



Review of Kevin's Corner Coal Project

Economics

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## Executive summary

*Section 23: Economics* is not an appropriate document for decision making purposes. To understand if the project serves the best interests of Queensland or the local community, cost benefit analysis must be undertaken. The method of input-output analysis is inappropriate for decision making purposes, as is made clear by treasuries and similar departments throughout Australia, including Queensland. The figures presented as benefits and costs (the value of coal and the value of habitat and agricultural production) are highly misleading.

The input-output analysis presented does not use appropriate inter-industry coefficients. These are vital to understanding if the analysis is accurate or not. If the analysis is not based on empirically-derived coefficients relevant to the local region, the impacts will be overstated.

The use of overstated impacts from input-output analysis to justify projects was a key reason the ABS stopped publishing tables of I-O coefficients. Particular problems relate to I-O's inability to account for resource constraints, price changes and the challenges of small regions.

## Introduction

### Background

The proposed Kevin's Corner Coal Project is for an open-cut and underground mine into agricultural land and woodlands in the Galilee Basin, Central Queensland. The proposal is for a 30-plus-year mine which will produce up to 30 megatonnes of thermal coal per year. The proponent is currently seeking project approval and has prepared an environmental impact statement.

The Kevin's Corner Project is one of several mining proposals in this traditionally agricultural area. The Capricorn Conservation Council is concerned that the proposed projects will affect agriculture, the community and the environment. Many communities in Australia are facing similar issues and are concerned that the often-touted benefits of the mining boom may be overstated and/or not accruing to local people.

### This submission

The Capricorn Conservation Council is making a submission on the Kevin's Corner Coal Project Environmental Impact Statement. As part of their submission they have asked Economists at Large to review *Section 23: Economics* and *Appendix V* on which section 23 is based. We consider there are a number of very significant issues in the economic assessment, which, without being addressed, would render the assessment unsuitable to contribute to decision-making. These issues are:

- **Lack of cost-benefit analysis.**
- **Inappropriate use of input-output analysis**

We believe that these issues need to be clarified and adjustments made to the economic assessment of the project to ensure a decision is made in line with the Queensland public interest. Doing so would not only allow for the best outcome in relation to this project, but could serve as a guide for other projects in the area and nationally.

This is occurring at a time when the mining industry is perceived as lacking a "social licence to operate" in farming areas. Conflicts between farming 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.

## Lack of Cost-Benefit Analysis

The economic assessment of the Kevin's Corner project is based on input-output analysis, with no cost-benefit analysis. To assess if the project is in the interests of the state and local communities, the assessment must be revised to include cost benefit analysis. While cost-benefit analysis is not explicitly required of the assessment, section 5.2 of the Terms of Reference for the project require the environmental impact statement (EIS) to:

*provide a comparative analysis of how the project conforms to the objectives for 'sustainable development'—see the National Strategy for Ecologically Sustainable Development (1992)...This analysis should consider the cumulative impacts (both beneficial and adverse) of the project from a life-of-project perspective, taking into consideration the scale, intensity, duration and frequency of the impacts to demonstrate a balance between environmental integrity, social development and economic development.*

In other words the EIS should assess all the positives and negatives of the whole project in a way that shows whether the project will provide a net benefit to the state.

However, *Section 23: Economics* provides no analysis that can assist with this decision as it is based on input-output modelling not cost-benefit analysis. This is clearly against the recommendations of the Department of Infrastructure and Planning's Project Assurance Framework, which states:

*The primary method of economic evaluation of public sector policies and projects is cost-benefit analysis. Input-output methodology (or the use of multipliers) is not a preferred methodology for economic evaluations. (Qld DIP 2011, p18)*

The evaluation of mining projects with private sector involvement is no different, as is made clear by Eggert (2001):

*Summing up, a benefit-cost framework for assessing the effects of a mining project is useful, even essential, for evaluating the impact of a mining project on the economic development of a local community or region. Such a framework focuses our attention on a number of critical issues: What is the overall effect of a project? What are the costs, and are the parties bearing the costs being compensated? What are the net benefits and how are they distributed?*

Virtually the entire economics profession agrees that cost-benefit analysis is essential for project assessment, see for example (Dobes and Bennett 2009; Ergas 2009; Abelson 2011) and many others. In other states, cost-benefit analysis would be required for such a project; the NSW Department of Planning's Environmental Assessment Requirements require:

*A detailed assessment of the costs and benefits of the Project as a whole, and whether it would result in a net benefit for the NSW community (DoP NSW, quoted in the economic assessment of the Maules Creek Coal Project, Gillespie Economics 2011, p4).*

It is important to understand the difference between these two forms of analysis. As the Department of Infrastructure and Planning explains:

