



Review of Bulga Extension Project Environmental Impact Statement

Appendix 18 Economic Impacts

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Introduction

The proposed Bulga Extension Project is for the continuation of an open-cut mine into agricultural land and native forest, in the upper Hunter Valley, NSW. The proposal is to extend the life of the mine from 2018 to 2035, extracting a total of 230 million tonnes of run of mine (ROM) coal. The proponent is currently seeking planning approval and has prepared an Environmental Impact Statement (EIS). Appendix 18 of the EIS is an economic assessment of the project conducted by consultants Economics Consulting Services (ECS).

The Bulga project is one of several proposals and mine extension projects in this area. Local residents, such as the Bulga Milbrodale Progress Association (BMPA), are concerned that the proposed projects will affect agriculture, the community, health and native vegetation which contains critical areas for threatened species and ecosystems.

Economic assessment aims to quantify and balance financial, environmental and social impacts to assist decision makers. We have reviewed Appendix 18 by ECS and consider that there are a number of significant flaws in the appendix, which, without being addressed, would render the assessment unsuitable to contribute to decision-making. These issues are:

- **Misplaced emphasis on multiplier analysis**
- **Flawed cost benefit analysis**
 - **Scope**
 - **Royalty calculations**
 - **Social and environmental costs**

These issues serve to overstate the value of the project and provide little guidance for NSW decision makers as to how to make a decision to further the NSW public interest.

The most important number in economic analysis of projects is the net present value to the community. ECS estimate this present value at \$2,588 million. Due to the above errors, this figure is heavily overstated. We believe the main economic benefit to NSW will be royalties, which we estimate at \$515 million. Decision makers need to weigh this value against the considerable environmental and social impacts of the projects and negative economic impacts on other industries. ECS's analysis provides no quantitative estimates to assist with this decision.

These issues have been better addressed by other project assessments in the recent past. The standard of analysis provided by ECS represents a backward step in the quality of economic assessment in the NSW planning process.

This is occurring at a time when the coal industry is perceived as lacking a "social licence to operate" in many areas. Conflicts between communities and coal and coal seam gas developments are making headlines regularly, with farmers and the broader community losing confidence that such developments are in the community's best interests. Robust and transparent assessment of this project could help to address this issue.

Misplaced emphasis on multiplier analysis

Throughout the economic assessment, the authors emphasise the results of their multiplier analysis:

The Project development investment will have a ripple effect through the economy as workers spend their wages on household goods and services and businesses expand to meet the needs of the Project. The multiplier effect is estimated to increase turnover in the local economy by \$6 million a year, by \$153 million in the regional economy and by \$385 million a year in New South Wales during the construction phase of the Project.

During the eighteen years extended operating phase, the Project will increase economic output by \$4 million in the local economy, \$410 million in the region and \$837 million in the State as a whole.

During the extended open cut operations, the mine will continue to employ an estimated 700 workers and contractors. The flow-on effect through the economy will mean a total of 52 local jobs, 1,010 in the region and 2,450 in the State. Most of these jobs are already in place – this project extends employment opportunities associated with open cut mining at the BCC for a further eighteen years. (piii-iv)

These results are emphasised in the “Summary impacts” table, as well as through Chapter 4, Section 5.8, Section 5.13 and a basic explanation of multiplier analysis given in Appendix 1. In Section 4.1, ECS claim:

A new Project impact can be assessed in terms of the changes in financial output for the economy, changes in job numbers and household income. The impact will include the actual Project expenditure and employment and the ripple effect through the economy of this increase in activity. The flow-on effect is assessed using multiplier analysis. (p33)

This is not standard economic project assessment practice, which is to prioritise cost benefit analysis over multiplier, or input-output, analysis. This is emphasised by NSW Treasury (2007):

Input-Output (Multiplier) Analysis is commonly used to assess the regional impacts of a project. In the simplest form of input-output analysis, input-output multipliers are applied to measures of direct impact to determine estimates of flow-on impacts in terms of income and employment. All such analysis is subject to significant limitations, and extreme care should be taken in its interpretation.

