hudson howells

TrustPower

Rye Park Wind Farm –

327MW Option

Economic Impact Assessment

August 2015

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Executive Summary

The proposed Rye Park Wind Farm is a major new wind farm proposal in the Yass area of NSW which Epuron has been actively developing since late 2008 when the first wind monitoring mast was installed. The proposed wind farm is located to the north of Yass and east of Boorowa, New South Wales, on the edge of the Southern Tablelands and the South West Slopes in the vicinity of the township of Rye Park.

The project would involve the construction and operation of 109 wind turbines, together with the control and maintenance buildings, associated civil works and electrical infrastructure required to connect into the existing transmission network.

The modelling for this paper assumes the project is constructed with the capacity to deliver327 MW of power. The turbine counts for the three LGA's are 73 in Boorowa, 25 in Upper Lachlan and 11 in Yass, with 6 turbines included above that could fall either side of the Boorowa – Upper Lachlan Boundary.

The closest rural centre is the township of Rye Park located approximately 3 – 4km to the west of the site. Boorowa is located approximately 17 km to the north west and Yass is about 17 km to the south of the site.

Hudson Howells has been engaged by Trustpower to undertake an Economic Impact Assessment of the proposed Rye Park Wind Farm Project.

The objectives of this project include:

- An economic assessment of the Rye Park Wind Farm Project in terms of economic benefits to New South Wales, ACT, the region and also the local community.

- An assessment of the associated benefits of offsetting carbon by displacing the need for further non-renewable generation development, such as coal or gas fired power stations.

This economic impact assessment focuses on the effect of the Rye Park Wind Farm Project on regional incomes and employment associated with the construction and operating phases of the project. This effect arises through the primary expenditure directly associated with the project, and then from further 'rounds' of indirect expenditure that this direct expenditure stimulates as it flows to supplying industries and into incomes and consumption.

The economic modelling for the project has been undertaken using a conservative scenario of impact. This conservative scenario is based on a relatively low proportion of construction and operating inputs being supplied locally (i.e. by the LGA's of Yass Valley and Boorowa, Goulburn-Yass region, the State of NSW and given its proximity to the project, the economy of the ACT). It is assumed that the towers are imported from interstate or overseas, and the major local impact is based on transport and assembly. Alternative scenarios with higher

contributions are possible but have not been modelled.

Modelling for this scenario indicates that the project will generate $163 million of value added (which is a net contribution to Gross State Product[1]) **in the State of NSW** and $45 million of value added **to the ACT** – or a total of $208 million, over the period of construction and that this would happen over three years (allowing for lagged flow through effects). 1,411 person years[2] of employment in NSW and 433 in the ACT (total of 1,844) would be supported – or an average of over 470[3] jobs and 144 respectively (total of 614) sustained per year over three years. Once operational the project is estimated to support annually $8.2 million of value added in NSW and $2.9 in the ACT, and support directly and indirectly of the order of 68 and 26 jobs respectively per year. Note that the impact at the national level would be similar to the state level, unless there are constraints in national labour and capital markets. Such constraints would reduce the State level of impact, with the project drawing resources into New South Wales and out of other states.

From a **broad regional perspective**[4], the modelling indicates that the project will generate $49 million of value added (contribution to Gross Regional Product) in the region over the period of construction and, again allowing for lagged flow through effects, this would happen over three years. 437 person years of employment would be supported, or an average of 146 jobs sustained per year over three years. Once operational the project is estimated to support annually $3.6 million of value added in the region, and support directly and indirectly (including the multiplier impact) approximately 32 jobs per year.

From a local perspective[5], the modelling indicates that the project will generate $22 million of value added (contribution to Gross Regional Product) in LGA's of Yass Valley, Upper Lachlan and Boorowa over the period of construction and, again allowing for lagged flow through effects, this would happen over three years. 186 person years of employment for local residents would be supported, or an average of 62 jobs sustained per year over three years. Once operational the project is estimated to support annually $1.4 million of value added in the region, and support directly and indirectly (including the multiplier impact) approximately 12 jobs per year.

The above economic modelling results are summarized in the following tables:

[1] Value added is the way in which economic activity is measured in the National Accounting system. At the national level this is equivalent to Gross Domestic Product (GDP) and is made up of returns to labour (wages and salary and taxes on labour) and returns to capital (gross operating surplus (or profits plus depreciation and financing costs) and company tax and GST). At the state level the national accounts call this amount the Gross State Product.

[2] ie the number of full time equivalent annual jobs created over the period. So a project that created 100 full time jobs that last for four years would have an outcome of 400 person years of employment

[3] $1411 \div 3$

[4] Regional in this context is defined as the Goulburn-Yass South area of New South Wales.

[5] Local in this context is the LGA's of Yass Valley and Boorowa.

3 Year Construction Impacts

Contribution to NSW GSP	Total NSW Employment Impact	Contribution to ACT GSP	Total ACT Employment Impact	Contribution to GSP - NSW and ACT	Employment Impact - NSW and ACT	Contribution to GRP - Goulburn Yass Region	Employment Impact - Goulburn Yass Region	Contribution to GRP - Yass Valley, Boorowa & Upper Lachlan LGA's	Employment Impact - Yass Valley, Boorowa & Upper Lachlan LGA's
$162.8 million	1411; or 470 per annum	$44.7 million	433; or 144 per annum	$207.4 million	1844; or 614 per annum	$49.1 million	437; or 146 per annum	$21.5 million	186; or 62 per annum

Note – GSP is Gross State Product, GRP is Gross Regional Product, and jobs are in FTE's or person years

Annual Operational Impacts

Contribution to NSW GSP	Total NSW Employment Impact	Contribution to ACT GSP	Total ACT Employment Impact	Contribution to GSP - NSW and ACT	Employment Impact - NSW and ACT	Contribution to GRP - Goulburn Yass Region	Employment Impact - Goulburn Yass Region	Contribution to GRP - Yass Valley, Boorowa & Upper Lachlan LGA's	Employment Impact - Yass Valley, Boorowa & Upper Lachlan LGA's
$8.2 million	68 per annum	$2.9 million	26 per annum	$11.1 million	94 per annum	$3.6 million	32 per annum	$1.4 million	12 per annum

These outcomes are based on assumed levels of local supply, and where the more of the activity that can be retained in the region (while acknowledging the specialist nature of the construction itself), the more extensive the degree of economic activity.

Wind farms can have other positive and negative socio-economic impacts depending on a variety of factors and the specific communities being impacted by the developments. For example, farmers hosting turbines may receive positive financial benefits while other communities might be subject to negative visual impacts. Other than employment and income generation, two of the most significant externalities of wind farms are on property values and carbon emissions.

