:

*I agree with the [project opponents] that the Choice Modelling study and the BCA undertaken for the Project have a number of deficiencies which lessen their usefulness. (p163)*

These deficiencies include identified by Preston CJ include:

- Distribution of Choice Modelling survey too limited (quoted above in discussion of scope)
- Deficiencies in information provided to survey respondents:  
*The information provided to survey respondents was not, in my view, sufficiently accurate to enable them to make informed and meaningful choices. (p163)*
- Values in Choice Modelling survey inadequate:

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<sup>6</sup> (PAC 2012)

<sup>7</sup> Note the similar quote in Appendix S on p17.

<sup>8</sup> (DPI 2013)

<sup>9</sup> (Preston 2013)

*I agree with Mr Campbell that modelling a situation based on a willingness to pay of survey respondents presented with a range of levels that, as Professor Bennett described and Mr Gillespie accepted has nothing to do with the costs, is of limited assistance in the situation confronting a decision-maker. (p167)*

- All relevant matters, at level of particularity required, not considered  
*I have identified above matters relevant to biodiversity and ecological integrity, including the EEGs, noise and dust, and social impacts, which were not included in the Choice Modelling survey or BCA. (p167)*
- Other non-market impacts and values not considered:  
*I agree with Mr Campbell that there are non-market values that have either not been, or have inadequately been, taken into consideration in the BCA, including impacts of noise and dust, impacts on amenity values, and ecosystem services (aff, second dot point). The omission of these non-market values is a deficiency of this BCA. (p168)*

In light of Preston CJ's emphatic agreement with Economists at Large's evidence on the choice modelling surveys, we suggest that decision makers place little weight on the estimate in this project which derives from these same surveys. They are likely to overstate the external value of employment. The very existence of this latter value in relation to coal projects has been doubted for several years by a range of economists, including coal industry consultant and ANU economist Jeff Bennett<sup>10</sup>.

## Greenhouse gas emissions

The project will cause a small increase in the amount of coal used in the world. Coal industry proponents often adopt the "drug dealer's defence" – that if we did not sell the coal/drug to the users, someone else would, and our actions therefore make no difference. This is true to a large extent - most coal that would be consumed in the world would be substituted from other mines, but not all of it. The expansion of the coal supply that the project represents will exert some downward pressure on prices which will result in an increase in the amount demanded.

In the absence of the project, not all of the coal exported would be offset by production in other mines. To argue otherwise is to suggest that coal supply is perfectly elastic and therefore that coal price should not vary. This is clearly not the case. Some estimate of this effect can be made from published sources and consideration of the price elasticities of supply and demand for coal. The standard analysis gives the equilibrium effect on aggregate quantity by the project as  $\Delta(-\epsilon/(-\epsilon+\eta))$  where:

$\Delta$  is the initial change in supply

$\epsilon$  is the elasticity of demand

$\eta$  is the elasticity of supply

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<sup>10</sup> (Bennett 2011)



The elasticity of demand for coal is estimated at -0.3<sup>11</sup>. Estimates of the elasticity of supply vary widely and are also frustratingly out of date. International authors cite a range of estimates from 0.3 to 2.0 and conclude that the best estimate is around 0.5<sup>12</sup>.

Using the Light, Kolstad and Peterson estimate, if the project did not proceed, a reduction in supply would ensue of approximately 8 million tonnes per year<sup>13</sup>. The equilibrium market outcome would be a reduction in total output and consumption of  $8 * (0.3 / (0.3 + 0.5)) = 3.0$  million tonnes, with associated emissions of around 8 million tonnes of CO<sub>2</sub>. At a price of \$23/tonne, the implied social cost is over \$184 million per year, the present value of which substantially exceeds the estimated benefits of the project.

The greenhouse gas impacts of the project estimated in the economic assessment relate only to the direct emissions of the project. To understand the full impacts of the project Gillespie Economics need to incorporate the impact of the increase in coal consumed in the world. This impact is not equivalent to greenhouse from combustion of all of the product coal, as is sometimes contested by anti-coal groups. In the absence of the project, most of this consumption would have been sourced from other coal mines. The economic assessment should, however, include the emission from the additional coal burned as a result of the project.