[Cost-benefit analysis should] *comprehensively identify and estimate as many costs and benefits of a project as can reasonably be measured, including those which can be thought of as social and environmental, [in order] to rank project options according to their net economic benefit.* (p18)

Whereas economic impact assessment, such as Input-Output modelling:

*typically measures the impact of a project on the volume of economic activity in a region (e.g. on gross domestic product or employment),* (Qld DIP 2011, p23)

The NSW Treasury confirms these interpretations:

*Model based economic impact assessment is not a substitute for a thorough economic analysis of a policy. The appropriate method for analysing policy alternatives is benefit cost analysis (BCA). BCA considers the best use of resources and as such treats labour inputs as a cost. An I-O based economic impact analysis is best seen as a complement to a BCA and does not provide evaluative guidance. An I-O model will estimate flow on impacts irrespective of the qualities of the policy triggering those impacts.* (NSW Treasury 2009, p4)

I-O models estimate impacts such as gross regional product. Economic activity (gross regional product (GRP) in Section 23) is not a good measure of welfare, for three reasons identified by Abelson (2011) p49:

1. [GRP and other measures] include output produced by, and income accruing to:
  - non-resident owners of capital employed in the state;
  - non-resident labour including short-term casual labour arriving for a major event;
  - the Australian government via income and indirect taxes.
2. [GRP and other measures] make no allowance for the real cost of labour, i.e. the loss of household production or leisure which is embodied in labour's reservation price. Therefore, it does not measure the net benefit to labour.
3. [GRP and other measures] do not account for any other non-market goods including consumer surpluses, health status, travel in non-work time or environmental impacts.

To understand if the Kevin's corner project is in the interests of the Queensland and local communities it is essential that economic analysis be based on thorough cost-benefit analysis, including consideration of social and environmental, in accordance with the Department of Infrastructure and Planning guidelines before further consideration is given to this project.

## Appendix V sections 5.2 and 5.3

Though falling far short of cost-benefit analysis, sections 5.2 and 5.3 do show some interesting figures relating to the value of coal exports and the opportunity costs of the project. Section 5.2 is brief enough to reproduce in its entirety here:

### **5.2 Value of Coal Exports**

*The Kevin's Corner Coal Project will produce approximately 856 million tonnes (Mt) of coal for export from Queensland throughout the life of the mine, the value of these exports to the Queensland economy will be approximately \$67.8 billion. Once fully operational the coal mine, will produce between 25 Mtpa and 30 Mtpa of coal exports, equating to a value of \$2.7 billion per annum.*

This short section poses more questions than it answers. It is not clear what this \$67.8 billion figure represents, how it was calculated and if it is discounted. No sources or calculations are shown in either *Appendix V* or *Section 23*. If it represents total revenue over the life of the mine, the price of coal assumed is \$79.21 per tonne, which seems conservative given assessments of coal mines regularly assume prices of around \$100 per tonne, see for example Gillespie (2011). The later figure of \$2.7 billion per year based on an average of 27.5 Mtpa equates to a price of \$98.18 per tonne.

Regardless of the price, it seems the \$67.8 billion figure is undiscounted. Discounting the value of cost and benefit streams over time is standard practice, as people usually consider money in the future to be less valuable than money today. Indeed, in section 5.3 the opportunity costs of the project are discounted at 6%. A more appropriate rate for a commercial project such as this would be 15%.

Discounting the annual \$2.7 billion figure over 30 years at 6% and 15% gives the following:

<b>Discount rate</b>	<b>Present value of revenue (\$millions)</b>
<b>6%</b>	37,165
<b>15%</b>	17,728

Whatever the figure of the present value of the mine's export revenue – which would be explicitly stated and explained in a cost-benefit analysis – it is important to realise that this figure does not represent “benefit” to the Queensland economy. Scarce resources were used in producing this revenue that have not been deducted from this figure. Even if this figure did represent the clear profit of the operation, most of it would accrue to foreign shareholders, with little remaining in Queensland. This has recently been made clear by a prominent Australian economist employed by the proponents of a major coal mine in NSW:

*Where the shareholders are not citizens, their mine benefits are expatriated and should not be included in the BCA. Careful attention should therefore be given to the register of*

*shareholders and adjustments made to the producer surplus benefit calculation.* (Bennett 2011)

As this assessment focuses on Queensland, profits sent outside of the state should not be considered a benefit of the project. As is reinforced by Eggert (2001):

*“an analyst must be careful to ... eliminate any net benefits that accrue to nonresidents of the community”* (p28). *“a national government would consider profits sent abroad as a cost.”* (p27)

This has major implications for any analysis of benefits of the Kevin’s Corner Project, as the project is nearly entirely owned by Indian resource firm GVK<sup>1</sup>. It seems unlikely there will be any benefits to the Queensland community other than royalties to state government. It is highly unusual that this economic analysis of a coal mine makes no mention of royalty payments, particularly given that they may be the only substantial economic benefit of the project to the state.