First and foremost, input-output analysis is concerned with measuring economic activity, and is not a tool for the evaluation of projects. Input-output analysis does not take account of the alternative uses (opportunity costs) of resources. Input-output analysis, however, will always indicate positive impacts – activity – without providing guidance as to whether such impacts correspond with net benefits. Poor investments, perhaps in heavily subsidised fields of endeavour, could be associated with greater levels of activity than good investments. (p12)

Multiplier analysis and input-output modelling has fallen from favour with economists for many reasons, the main ones being explained by the Australian Bureau of Statistics (ABS 2011):

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.*

In other words, the multiplier analysis assumes there is no limit to the amount of labour, land, water and other inputs in the economy. In the real world, these limitations are obvious to other industries, who experience difficulties accessing tradesmen and other services. This is particularly felt by manufacturing and agriculture, as they struggle with the downside of the mining boom. Yet this obvious downside is ignored by multipliers and input-output modelling.

This downside was recently acknowledged by Preston CJ (2013) in his ruling against the nearby Warkworth Extension Project:

The [multiplier] 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 data and assumptions used affect the reliability of the conclusions as to the net economic benefits of approval. More fundamentally, however, the [multiplier] 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)

ECS's emphasis on multiplier analysis over the accepted method of project assessment – cost benefit analysis (CBA) – represents a step backward in economic assessment of major projects in NSW. While Economists at Large have been critical of many recent project assessments, such as (Gillespie Economics 2012a; Gillespie Economics 2012b; Gillespie Economics 2013; Gillespie Economics 2011b), all of these studies used CBA as their main tool of project assessment. This backward step is particularly disappointing given the publication of NSW Treasury's (2012) CBA guidelines, which should have served to strengthen the role of CBA in assessment of coal projects. ECS's use of this form of modelling and emphasis on its results serves to overstate the value of the project and perpetuates the misuse of multipliers in project assessment, contrary to the recommendations of all Australian treasuries, most practicing economists and at least one judge.

Cost benefit analysis

Scope

The cost benefit analysis (CBA) conducted by ECS in chapter 5 of the economic appendix is flawed and heavily overstates the benefits of the project to NSW. While ECS claim to have followed the guidelines for CBA of coal and coal seam gas projects – see their figure 22 taken from p3 of NSW Treasury (2012) – they have omitted a crucial step, that of identifying the scope of the analysis, also known as the issue of standing. This is explained well by Eggert (2001):

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. (p27)

The importance of setting the scope for the assessment is emphasised in all university text books on CBA, see for example Boardman et al. (2006), who consider this the second step of CBA after identifying project alternatives. While not identified in the diagram reproduced by ECS, Treasury's guidelines list consideration of scope as the first "key feature" of CBA on p2 and on p12 they spell out their preferred scope as "*The community of interest is the NSW community*", further requiring analysts to "*Make explicit any adjustment to estimate NSW share of appropriate costs and benefits.*" ECS fail to do this.

The most obvious benefit of the project which needs adjustment to represent the interests of NSW is profits. As Eggert (2001) makes clear, in the case of a national-level assessment: "*a national government would consider profits sent abroad as a cost.*" (p27) As this assessment is to focus on NSW, profits sent outside of NSW should not be considered a benefit of the project.

The vast majority of profits from this project will accrue to the shareholders of Xstrata and Nippon Steel (see Economic Appendix p1), very few of whom are part of the NSW community. ECS's estimate of "net benefit to the community in NSW of \$2,588 million" is misleading as it does not consider how much of this will be repatriated to foreign interests. This error serves to overstate the value of the project to NSW and Australia and does not provide decision makers with any indication of whether the project is in the interests of their constituents.

Again, this flaw represents a backward step in NSW project assessment. The same error was made in several project assessments leading up to Gillespie Economics (2011a) relating to the Maules Creek project. The error was addressed in that case after submissions from Economists at Large and a review commissioned by the Maules Creek proponents (Bennett 2011):

Where the shareholders are not citizens, their mine benefits are expatriated and should not be included in the CBA. Careful attention should therefore be given to the register of shareholders and adjustments made to the producer surplus benefit calculation. (p3)

This error was also made in assessment of the Warkworth extension project, in Gillespie Economics (2009). Gillespie Economics initially calculated a net benefit of \$1,862 million, but conceded during the legal proceedings against the project that only one third of this might be retained through royalties and taxes, \$626 million (Bennett & Gillespie 2012). Similarly, while Gillespie Economics (2013) estimate the total financial benefits of the Watermark project to be around \$3,000 million, foreign ownership and application of more realistic price assumptions shows the project represents only \$541 million in financial benefits for Australians (Economists at Large 2013).