In relation to property values, many studies[6] by independent organisations around the world have failed to find any correlation between wind turbines and declining property values. Some studies have found positive property value impacts associated with:

- Improved regional amenities and infrastructure including local roads, firefighting access roads, etc.
- Increased regional incomes, jobs and property demand (as assessed above).
- Additional rental income from hosting towers.
- Provision of a drought-proofing income streams.
- Provision of post-retirement income for farmers.

[6] For example, the Lawrence Berkeley Study, United States, States http://eetd.lbl.gov/ea/ems/reports/lbnl-2829e.pdf, reported in Wind Energy the Facts, Clean Energy Council, March 2013

- Improved biodiversity via less intensive farm activity.

- Prevention of land subdivision and slowing down the process of productive agricultural land changing to rural residential uses in the short to medium term with the shift caused by the additional income generated from the wind farm making agricultural use more viable.

- Erosion control and passive wind protection for stock from sub stations and turbine tower structures.

There will be localised positive and negative impacts associated with wind farms depending on individual property locations. Some may appreciate faster than market trends due to improved farm incomes from hosting towers (offsetting the loss of productive land) and improved access to infrastructure. Some may fail to keep pace with market trends due to visual and noise impacts. Potential disruption during tower assembly and infrastructure establishment is also noted. However, the evidence supports no overall long term negative impact on property values associated with wind farm developments.

Finally, renewable wind energy generation has significant environmental benefits through **carbon emissions reduction** where it replaces coal or gas generated electricity.

It is assumed that the Rye Park Wind Farm will have the following operating characteristics:

- Total wind farm capacity of up to 327 megawatts.

- Annual average utilisation rate of 34%[7].

- Total generation of 974 Gigawatt hours (Gwh) per annum.

If it is conservatively assumed that when electricity is generated through coal fired stations, it produces 0.8 tonnes of carbon per megawatt hour[8] of electricity generated. Therefore the generation of 974 Gwh per annum through coal generation would produce in the order of 0.779 million tonnes of carbon emissions. At a carbon price of $20 per tonne (conservative relative to international trading schemes), the value of carbon emission savings therefore associated with the Rye Park Wind Farm is estimated to be $15.6 million per annum or a net present value of $165 million over a 20 year period (discount rate of 7%).

[7] Defined as the actual output of the project relative to its maximum possible output

[8] Annual carbon emissions from the National Electricity Market fell by over 12 million tonnes (CO2-e) between June 2012 and May 2013. They fell by only around 1.5 million tonnes over the previous twelve-month period. Carbon pollution per megawatt-hour has also fallen: from 0.86 to 0.81 tonnes per unit of output, or a little over 5 per cent. Source: The Climate Institute – www.climateinstitute.org.au

1. Introduction and Project Objectives

The proposed Rye Park Wind Farm is a major new wind farm proposal in the Yass area of NSW which Epuron has been actively developing since late 2008 when the first wind monitoring mast was installed. The Environmental Assessment was accepted by the NSW Government for public exhibition and is open to public comment until 4 July 2014.

The proposed wind farm is located to the north of Yass and east of Boorowa, New South Wales, on the edge of the Southern Tablelands and the South West Slopes in the vicinity of the township of Rye Park.

Figure 1: Location of Rye Park Wind Farm

The project involves the construction and operation of 109 wind turbines, together with the control and maintenance buildings, associated civil works and electrical infrastructure required to connect into the existing transmission network.

Following the installation of three on-site wind monitoring towers in 2008, Epuron is continuing to refine the proposal along ridgelines and hilltops that range in elevation from 700 to 800 meters above sea level. The exact site boundary will be confirmed in the Environmental Assessment to be prepared for the site. The turbine counts for the three LGA's are 73 in Boorowa, 25 in Upper Lachlan and 11 in Yass, with 6 turbines included above that could fall either side of the Boorowa – Upper Lachlan Boundary.

The closest rural centre is the township of Rye Park located approximately 3 – 4km to the west of the site. Boorowa is located approximately 17km to the north west and Yass is about 17km to the south of the site.

Hudson Howells has been engaged by Trustpower to undertake an Economic Impact Assessment of the proposed Rye Park Wind Farm Project, and this modelling looks at a development of a 327 MW option.

The objectives of this project include:

- An economic assessment of the Rye Park Wind Farm Project in terms of economic benefits to local community, the broader region and also to the ACT and the state of NSW.

- An assessment of the associated benefits of offsetting carbon by displacing the need for further non-renewable generation development, such as coal or gas fired power stations.

In addition to the above, consideration is given in this assessment to the potential impact of the project on local property values (within the Rye Park project area).

2. Project Assumptions

The economic modelling undertaken for this project is based on the following expenditure estimates supplied by Trustpower for construction and operation of the Rye Park Wind Farm. These figures are best estimates for the purposes on economic assessment. Final costs will depend on the turbine model selected:

- Total wind farm capacity of 327 megawatts.

- Total construction cost of $1.65 million per megawatt - $539.6 million apportioned over 3 years as follows:

    - Year 1 – 30%
    - Year 2 – 45%
    - Year 3 – 25%

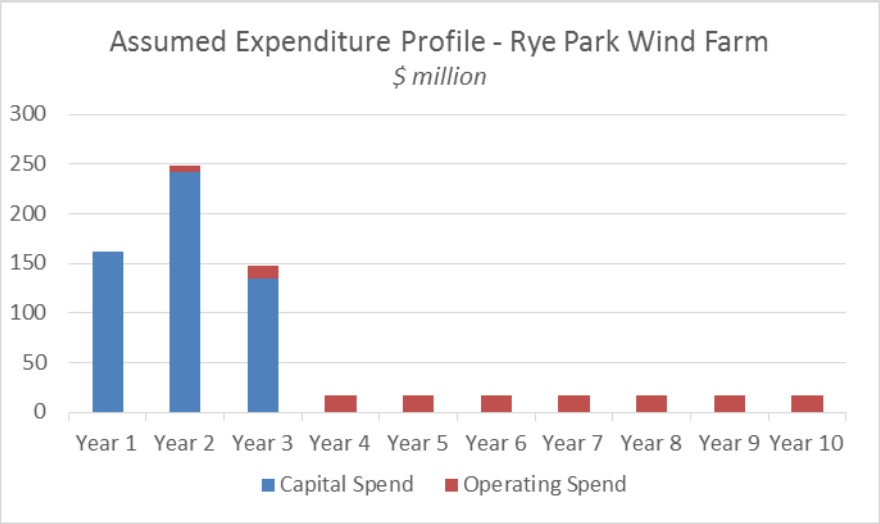
- The total construction cost of $539.6 million includes all construction and associated works, as follows:

WTG supply & install (%)	65.0%
U/g reticulation (%)	6.0%
Civil works	7.5%
Substation (%)	6.0%
Network connection (%)	14.0%
Wind monitoring (%)	0.2%
Visitor information centre etc. (%)	0.5%
O&M compound & car parking (%)	1.0%

- Annual operating costs are based on $18 per megawatt hour and an average utilisation rate of 34% - $17.53 million per annum.