Interestingly, in Washington State, USA, state government agencies are now beginning to include downstream emission as a part of project assessment processes. The Washington Department of Ecology is using its state environmental policy act to broaden the scope of its assessment beyond state and national boundaries. See:

- <http://www.eisgatewaypacificwa.gov/>
- <http://www.ecy.wa.gov/news/2013/238.html>

## Input-output model results

Appendix T claims the project will result in the following impacts in the Singleton, Musswelbrook and Upper Hunter LGAs:

- \$458M in annual direct and indirect regional output or business turnover;
- \$283M in annual direct and indirect regional value added;
- \$37M in annual direct and indirect household income; and
- 469 direct and indirect jobs.

At a state level it claims:

- \$657M in annual direct and indirect regional output or business turnover;
- \$374M in annual direct and indirect regional value added;
- \$113M in annual direct and indirect household income; and
- 1,128 direct and indirect jobs.

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<sup>11</sup> There seem to be no more recent estimates from ABARE/BREE than (Ball & Loncar 1991)

<sup>12</sup> (Light et al. 1999)

<sup>13</sup> Note this refers to run of mine coal, as no estimate of product coal is provided. These figures are likely somewhat of an overestimate.

To derive these results, Gillespie Economics use a modelling approach called input-output (IO) modelling. IO models estimate the “flow on” or “downstream” economic impacts of a project or policy on other industries - ie that when one industry spends more money or employs more people, it buys things from other industries which increases their output, in turn increasing activity in yet more industries and so on. These effects are estimated through “multipliers” which are higher or lower depending on the degree to which the analyst believes industries are integrated.

While IO modelling has been common in Australia, this does not reflect on its reliability and accuracy. Economists and public institutions have criticised its use for many years. The ABS stopped publishing IO multipliers in 1998-99 as the data was mostly used to support “bids for industry assistance”. The ABS details the shortcomings of this “biased estimator of the benefits or costs of a project”<sup>14</sup>:

***Lack of supply-side constraints:*** *The most significant limitation of economic impact analysis using multipliers is the implicit assumption that the economy has no supply-side constraints. That is, it is assumed that extra output can be produced in one area without taking resources away from other activities, thus overstating economic impacts. The actual impact is likely to be dependent on the extent to which the economy is operating at or near capacity.*

***Fixed prices:*** *Constraints on the availability of inputs, such as skilled labour, require prices to act as a rationing device. In assessments using multipliers, where factors of production are assumed to be limitless, this rationing response is assumed not to occur. Prices are assumed to be unaffected by policy and any crowding out effects are not captured.*

For an example of the ABS’s first point, IO analysis assumes there is no “constraint” to the amount of construction labour available in the Hunter Valley. They assume that there is a large “ghost workforce” of skilled construction and mining workers ready to work on the project who will not be taken away from some other project either in the Hunter Valley or in NSW more broadly.

The ABS’s point about fixed prices refers to the assumption that the new demand for inputs such as construction workers can be satisfied without increasing the price of their wages. This is clearly unrealistic, as mining wages have increased considerably during the mining boom as is regularly emphasised by the mining industry.

Wariness about the application of IO modelling to project applications is not limited to the ABS. A recent Productivity Commission research papers describes the Commission’s concern about “well recognised abuses” over several decades<sup>15</sup>:

*The lack of accounting for the opportunity costs in input-output multiplier analysis has resulted in persistent expressions of concern over many years regarding the applicability of multiplier analysis in a public policy context. As noted, a common focus of the concern is on the use of multipliers to make the case for government intervention (either to preserve*

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<sup>14</sup> (ABS 2011)

<sup>15</sup> (Gretton 2013)p10

*prevailing output or employment under threat or to support the set up or expansion of a designated activity).*

The economic assessment of the Warkworth expansion project also relied on IO modelling, which was criticised by Preston CJ<sup>16</sup>:

*The IO analysis is a limited form of economic analysis, assessing the incremental difference in economic impacts between approving or disapproving the extension of the Warkworth mine. The deficiencies in the data and assumptions used affect the reliability of the conclusions as to the net economic benefits of approval. More fundamentally, however, the IO analysis does not assist in weighting the economic factors relative to the various environmental and social factors, or in balancing the economic, social and environmental factors. (p155)*