Section 5.3 outlines some of the costs associated with the project – lost habitat values due to clearing of native vegetation and lost agricultural production.

### **Lost habitat values**

The adoption of a \$200 per hectare annual value for the use and non-use values of native habitat seems entirely arbitrary, with no justification other than this sits between \$24 and \$3,600, values cited in the author’s two chosen examples of contingent valuation in Australia. Why these two relatively obscure studies were chosen is unclear, particularly as one relates to valuation of urban bushland in Western Australia of unknown habitat type.

It is disappointing that these studies, noted only as Sugar CRC (2002) and Pepper et al (2005), were not included in the Appendix V or section 23 references to help readers assess their suitability for benefits transfer calculations such as were made. Note that more recent valuations of native habitat in relation to coal developments in NSW have been made such as (Curtis 2011) and (Campbell 2011).

Due to these shortcomings, we place little confidence in the claimed value of a \$17.9 million loss.

### **Loss to agriculture**

The claimed losses to agriculture of \$0.3 to \$0.9 million per year pale into insignificance when compared to the impacts on agriculture caused by this and other mines due to their impact on labour markets and exchange rates. Recent analysis of the China First Coal Project, **by the project proponents** (AEC group 2010), finds that that mine (slightly larger than Kevin’s Corner) will reduce agricultural employment by 126 jobs and output by \$42 million per year. The impacts on manufacturing are greater due to similar labour demands and exposure to export markets. Manufacturing employment will decline by up to 2,215 jobs while output will decline by over \$1.2 billion per year.

The reason these enormous impacts were not found in the assessment of Kevin’s Corner was the Input-Output methodology used, which is explained in the next section.

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<sup>1</sup> <http://www.theage.com.au/business/gvk-encounters-shut-bank-doors-20111130-1o70h.html>

## Understanding I-O analysis

Input-output models describe how different industries in an economy are linked. Each industry in an economy is linked to other industries – they buy goods and services for their own production and also sell their products as inputs into other industries. Households are the consumers of final goods and supply labour to all industries. If all these links are understood, the model can calculate how a change in the inputs and outputs of a specific industry affects the inputs and output of all industries in an economy. In the case of Kevin's Corner, an increase in the activity of the mining industry will increase the mining industry's demand for labour and other goods and services and increase its output. This cumulative effect of each industry on the others is known by economists as the multiplier effect.

In I-O modelling, Each industry produces an amount known as its final output. Final output represents the amount that was sold to end users (households or exports) and the amount that was purchased by other industries for use in their own production. Mathematically this is represented by:

$$x = ax + y$$

Where:

x is the final output of the industry

y is the amount of the industry's output consumed by final users.

a is the coefficient which describes the link between this industry and others. ax is the amount of this industry's production that is used as an input by other industries.

This equation can be rearranged to give:

$$x = (1-a)^{-1} y$$

and hence:

$$\Delta x = (1-a)^{-1} \Delta y$$

This means that if you know the change in output of the industry and you know the coefficient, a, you can find the impact of the change on final users. These equations above describe only one industry and the final users are considered to be only households. Real input-output tables use matrices to describe an economy with many industries. In an industry with three economies:

$$\vec{X} = A\vec{X} + \vec{Y}$$

Where different industries are represented as follows:

$$\begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} y_1 \\ y_2 \\ y_3 \end{bmatrix}$$

Although this looks more complicated, the algebra works similarly. By considering more industries in an economy the impacts on variables such as output (gross domestic or state product), household income or employment can be estimated.

It is not necessary for the general observer to understand matrix algebra. What is important is to understand that the change in an industry, X, causes impacts Y, estimated through the coefficients that link the industries, A. The derivation of these coefficients is all-important to the accuracy of the model. The accuracy of the results produced by an input output model can only be as good as the coefficients which have been developed to model inter-industry dependence. Each area within the national economy has different coefficients between industries and to the national data. In order to have an accurate model on an economic region, the coefficients must accurately affect the relationship between industries in that region (BRS 2005).

## I-O analysis of Kevin's Corner

The assessment employs the input-output model to estimate the impacts of the proposed Kevin's Corner thermal coal mine in the Barcaldine Regional Council. The changes the project would bring about – construction and capital expenditure as well as the ongoing operational costs of the mine – are estimated by the project proponents on p23-5 and p23-11. In the terms of our explanation above, these are the changes in X for the mining industry.

The impact of these changes on four economic variables – output, value added, household income and employment – are estimated on p23-8, p23-9, 23-14 and 23-15. In the terms of our explanation above, these are the impacts Y on the wider economy.