An indicative time line of the expenditure profile is provided in Figure 2 below.

Figure 2



3. Broad Project Methodology

This economic impact assessment focuses on the effect of the Rye Park Wind Farm Project on regional and local incomes and employment associated with the construction and operating phases of the project. This effect arises through the primary expenditure directly associated with the project, and then from further 'rounds' of indirect expenditure that this direct expenditure stimulates as it flows to supplying industries and into incomes and consumption.

The importance of the construction and operating expenditure identified above is that it will sustain turnover in local industry and will support local jobs and incomes. The use of economic impact assessments based on State and Regional Input Output Tables has been a prominent process[9] for translating directly created expenditure (a final demand stimulus) into jobs and incomes, and for establishing the extent of the flow-on impacts.

The use of these Input Output tables allows an assessment of the impact of a certain event or events (in this case the Rye Park Wind Farm Project) on the incomes (value added or

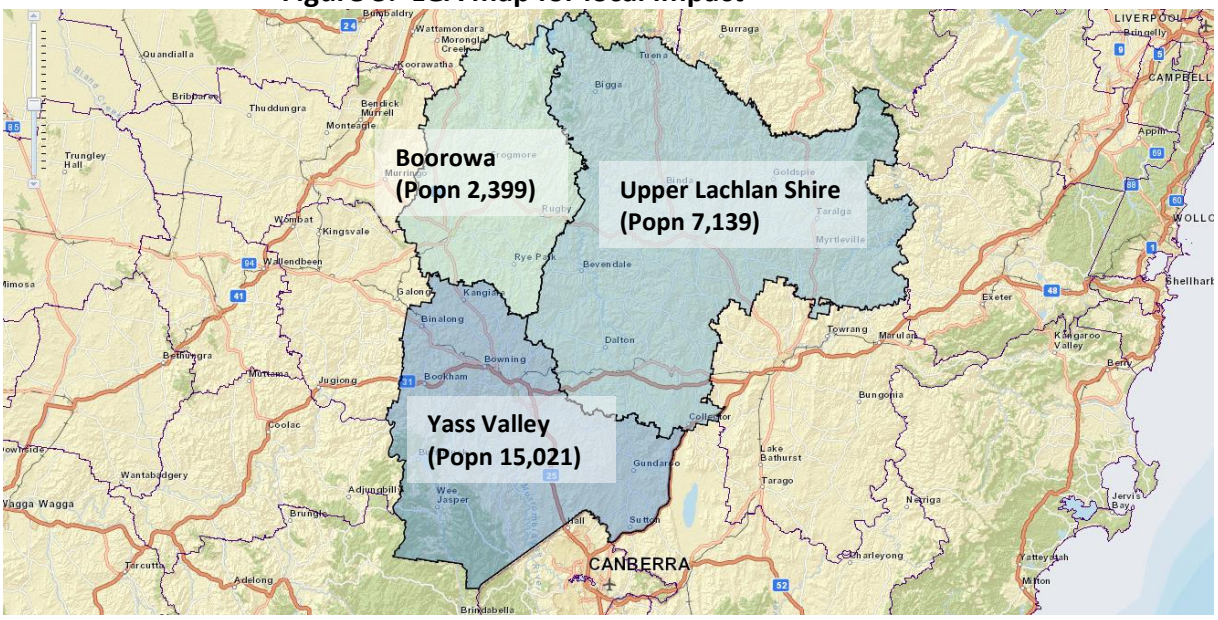
[9] Alternative economy wide models are available, including econometric models or CGE models. Input-Output models are general equilibrium models (in that the impacts of one sector are considered across the broader economy), but they assume infinite elasticity of supply. The other models include the impact of resource constraints (under varying assumptions). The evidence suggests that at the regional and state geographic levels such constraints are minimal in a long run perspective – as capital and labour can flow relatively easily across borders, and as such input output provides an appropriate methodology.

Gross State/Regional Product) and employment of a specified region or regions. This is consistent with national accounting frameworks.

The assessment for this project looks at the impact across 4 regions:

- **The local impact** – measured in terms of the contribution in the LGA's of Boorowa,Yass Valley and Upper Lachlan. This region is as mapped in Figure 3. The majority of the impact will occur in the three townships which are the major localities in the region.

Figure 3: LGA map for local impact



Source: ABS Table Builder (population as per 2011 Census)

- **The broader region**, as defined by the ABS in is regional definitions of Goulburn-Yass. This region adds in the major town of Goulburn – which is on the western transport route between the town of Yass and Sydney/Wollongong.

- **The state of NSW** – it should be noted that this region is inclusive of the regions above and the estimates of economic activity in the region are not additive to that of the state.

- **The ACT** – which as seen in the map above in close proximity to the region, to the south of Yass. The economic impact estimates in this context are additive to those of the state of NSW.

Table 1 illustrates the employment base of these regions, as estimated by the ABS (2011 census –place of work data).

Table 1: Employment by Industry and Region

	Boorowa	Yass Valley	Upper Lachlan Shire	Total of Local Area	Goulburn-Yass Region	NSW	ACT
Agriculture, Forestry and Fishing	311	586	887	1,784	3,153	68,883	290
Mining	0	10	3	13	112	29,798	40
Manufacturing	31	151	65	247	1,321	258,916	4,033
Electricity, Gas, Water and Waste Services	9	94	30	133	300	33,851	1,605
Construction	40	291	94	425	1,275	221,681	12,786
Wholesale Trade	19	78	43	140	626	137,210	2,811
Retail Trade	59	347	153	559	2,827	318,844	16,092
Accommodation and Food Services	34	389	118	541	1,812	206,260	11,791
Transport, Postal and Warehousing	23	96	58	177	914	151,956	4,772
Information Media and Telecommunications	0	16	16	32	154	71,629	4,165
Financial and Insurance Services	7	34	15	56	379	156,936	3,929
Rental, Hiring and Real Estate Services	5	37	8	50	251	50,886	2,701
Professional, Scientific and Technical Services	11	193	71	275	844	242,499	21,389
Administrative and Support Services	6	59	30	95	408	100,352	4,998
Public Administration and Safety	52	194	109	355	1,855	183,411	72,683
Education and Training	64	261	154	479	1,852	245,242	18,498
Health Care and Social Assistance	67	336	195	598	2,912	356,523	19,437
Arts and Recreation Services	8	41	13	62	200	45,557	3,587
Other Services	15	100	84	199	828	115,591	6,861
Inadequately described	4	25	22	51	169	35,337	1,504
Not stated	4	4	0	8	15	2,164	117
Total	769	3,342	2,168	6,279	22,207	3,033,526	214,089

Source: ABS Table Builder, data for Census 2011

The analysis develops estimates of economic impact for the regions based on indicative input-output tables developed for the regions above. These tables at the state level have been derived using the 2009/10 Australian input output table as prepared by the ABS, and using the location quotient method (based on regional employment data for the relevant regions from the 2011 Census), adjusting for inflation. The tables for the smaller regions also use the location quotient method, but the regional table is derived from the underlying NSW table, while the local table is based on the regional table.