*The IO analysis assumes that there are unemployed resources available within the Hunter region to meet any increase in workforce demand, and that the workforce will not be drawn away from any other activity. I accept [The Australia Institute's] evidence that the assumption of the IO model that there is a ghost pool of highly skilled yet unemployed people in the Hunter region, from which labour for the extension of the existing mine would be drawn, is unrealistic. I accept [the Institute's] evidence that, to a considerable extent, employment generated from the extension of the Warkworth mine would involve currently employed skilled workers transferring from other industries, but the vacancy thereby created in the other industries may not necessarily be filled, partly because of a shortage of skilled workers and partly because the remuneration is inferior to that offered in the mining industry. (p159)*

Preston CJ is not alone in his criticisms. Following his decision, coal industry major Yancoal reassessed the IO modelling of their Ashton South East Open Cut project, also facing an appeal before the Land and Environment Court. Yancoal commissioned ACIL Allen to review the IO modelling and to re-evaluate the project's impacts using another model<sup>17</sup>:

*[In] the Warkworth case IO modelling was criticised by the chief judge and ... for good reason. [This] modelling is fine for some purposes but it's not the best technique ... for this kind of purpose [evaluating a coal mine]. The reason is that IO modelling takes no account of the fact that there are limited productive resources [in the economy] principally people to be employed. So it always makes the amount of output, income, jobs, bigger than would likely be the case, unless you're in the Great Depression, or a very deep recession.*

Instead of IO modelling, ACIL Allen used more sophisticated computable general equilibrium (CGE) modelling to assess the project. They estimated that while the Ashton project would employ 162 people, local employment would increase by only 78. This means that 84 jobs in other projects and industries are "destroyed" at a local level. At a state level, downstream jobs estimated by Yancoal were only 2 jobs greater than the direct employment number of 162. (See court transcripts)

Because of the flaws inherent in IO modelling counsel for the Minister for Planning has dropped the earlier IO modelling of that project from their case and rely on Yancoal's CGE modelling.

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<sup>16</sup> (Preston 2013)

<sup>17</sup> (see court transcripts, p546)

While detailed modelling of the impacts of the Liddell project is beyond the scope of this submission, applying the Yancoal modelling to the Liddell project can give some estimate of the likely impacts on local employment, including the reductions in other industries. Rather than an increase of over 1128, we estimate a net increase in employment of 173:

	Ashton	Liddell	Notes and sources
<b>Direct employment</b>	162	360	See Ashton court transcripts and (Gillespie Economics 2009)
<b>IO model estimate of state direct and indirect employment</b>	682	1,128	(HVRF 2009)
<b>CGE model estimate of net change in local employment</b>	78	173	Ashton court transcripts and EAL calculation.

To put this in context, at the 2011 census there were 28,671 people in the labour force working in Singleton, Muswellbrook and Upper Hunter Local Government Areas<sup>18</sup>. The project would increase employment in the area by less than 1 percent. This will not affect unemployment, however, with only 647 people looking for full time work in these areas at the census. Instead, they will likely come from outside the area.

In summary, decision makers should be sceptical of the economic impacts emphasised in the EIS due to the flaws in IO modelling. While the project proposes to employ on average 360 people, the project's impacts on the local markets for labour, land, capital and inputs will crowd other industries out, meaning the net increase in employment considerably lower, likely around 170, based on Yancoal modelling. The increase in employment will be sourced 80 percent from outside the local area according to the EIS, meaning there will be minimal impact on local unemployment and a negligible increase in employment at a wider level.

## Conclusion

The economic impact assessment of the Liddell project contains a number of flaws relating to:

- Input output modelling
- Cost benefit analysis
  - Scope
  - Non transparency
  - Understatement of environmental costs

It is not clear from this assessment that the project represents a net increase in the welfare of the NSW community. This is concerning as economic assessment of major projects has been under close scrutiny, a pattern set to increase under new state regulation. We recommend extensive revision of this assessment before any decision can be made on the future of the project.

<sup>18</sup> Sourced through ABS Tablebuilder, Census 2011

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