Unfortunately, there is no discussion in *Section 23* of the all-important inter-industry coefficients, the values for A in our explanation. This important discussion is left to p37 of *Appendix V* where it is explained that:

*The economic impact analysis is based on input-output tables which describe interindustry transactions for a given region. National input-output tables for 2005-06 are prepared by the Australian Bureau of Statistics based on the Australian National Accounts. Queensland tables are then imputed using Queensland State Accounts and Census data.*

The coefficients used should have been based on empirical study of the industries in the Barcaldine Regional Council and Central West statistical division. As the Bureau of Rural Sciences (2005) explains:

*[M]ultipliers should be calculated from input-output tables for the relevant region. Regional economies generally have a higher degree of specialisation, and rely more heavily on external suppliers in most industries, than national economies. As such, regional multipliers are often lower than national multipliers. However, in most cases regional input-output tables are not readily available, and must be developed for specific economic impact studies (rather than using less appropriate state or national tables). If available, extant tables from earlier studies of the region can be a quick and inexpensive short-cut, however elements of the table may change over time (particularly in smaller regions or regions with dominating firms) which could lead to significant inaccuracy if not updated with more recent data.*

These coefficients that the authors derived from the ABS national accounts data used to be published by the ABS. It is worth noting that the ABS stopped publishing these coefficients directly because:

*Production of multipliers was discontinued with the 2001–02 issue for several reasons. There was considerable debate in the user community as to their suitability for the purposes to which they were most commonly applied, that is, to produce measures of the size and impact of a particular project to support bids for industry assistance of various forms. (ABS 2011)*

The ABS goes on to discuss some of the reasons why I-O analysis is inappropriate for such assessment, some of which are mentioned in *Appendix V*, though not in *Section 23*:

***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.*

This is clearly apparent in the case of Kevin’s Corner. *Section 23: Economics* notes that labour and real estate markets in the region are very thin, conceding that “*The Project is likely to place pressure on local and regional labour and accommodation (both housing and commercial accommodation) markets.*” (p23-16). Which leads to the ABS’s next point:

***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.*

The proponents concede this point: “*Large resource projects can push demand well ahead of supply for a range of goods and services, leading to localised inflation.*” (p23-17), but take a very glass-half full approach when they claim:

*As a result, competing sectors such as agriculture and population servicing sectors (e.g. automotive industry, general industry etc) are also likely to experience higher incomes. (Appendix V p75)*

The glass-half empty economist would point out that this will significantly increase costs to farms and businesses and reduce the availability of services. This is made clear by AEC group (2010) who use different modelling methods to quantify the losses that the China First Coal Project will bring to other industries:

Industry	Forecast decline in annual output to 2012-13	Forecast decline in annual output to 2018	Forecast decline in annual output to 2037
Agriculture (\$M)	-42.0	-38.0	-15.2
Manufacturing (\$M)	-209.3	-1,249.4	-1,050.8

Such impacts are already apparent to local residents, as a recent email shows:

*Was talking to a local grazier a couple of days ago (15mins out of Springsure) who hasn't been able to get an electrician in to fix his pump from the floods at the beginning of the year. He is now organising to fly in an electrician from Brisbane! Similarly Ergon Energy are losing electricians to the mines at an alarming rate and there is talk that they will have to offer much better conditions and pay in order to retain them. The outcome being higher costs to Ergon and hence to us. (personal communication)*

The ABS concludes that I-O modelling:

***Not applicable for small regions:*** Multipliers that have been calculated from the national I–O table are not appropriate for use in economic impact analysis of projects in small regions. For small regions multipliers tend to be smaller than national multipliers since their inter–industry linkages are normally relatively shallow. Inter–industry linkages tend to be shallow in small regions since they usually don't have the capacity to produce the wide range of goods used for inputs and consumption, instead importing a large proportion of these goods from other regions.

Or as Abelson put it:

*I–O models lack resource constraints and fail to capture significant welfare (consumer and environmental) impacts. They always produce a positive gain to the economy, however disastrous the event.*

## Conclusion:

Section 23: *Economics* is not an appropriate document for decision making purposes. To understand if the project serves the best interests of Queensland or the local community, cost benefit analysis must be undertaken. Input-output analysis is inappropriate for decision making purposes, as is made clear by treasuries and similar departments throughout Australia, including Queensland. The figures presented as benefits and costs (the value of coal and the value of habitat and agricultural production) are highly misleading.

The input-output analysis presented does not use appropriate inter-industry coefficients. These are vital to understanding if the analysis is accurate or not. If the analysis is not based on empirically-derived coefficients relevant to the local region, the impacts will be overstated.

The use of overstated impacts from input-output analysis to justify projects was a key reason the ABS stopped publishing tables of I-O coefficients. Particular problems relate to I-O's inability to account for resource constraints, price changes and the challenges of small regions.

All of this highlights what local residents already know – that there is little evaluation carried out of the local impacts of mining projects and that the benefits are often overstated.

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