4. Economic Assessment

This section of the report details the economic impact assumptions and findings of the project assuming low levels of direct supply from local industry. In short, the economic modelling for the project has been undertaken for a scenario which could be considered conservative. This base scenario is based on a low proportion of construction and operating inputs being supplied locally. It is assumed that the towers are imported from interstate or overseas.

The assumptions regarding transport inputs and assembly are similar in each case, with the main variations being in materials inputs and construction.

Core Assumptions

Tables 2a – 2c below show the Scenario assumptions for capital and operating expenditure by category and source. The assumed distributions are based on the nature of the spend and specific assumptions regarding the expenditure profiles for the state, region and shire, and for the ACT. It should be noted that the major assumption that impacts economic outcomes is the percentage of imported material. The distribution of local product to other sectors is not as critical (in an order of magnitude perspective).

Table 2a present the assumptions in terms of the broad basis of expenditure (i.e. nature of expenditure). Table 2b extends the detail of the distribution to match more closely the 19 sector Input Output Tables that have been developed for this project. The spend of labour wages and salaries is distributed at the State level based on the average consumption vector, while at the regional and local level it is assumed that for capital works most of the labour force is external and their spend is in retail trade and hospitality, but for ongoing operations labour costs are distributed as per the average consumption vector (excluding ownership of dwellings, as that is conservatively assumed to have a less direct linkage between income and annual spend). Table 2c involves the conversion of these values from purchasers' prices to basic prices, as the raw data includes margins, taxes and subsidies. In addition, there is a management fee added to the Table2b base distributions that is assigned to the business services sector to allow for activity that will occur outside of the direct project budget (general governance and compliance activity). The assumed margin is higher for the State level than the regional level. All monetary values in Input Output models are expressed as basic values. The prime differences between purchaser prices and basic values are that:

- Basic values exclude the cost of transport and wholesale and retail trade embedded in the purchase price (and allocate these to the transport and trade sectors).

- GST will be allocated to Gross Operating Surplus

The core assumptions to make the adjustments from purchaser price distributions to basic values are:

- The average value added in each of the industry sectors is extracted and then the GST component (at 10% - which is only paid on the value added) is deducted and separately identified.

- The purchaser price is adjusted for the average margin for wholesale, retail and transport sectors, as identified in national Input Output tables.

Table 2a: Assumed Expenditure Distributions

	Capital				Operating			
	Local	Region	NSW	ACT	Local	Region	NSW	ACT
Building Construction	0.0%	0.0%	7.5%	2.5%	4.0%	8.0%	15.0%	5.0%
Fabricated metals	0.0%	0.0%	0.0%	0.0%	2.0%	4.0%	5.0%	5.0%
Transport	4.0%	8.0%	11.0%	4.0%	1.0%	2.0%	2.5%	2.5%
Spend of Labour	2.0%	4.0%	10.0%	5.0%	12.5%	25.0%	30.0%	10.0%
Imports	94.0%	88.0%	71.5%	88.5%	80.5%	61.0%	47.5%	77.5%
	100%	100%	100%	100%	100.0%	100.0%	100%	100%

Source: Assumptions

Table 2b: Assumed Expenditure Distributions by Detailed Sector

	Capital Spend				Operating Spend			
	Local	Region	NSW	ACT	Local	Region	NSW	ACT
Agriculture, Forestry and Fishing	0.2%	0.4%	1.0%	0.5%	0.1%	0.2%	0.2%	0.0%
Mining	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%
Manufacturing	0.60%	1.20%	3.0%	1.5%	2.5%	5.6%	7.7%	5.4%
Electricity, Gas, Water and Waste Services	0.0%	0.0%	0.0%	0.0%	0.3%	0.6%	0.7%	0.3%
Construction	0.0%	0.0%	6.0%	2.0%	3.2%	8.0%	10.5%	3.5%
Wholesale Trade	0.0%	0.0%	0.0%	0.0%	0.3%	0.7%	1.3%	0.3%
Retail Trade	0.6%	1.2%	3.0%	1.5%	0.9%	2.5%	3.0%	1.6%
Accommodationand Food Services	0.6%	1.2%	3.0%	1.5%	0.8%	1.6%	1.9%	1.1%
Transport, Postal & Warehousing	4.0%	8.0%	11.0%	4.0%	1.2%	2.6%	3.4%	2.8%
Information Media & Telecommunications	0.0%	0.0%	0.0%	0.0%	0.1%	0.3%	1.0%	0.8%
Finance and Insurance Services	0.0%	0.0%	0.0%	0.0%	0.2%	0.7%	2.4%	0.9%
Ownership of Dwellings	0.0%	0.0%	1.5%	0.5%	0.0%	0.0%	0.0%	0.0%
Property and Business Services (L, M, N)	0.0%	0.0%	0.0%	0.0%	0.9%	1.7%	3.3%	1.2%
Public Administration & Safety	0.0%	0.0%	0.0%	0.0%	0.4%	1.0%	1.2%	1.3%
Education & Training	0.0%	0.0%	0.0%	0.0%	0.5%	1.3%	1.6%	0.9%
Health care and social assistance	0.0%	0.0%	0.0%	0.0%	0.1%	0.3%	0.6%	1.0%
Arts and recreation services	0.0%	0.0%	0.0%	0.0%	0.3%	0.8%	0.9%	0.5%
Other Services	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%
Total	**6.0%**	**12.0%**	**28.5%**	**11.5%**	**11.8%**	**27.8%**	**39.8%**	**22.3%**

* *Property and Business Services includes a small margin related to business services, in addition to the project budget. The distribution of labour spend is based on the average consumption vector, and as such some is distributed to imports and ownership of dwellings is conservatively treated as not being direct spend. Source: Assumptions*