Royalty calculations

Decision makers should note that the main financial benefits of the project to NSW are the royalties paid on sale of coal. ECS estimate that:

Royalties on the coal are estimated at an average of \$76 million a year over the eighteen year life of the project for a total of over \$1,760 million. (p39)

Despite being the most important value to NSW decision makers, ECS show no working for this calculation and minimal discussion on the uncertainties around these figures. This is particularly disappointing as even this statement raises more questions than it answers – starting with the problem that $18 \times \$76\text{m} = \1368m rather than \$1,760m.

Furthermore it is standard financial and economic practice to present a stream of benefits not as a total amount, but in present value terms. This enables decision makers to compare benefits and costs occurring at different times through a project's life. An estimate of the present value of royalties accruing to the NSW state from the ECS analysis and other sources:

Saleable coal production	Mt	135
Mine life	Years	18
Average annual production	Mtpa	7.5
% Semi soft	%	42%
% Thermal	%	58%
Semi soft price	USD/t	\$101
Thermal price	USD/t	\$90
Average annual revenue	USD \$m	\$709
Exchange rate	AUD/USD	0.88
Average annual revenue	AUD \$m	\$624.18
Royalty rate	%	8.2%
Average annual royalty revenue	AUD \$m	\$51.18
Discount rate	%	7%
Present value of royalty revenue	AUD \$m	\$515

This estimate is based on:

- Saleable production estimates based on ECS estimates of project and no-project production, on p(i).
- Life of the project based on ECS p(i).
- Marketing split between semi soft coking coal and thermal coal based on Coal and Allied (2010) p73. Note that ECS do not provide any sources to substantiate their split between

semi soft coking coal and thermal coal marketing. The adjacent Mt Thorley Warkworth mine markets just under half of its production as coking coal.

- Coal prices, based on CBA (2012) p12 and BREE (2013) p68 and p38. Note that ECS provide no source for their price estimates other than unspecified reports from “Bureau of Resource Economics”, by which they presumably mean the Bureau of Resource and Energy Economics (BREE).
- An estimate of the long term exchange rate is based on CBA (2012) p12.
- Royalty rates for open cut coal operations in NSW are given by NSW DII (2008).
- Discount rate is in line with ECS’s analysis and standard practice in NSW project evaluation.

We see that the project’s main economic benefit to NSW is royalties, with a present value of approximately \$515 million. Against this value decision makers need to weigh social and environmental costs. ECS’s inability to present a discounted royalty figure based on transparent price assumptions represents another backward step in economic project assessment in NSW, as recent assessments have featured this value.

Social and environmental costs

The CBA makes the assumption that all environmental and social impacts of the project will be contained within guideline levels or be perfectly offset by mitigation measures. It takes this approach in relation to:

- Ecological impacts
- Water quality
- Air quality
- Visual impacts
- Noise
- Heritage impacts

In relation to ecological impacts, this assumption of perfect substitution is clearly unrealistic and is rejected by ecologists. See Bekessy et al. (2010); Gibbons & Lindenmayer (2007); Walker, Brower, Stephens, & Lee (2009) for examples of the positions taken by most ecologists:

- that offsetting destruction of one area of habitat by increasing the protection of another area is inappropriate and results in a net loss of biodiversity;
- that replanted and restored offset areas can take a long time to mature into the functioning ecosystems they are supposed to replace, meaning a loss of ecological function for long periods, if not forever.

It is not only ecologists who dispute the idea of perfect substitutability of biodiversity offsets. In the recent judgement on the Warkworth Coal project, Justice Preston found that the mine’s offset package, also approved by the NSW Planning Department was inadequate to compensate for its impacts (see Preston 2013).