Table 2c: Assumed Expenditure Distributions in Basic Values

	Capital Spend				Operating Spend			
	Local	Region	NSW	ACT	Local	Region	NSW	ACT
Agriculture, Forestry and Fishing	0.2%	0.4%	0.9%	0.5%	0.1%	0.1%	0.2%	0.0%
Mining	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%
Manufacturing	0.6%	1.1%	2.8%	1.4%	2.3%	5.2%	7.1%	5.0%
Electricity, Gas, Water and Waste Services	0.0%	0.0%	0.0%	0.0%	0.3%	0.5%	0.6%	0.3%
Construction	0.0%	0.0%	5.5%	1.8%	2.9%	7.3%	9.6%	3.2%
Wholesale Trade	0.5%	0.7%	2.2%	0.7%	0.7%	1.4%	3.4%	1.0%
Retail Trade	0.6%	1.2%	3.0%	1.6%	0.8%	2.3%	3.0%	1.5%
Accommodationand Food Services	0.6%	1.1%	2.8%	1.4%	0.7%	1.5%	1.7%	1.1%
Transport, Postal & Warehousing	3.7%	7.3%	10.0%	3.7%	1.1%	2.4%	3.1%	2.6%
Information Media & Telecommunications	0.0%	0.0%	0.0%	0.0%	0.1%	0.2%	0.9%	0.7%
Finance and Insurance Services	0.0%	0.0%	0.0%	0.0%	0.2%	0.6%	2.2%	0.8%
Ownership of Dwellings	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Property and Business Services (L, M, N)	0.0%	0.0%	0.0%	0.0%	0.8%	1.6%	3.0%	1.1%
Public Administration & Safety	0.0%	0.0%	0.0%	0.0%	0.4%	0.9%	1.1%	1.2%
Education & Training	0.0%	0.0%	0.0%	0.0%	0.4%	1.2%	1.5%	0.8%
Health care and social assistance	0.0%	0.0%	0.0%	0.0%	0.1%	0.3%	0.5%	0.9%
Arts and recreation services	0.0%	0.0%	0.0%	0.0%	0.3%	0.7%	0.8%	0.4%
Other Services	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.5%
GST	0.0%	0.2%	1.3%	0.5%	0.4%	1.5%	1.0%	1.1%
Total	**6.0%**	**12.0%**	**28.5%**	**11.5%**	**11.8%**	**27.8%**	**39.8%**	**22.3%**

Source: Assumptions

Modelling Results – State Level Outcomes

New South Wales

Tables 3a-3c show the results of shocking the Input Output Table for New South Wales with the aggregated expenditures, in the context that they would represent an increase in final demand[10], and distributed as per Table 2c through the Input Output Table. Tables 3a and 3b show the detailed outcomes – with the level of activity generated by industry sector. Table 3c provides a summary of the outcomes.

The modelling indicates that the project will generate $163 million of value added[11] (incomes created or contribution to Gross State Product) in the State of NSW over the period of construction and that this would happen over three years (allowing for lagged flow through effects). 1,411 person years[12] of employment would be supported – or an average of 470 jobs sustained per year over three years. Once operational the project is estimated to support annually $8.2 million of incomes, and support directly and indirectly of the order of 68 jobs per year.

[10] This analysis assesses the contribution of the project in isolation. It does not compare the project with other possible projects, and nor does it investigate the change in expenditure levels at existing energy providers, as this project takes on market share – although this is expected to be negligible given the fixed cost context of the industry.

[11] Contribution to Gross State or Regional Product (GSP/GRP) – and defined as the returns to labour and the returns to capital as per the national accounting framework.

[12] Person years are the number of full time annual job equivalents over the period of construction

Table 3a: Estimates of Economic Activity by Sector Related to Aggregate Capital Spend for New South Wales– Outcomes over Life of Project

(Note employment should be interpreted as person years of employment rather than number of jobs at a point of time) See the earlier definitions of person years of employment

	Expend-iture ($m)	Value Added ($m)			Income ($m)			Employment (FTE's)		
		Direct	Induced	Total	Direct	Induced	Total	Direct	Induced	Total
Agriculture, Forestry and Fishing	$4.97	$2.11	$2.60	$4.71	$0.51	$0.63	$1.15	22	27	49
Mining	$0.00	$0.00	$2.51	$2.51	$0.00	$0.50	$0.50	0	4	4
Manufacturing	$14.91	$4.21	$11.39	$15.60	$2.36	$6.40	$8.76	33	90	124
Electricity, Gas, Water and Waste Services	$0.00	$0.00	$3.50	$3.50	$0.00	$1.28	$1.28	0	14	14
Construction	$29.63	$8.91	$3.82	$12.73	$4.64	$1.99	$6.63	79	34	113
Wholesale Trade	$11.78	$5.70	$6.51	$12.22	$3.67	$4.19	$7.86	37	42	79
Retail Trade	$16.24	$9.11	$6.66	$15.76	$6.25	$4.57	$10.81	132	97	229
Accommodationand Food Services	$14.90	$6.62	$3.62	$10.25	$4.50	$2.46	$6.96	110	60	171
Transport, Postal & Warehousing	$54.20	$23.52	$8.14	$31.67	$12.39	$4.29	$16.68	179	62	240
Information Media & Telecommunications	$0.00	$0.00	$5.78	$5.78	$0.00	$1.92	$1.92	0	25	25
Finance and Insurance Services	$0.00	$0.00	$15.07	$15.07	$0.00	$7.53	$7.53	0	41	41
Ownership of Dwellings	$0.00	$0.00	$19.60	$19.60	$0.00	$13.05	$13.05	0	159	159
Property and Business Services (L, M, N)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0	0	0
Public Administration & Safety	$0.71	$0.39	$1.29	$1.67	$0.31	$1.05	$1.36	4	13	17
Education & Training	$0.00	$0.00	$3.15	$3.15	$0.00	$2.75	$2.75	0	34	34
Health care and social assistance	$0.00	$0.00	$3.62	$3.62	$0.00	$3.06	$3.06	0	43	43
Arts and recreation services	$0.00	$0.00	$0.98	$0.98	$0.00	$0.58	$0.58	0	12	12
Other Services	$0.00	$0.00	$3.95	$3.95	$0.00	$2.77	$2.77	0	59	59
Total	**$147.34**	**$60.56**	**$102.21**	**$162.77**	**$34.64**	**$59.01**	**$93.65**	**596**	**815**	**1,411**

Source: Modelled Result

Table 3b: Estimates of Annual Economic Activity by Sector Related to Operating Spend for New South Wales

	Expend-iture ($m)	Value Added ($m)			Income ($m)			Employment (FTE's)		
		Direct	Induced	Total	Direct	Induced	Total	Direct	Induced	Total
Agriculture, Forestry and Fishing	$0.03	$0.01	$0.12	$0.13	$0.00	$0.03	$0.03	0	1	1
Mining	$0.01	$0.01	$0.14	$0.15	$0.00	$0.03	$0.03	0	0	0
Manufacturing	$1.33	$0.37	$0.58	$0.96	$0.21	$0.33	$0.54	3	5	8
Electricity, Gas, Water and Waste Services	$0.12	$0.05	$0.19	$0.24	$0.02	$0.07	$0.09	0	1	1
Construction	$1.79	$0.54	$0.24	$0.78	$0.28	$0.13	$0.41	5	2	7
Wholesale Trade	$0.63	$0.30	$0.31	$0.61	$0.20	$0.20	$0.40	2	2	4
Retail Trade	$0.56	$0.31	$0.36	$0.67	$0.21	$0.25	$0.46	5	5	10
Accommodationand Food Services	$0.32	$0.14	$0.18	$0.33	$0.10	$0.12	$0.22	2	3	5
Transport, Postal & Warehousing	$0.58	$0.25	$0.35	$0.60	$0.13	$0.18	$0.32	2	3	5
Information Media & Telecommunications	$0.17	$0.09	$0.30	$0.38	$0.03	$0.10	$0.13	0	1	2
Finance and Insurance Services	$0.41	$0.28	$0.82	$1.10	$0.14	$0.41	$0.55	1	2	3
Ownership of Dwellings	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0	0	0
Property and Business Services (L, M, N)	$0.57	$0.25	$0.96	$1.21	$0.17	$0.64	$0.81	2	8	10
Public Administration & Safety	$0.20	$0.11	$0.06	$0.17	$0.09	$0.05	$0.14	1	1	2
Education & Training	$0.27	$0.20	$0.16	$0.36	$0.18	$0.14	$0.32	2	2	4
Health care and social assistance	$0.09	$0.06	$0.19	$0.25	$0.05	$0.16	$0.21	1	2	3
Arts and recreation services	$0.15	$0.06	$0.06	$0.12	$0.04	$0.03	$0.07	1	1	1
Other Services	$0.00	$0.00	$0.16	$0.16	$0.00	$0.11	$0.11	0	2	2
Total	**$7.23**	**$3.04**	**$5.18**	**$8.22**	**$1.84**	**$2.97**	**$4.82**	**27**	**41**	**68**

Source: Modelled Result

Table 3c: Estimates of Economic Activity for New South Wales

	Total GSP Impact (3 yrs)	Average Annual GSP Impact	Total Jobs Impact (Person Years - over 3 yrs)	Average Annual Jobs Impact
Construction Phase				
• Direct	$60.6 million	$20.2 million	596	199
• Indirect	$102.2 million	$34.1 million	815	272
• Total	$162.8 million	$54.3 million	1,411	470
Operating Phase				
• Direct		$3 million		27
• Indirect		$5.2 million		41
• Total		$8.2 million		68

Source: Modelled Result
**Full Time Equivalent Jobs*
Note – these numbers are rounded versions of the numbers in the tables above, as the modelling should be interpreted in terms of order of magnitude, but it means that not all numbers are exactly additive.

It should be noted that the impact at the national level would be similar to that estimated for the State level, unless there are constraints in national labour and capital markets. Such constraints would reduce the State level of impact, with the project drawing resources into New South Wales and out of other states. If such constraints existed (i.e. at extended times with very low unemployment rates, or where the project might have significant effects on exchange rates) the national outcomes would be best modelled using a CGE model to allow for those constraints.

Australian Capital Territory
Tables 4a-4c show the results of shocking the Input Output Table for Australian Capital Territory with the aggregated expenditures, in the context that they would represent an increase in final demand, and distributed as per Table 2c through the Input Output Table. Tables 4a and 4b show the detailed outcomes – with the level of activity generated by industry sector. Table 4c provides a summary of the outcomes.

The modelling indicates that the project will generate $45 million of value added (incomes created or contribution to Gross State Product) in the ACT over the period of construction and that this would happen over three years (allowing for lagged flow through effects). 433 person years of employment would be supported – or again an average of over 144 jobs sustained per year over three years. Once operational the project is estimated to support annually $2.9 million of incomes, and support directly and indirectly of the order of 26 jobs per year.

Table 4a: Estimates of Economic Activity by Sector Related to Aggregate Capital Spend for Australian Capital Territory – Outcomes over Life of Project

(Note employment should be interpreted as person years of employment rather than number of jobs at a point of time) See the earlier definitions of person years of employment

	Expend-iture ($m)	Value Added ($m)			Income ($m)			Employment (FTE's)		
		Direct	Induced	Total	Direct	Induced	Total	Direct	Induced	Total
Agriculture, Forestry and Fishing	$2.49	$1.05	$0.04	$1.09	$0.26	$0.01	$0.27	11	0	11
Mining	$0.00	$0.00	$0.01	$0.01	$0.00	$0.00	$0.00	0	0	0
Manufacturing	$7.46	$2.10	$0.58	$2.69	$1.18	$0.33	$1.51	17	5	21
Electricity, Gas, Water and Waste Services	$0.00	$0.00	$0.59	$0.59	$0.00	$0.21	$0.21	0	2	2
Construction	$9.88	$2.97	$0.84	$3.81	$1.55	$0.44	$1.98	26	7	34
Wholesale Trade	$3.93	$1.90	$0.62	$2.52	$1.22	$0.40	$1.62	12	4	16
Retail Trade	$8.65	$4.85	$1.19	$6.04	$3.33	$0.82	$4.15	70	17	88
Accommodationand Food Services	$7.45	$3.31	$0.82	$4.14	$2.25	$0.56	$2.81	55	14	69
Transport, Postal & Warehousing	$19.71	$8.55	$0.96	$9.51	$4.51	$0.51	$5.01	65	7	72
Information Media & Telecommunications	$0.00	$0.00	$1.69	$1.69	$0.00	$0.56	$0.56	0	7	7
Finance and Insurance Services	$0.00	$0.00	$1.96	$1.96	$0.00	$0.98	$0.98	0	5	5
Ownership of Dwellings	$0.00	$0.00	$5.62	$5.62	$0.00	$3.74	$3.74	0	45	45
Property and Business Services (L, M, N)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0	0	0
Public Administration & Safety	$0.25	$0.14	$0.41	$0.55	$0.11	$0.34	$0.45	1	4	5
Education & Training	$0.75	$0.55	$0.90	$1.45	$0.48	$0.79	$1.27	6	10	16
Health care and social assistance	$0.75	$0.51	$0.85	$1.36	$0.43	$0.72	$1.15	6	10	16
Arts and recreation services	$0.00	$0.00	$0.31	$0.31	$0.00	$0.18	$0.18	0	4	4
Other Services	$0.75	$0.37	$0.94	$1.32	$0.26	$0.66	$0.92	6	14	20
Total	**$62.05**	**$26.31**	**$18.34**	**$44.65**	**$15.58**	**$11.24**	**$26.82**	**276**	**157**	**433**

Source: Modelled Result

Table 4b: Estimates of Annual Economic Activity by Sector Related to Operating Spend for Australian Capital Territory