Similarly, the cost benefit analysis places no value on impacts the project will have on Aboriginal heritage beyond costs involved in mitigation. This relies on the perfect substitution of Aboriginal heritage offsets to offset this damage. This is disputed by large parts of the NSW indigenous community. Failure to acknowledge this impact serves to overstate the value of the project.

ECS consider that there is no need to value impacts on the community outside the affected zone, provided they remain within legislated guidelines. This is inappropriate as compliance with guidelines does not mean community welfare is unaffected in these areas. Local people who are affected by these impacts, but are not compensated for them, incur economic costs of this project and this should be included in the CBA. Furthermore, the Bulga Milbrodale Progress Association claim the estimates of noise-affected areas are inaccurate and are planning to contest them. Failure to acknowledge such impacts and estimates serves to overstate the value of the project.

This oversight is particularly relevant to human health. There is an increasing body of research linking and quantifying the damage of coal mining and transport on health. Open cut coal mining, transportation of coal in uncovered wagons, coal loading and unloading facilities all create particulate pollution that can affect human health, reducing our productivity and increasing health costs. A well known study in the *American Economic Review* (Muller et al. 2011) found that in the USA the effects of coal mining and coal fired power on health outweigh the industry's value of production:

The largest industrial contributor to external costs is coal-fired electric generation, whose damages range from 0.8 to 5.6 times value added.

This study is not alone. Other American researchers in the Appalachian region (Hendryx & Ahern 2009) found that the health costs associated with coal mining in that region from 1979 to 2005 ranged from \$18 billion to \$86 billion, while the financial benefits of the industry had been only \$8 billion. The study concluded:

The human cost of the Appalachian coal mining economy outweighs its economic benefits.

Australian research in this area is less advanced, but supports these general findings. In a submission to the Senate Committee Inquiry into the Impacts of Air Quality on Health, a University of Newcastle researcher has applied the results of research into the costs of air pollution in Sydney's Greater Metropolitan Region to the predicted air quality impacts of a coal project on the Hunter region. This analysis finds that air pollution in the Hunter causes annual health costs of approximately \$1,766 million and that a proposed coal export terminal project would increase this cost by approximately \$29 million ((HCEC 2013) based on (DEC NSW 2005)).

Even if the project manages to stay within prescribed guidelines on particulate pollution, medical studies conclude that there is no threshold level below which health is unaffected by some pollutants. People with heart and lung conditions, respiratory infections, asthma, infants and the elderly are vulnerable to even very low levels of exposure to particulate pollution. In reality, exceedances of air quality guidelines is routine - a recent study by (CTAG 2013) found that although particulate pollution guidelines allow for five exceedances of average levels per year, they recorded thirteen in less than four months.

By not including an estimate of impacts on health, or by assuming that compliance with guidelines ensures a zero impact, the economic assessment overstates the value of the project. This is inappropriate given the high costs of health impacts identified in overseas studies and recent findings in NSW.

ECS's failure to incorporate any of these external costs into their CBA is another backward step for project evaluation in NSW. Analyses by Gillespie Economics over several years and many projects generally made efforts to quantify such impacts, with a notable exception of health impacts. Their estimates were controversial and often disputed, but at least provided decision makers with some understanding of the issues from an economic perspective.

Conclusion

The economic appendix of the Bulga extension project contains major flaws which render it unsuitable for decision making purposes:

- Misplaced emphasis on multiplier analysis
- Errors in cost benefit analysis, particularly relating to:
 - Scope
 - Financial calculations
 - Environmental and social factors

The most important number in economic analysis of projects is the net present value to the community. ECS estimate this present value at \$2,588 million. Due to the above errors, this figure is heavily overstated. We believe the main economic benefit to NSW will be royalties, which we estimate at \$515 million. Decision makers need to weigh this value against the considerable environmental and social impacts of the projects and negative economic impacts on other industries. ECS's analysis provides no quantitative estimates to assist with this decision.

ECS's analysis is disappointing as it features flaws that have become less common in project assessments in NSW in recent years. We hope this appendix will not undo all the progress achieved by proponent's consultants, public submissions, academic economists, the planning department and the Land and Environment Court in improving economic assessment of major projects.

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