	Expend-iture ($m)	Value Added ($m)			Income ($m)			Employment (FTE's)		
		Direct	Induced	Total	Direct	Induced	Total	Direct	Induced	Total
Agriculture, Forestry and Fishing	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0	0	0
Mining	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0	0	0
Manufacturing	$0.93	$0.15	$0.16	$0.31	$0.00	$0.17	$0.17	2	0	2
Electricity, Gas, Water and Waste Services	$0.06	$0.02	$0.05	$0.07	$0.00	$0.02	$0.02	0	0	0
Construction	$0.60	$0.23	$0.01	$0.24	$0.00	$0.13	$0.13	2	1	2
Wholesale Trade	$0.19	$0.06	$0.07	$0.13	$0.00	$0.09	$0.09	1	0	1
Retail Trade	$0.28	$0.06	$0.19	$0.25	$0.00	$0.17	$0.17	2	1	4
Accommodationand Food Services	$0.20	$0.03	$0.11	$0.14	$0.00	$0.10	$0.10	1	1	2
Transport, Postal & Warehousing	$0.48	$0.16	$0.10	$0.26	$0.00	$0.14	$0.14	2	0	2
Information Media & Telecommunications	$0.13	$0.00	$0.18	$0.18	$0.00	$0.06	$0.06	0	0	1
Finance and Insurance Services	$0.15	$0.05	$0.20	$0.24	$0.00	$0.12	$0.12	0	0	1
Ownership of Dwellings	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0	0	0
Property and Business Services (L, M, N)	$0.21	$0.14	$0.31	$0.44	$0.00	$0.30	$0.30	1	3	4
Public Administration & Safety	$0.22	$0.12	$0.02	$0.14	$0.00	$0.12	$0.12	1	0	1
Education & Training	$0.15	$0.03	$0.14	$0.17	$0.00	$0.15	$0.15	1	1	2
Health care and social assistance	$0.16	$0.06	$0.11	$0.17	$0.00	$0.14	$0.14	1	1	2
Arts and recreation services	$0.08	$0.01	$0.04	$0.05	$0.00	$0.03	$0.03	0	0	1
Other Services	$0.10	$0.00	$0.10	$0.10	$0.00	$0.07	$0.07	1	1	1
Total	**$3.94**	**$1.12**	**$1.79**	**$2.91**	**$0.00**	**$1.81**	**$1.81**	**16**	**10**	**26**

Source: Modelled Result

Table 4c: Estimates of Economic Activity for Australian Capital Territory

	Total GSP Impact (3 yrs)	Average Annual GSP Impact	Total Jobs Impact (Person Years - over 3 yrs)	Average Annual Jobs Impact
Construction Phase				
• Direct	$26.3 million	$8.8 million	276	92
• Indirect	$18.3 million	$6.1 million	157	52
• Total	$44.7 million	$14.9 million	433	144
Operating Phase				
• Direct		$1.1 million		16
• Indirect		$1.8 million		10
• Total		$2.9 million		26

Source: Modelled Result
**Full Time Equivalent Jobs*
Note – these numbers are rounded versions of the numbers in the tables above, as the modelling should be interpreted in terms of order of magnitude, but it means that not all numbers are exactly additive.

Modelling Results – Goulburn-Yass Region Outcomes

Tables 5a-5c show the results of applying the regional expenditures (as per Table 2c) above to the regional Input Output Table for the Goulburn-Yass Region. It should be noted these results are inclusive in the NSW results.

Tables 5a and 5b show the detailed outcomes with the level of activity generated by industry sector, while Table 5c provides a summary of the outcomes.

From a regional perspective, the modelling indicates that the project will generate $49 million of value added (incomes created or contribution to Gross Regional Product) in the region over the period of construction and, again allowing for lagged flow through effects, this would happen over three years. 437 person years of employment would be supported, or again an average of 146 jobs sustained per year over three years. Once operational the project is estimated to support annually $3.6 million of incomes in the region, and support directly and indirectly (including the multiplier impact) approximately 32 jobs per year.

Table 5a: Estimates of Economic Activity by Sector Related to Aggregate Capital Spend for the Goulburn-Yass Region – Outcomes over Life of Project

(Note that employment should be interpreted as person years of employment rather than number of jobs at a point of time).

	Expend-iture ($m)	Value Added ($m)			Income ($m)			Employment (FTE's)		
		Direct	Induced	Total	Direct	Induced	Total	Direct	Induced	Total
Agriculture, Forestry and Fishing	$1.99	$0.84	$0.78	$1.63	$0.21	$0.19	$0.40	8	8	16
Mining	$0.00	$0.00	$0.34	$0.34	$0.00	$0.07	$0.07	0	1	1
Manufacturing	$5.97	$1.68	$2.57	$4.26	$0.95	$1.44	$2.39	13	19	32
Electricity, Gas, Water and Waste Services	$0.00	$0.00	$1.06	$1.06	$0.00	$0.38	$0.38	0	4	4
Construction	$0.00	$0.00	$0.55	$0.55	$0.00	$0.29	$0.29	0	5	5
Wholesale Trade	$3.93	$1.90	$1.28	$3.18	$1.22	$0.83	$2.05	12	8	20
Retail Trade	$6.40	$3.59	$2.37	$5.96	$2.46	$1.63	$4.09	25	58	82
Accommodationand Food Services	$5.96	$2.65	$1.09	$3.74	$1.80	$0.74	$2.54	42	17	59
Transport, Postal & Warehousing	$39.42	$17.11	$2.44	$19.55	$9.01	$1.29	$10.30	124	18	141
Information Media & Telecommunications	$0.00	$0.00	$0.49	$0.49	$0.00	$0.16	$0.16	0	2	2
Finance and Insurance Services	$0.00	$0.00	$1.20	$1.20	$0.00	$0.60	$0.60	0	3	3
Ownership of Dwellings	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0	23	23
Property and Business Services (L, M, N)	$0.00	$0.00	$2.98	$2.98	$0.00	$1.98	$1.98	0	0	0
Public Administration & Safety	$0.00	$0.00	$0.45	$0.45	$0.00	$0.37	$0.37	0	4	4
Education & Training	$0.00	$0.00	$0.93	$0.93	$0.00	$0.82	$0.82	0	10	10
Health care and social assistance	$0.00	$0.00	$1.07	$1.07	$0.00	$0.91	$0.91	0	12	12
Arts and recreation services	$0.00	$0.00	$0.16	$0.16	$0.00	$0.10	$0.10	0	2	2
Other Services	$0.00	$0.00	$1.50	$1.50	$0.00	$1.06	$1.06	0	21	21
Total	**$63.66**	**$27.77**	**$21.28**	**$49.05**	**$15.65**	**$12.84**	**$28.49**	**223**	**214**	**437**

Source: Modelled Result

Table 5b: Estimates of Annual Economic Activity by Sector Related to Operating Spend for the Goulburn-Yass Region

	Expend-iture ($m)	Value Added ($m)			Income ($m)			Employment (FTE's)		
		Direct	Induced	Total	Direct	Induced	Total	Direct	Induced	Total
Agriculture, Forestry and Fishing	$0.03	$0.01	$0.06	$0.07	$0.00	$0.02	$0.02	0	1	1
Mining	$0.00	$0.00	$0.04	$0.04	$0.00	$0.01	$0.01	0	0	0
Manufacturing	$0.96	$0.27	$0.21	$0.48	$0.15	$0.12	$0.27	2	2	4
Electricity, Gas, Water and Waste Services	$0.10	$0.04	$0.10	$0.14	$0.02	$0.03	$0.05	0	0	1
Construction	$1.37	$0.41	$0.11	$0.52	$0.21	$0.06	$0.27	3	1	4
Wholesale Trade	$0.25	$0.12	$0.09	$0.22	$0.08	$0.06	$0.14	1	1	1
Retail Trade	$0.44	$0.25	$0.17	$0.42	$0.17	$0.12	$0.28	3	2	6
Accommodationand Food Services	$0.27	$0.12	$0.08	$0.20	$0.08	$0.06	$0.14	2	1	3
Transport, Postal & Warehousing	$0.45	$0.19	$0.14	$0.33	$0.10	$0.07	$0.17	1	1	2
Information Media & Telecommunications	$0.04	$0.02	$0.04	$0.06	$0.01	$0.01	$0.02	0	0	0
Finance and Insurance Services	$0.11	$0.08	$0.11	$0.19	$0.04	$0.05	$0.09	0	0	0
Ownership of Dwellings	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0	0	0
Property and Business Services (L, M, N)	$0.30	$0.13	$0.22	$0.35	$0.09	$0.15	$0.23	1	2	3
Public Administration & Safety	$0.17	$0.09	$0.03	$0.12	$0.07	$0.02	$0.10	1	0	1
Education & Training	$0.23	$0.17	$0.07	$0.24	$0.15	$0.06	$0.21	2	1	2
Health care and social assistance	$0.05	$0.03	$0.08	$0.12	$0.03	$0.07	$0.10	0	1	1
Arts and recreation services	$0.13	$0.05	$0.02	$0.06	$0.03	$0.01	$0.04	1	0	1
Other Services	$0.00	$0.00	$0.08	$0.08	$0.00	$0.05	$0.05	0	1	1
Total	**$4.88**	**$1.99**	**$1.64**	**$3.63**	**$1.22**	**$0.97**	**$2.19**	**18**	**14**	**32**

Source: Modelled Result

Table 5c: Estimates of Economic Activity for the Goulburn-Yass Region

	Total GSP Impact (3 yrs)	Average Annual GSP Impact	Total Jobs Impact (Person Years - over 3 yrs)	Average Annual Jobs Impact
Construction Phase				
• Direct	$27.8 million	$9.3 million	223	74
• Indirect	$21.3 million	$7.1 million	214	71
• Total	$49.1 million	$16.4 million	437	146
Operating Phase				
• Direct		$2 million		18
• Indirect		$1.6 million		14
• Total		$3.6 million		32

Source: Modelled Result

Note – these numbers are rounded versions of the numbers in the tables above, as the modelling should be interpreted in terms of order of magnitude, but it means that not all numbers are exactly additive.

Modelling Results – LGA's of Yass Valley and Boorowa Outcomes

Tables 6a-6c show the results of applying the expenditures (as per Table 2c) above to the regional Input Output Table for the LGA's of Yass Valley, Boorowa and Upper Lachlan.

Tables 6a and 6b show the detailed outcomes with the level of activity generated by industry sector, while Table 6c provides a summary of the outcomes.

From a local perspective, the modelling indicates that the project will generate $22 million of value added (incomes created or contribution to Gross Regional Product, mainly in the transport sector, in the three LGA's over the period of construction and, again allowing for lagged flow through effects, this would happen over three years. 186 person years of employment would be supported, or again an average of 62 jobs sustained per year over three years. Once operational the project is estimated to support annually $1.4 million of incomes in the region, and support directly and indirectly (including the multiplier impact) approximately 12 jobs per year.

Table 6a: Estimates of Economic Activity by Sector Related to Aggregate Capital Spend for the LGA's of Yass Valley, Boorowa and Upper Lachlan – Outcomes Over Life of Project

(Note that employment should be interpreted as person years of employment rather than number of jobs at a point of time)

	Expend-iture ($m)	Value Added ($m)			Income ($m)			Employment (FTE's)		
		Direct	Induced	Total	Direct	Induced	Total	Direct	Induced	Total
Agriculture, Forestry and Fishing	$1.08	$0.46	$0.34	$0.80	$0.11	$0.08	$0.20	4	3	7
Mining	$0.00	$0.00	$0.05	$0.05	$0.00	$0.01	$0.01	0	0	0
Manufacturing	$3.24	$0.91	$0.76	$1.67	$0.51	$0.43	$0.94	7	5	12
Electricity, Gas, Water and Waste Services	$0.00	$0.00	$0.47	$0.47	$0.00	$0.17	$0.17	0	2	2
Construction	$0.00	$0.00	$0.25	$0.25	$0.00	$0.13	$0.13	0	2	2
Wholesale Trade	$0.00	$0.00	$0.45	$0.45	$0.00	$0.29	$0.29	0	3	3
Retail Trade	$3.24	$1.82	$0.73	$2.55	$1.25	$0.50	$1.75	24	10	33
Accommodationand Food Services	$3.24	$1.44	$0.47	$1.91	$0.98	$0.32	$1.30	22	7	29
Transport, Postal & Warehousing	$21.58	$9.37	$0.74	$10.11	$4.93	$0.39	$5.33	64	5	70
Information Media & Telecommunications	$0.00	$0.00	$0.15	$0.15	$0.00	$0.05	$0.05	0	1	1
Finance and Insurance Services	$0.00	$0.00	$0.27	$0.27	$0.00	$0.13	$0.13	0	1	1
Ownership of Dwellings	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0	0	0
Property and Business Services (L, M, N)	$0.00	$0.00	$1.31	$1.31	$0.00	$0.87	$0.87	0	10	10
Public Administration & Safety	$0.00	$0.00	$0.14	$0.14	$0.00	$0.12	$0.12	0	1	1
Education & Training	$0.00	$0.00	$0.37	$0.37	$0.00	$0.32	$0.32	0	4	4
Health care and social assistance	$0.00	$0.00	$0.34	$0.34	$0.00	$0.28	$0.28	0	4	4
Arts and recreation services	$0.00	$0.00	$0.07	$0.07	$0.00	$0.04	$0.04	0	1	1
Other Services	$0.00	$0.00	$0.60	$0.60	$0.00	$0.42	$0.42	0	8	8
Total	**$32.37**	**$13.99**	**$7.52**	**$21.51**	**$7.78**	**$4.57**	**$12.35**	**121**	**65**	**186**

Source: Modelled Result

Table 6b: Estimates of Annual Economic Activity by Sector Related to Operating Spend for the LGA's of Yass Valley and Boorowa

	Expend-iture ($m)	Value Added ($m)			Income ($m)			Employment (FTE's)		
		Direct	Induced	Total	Direct	Induced	Total	Direct	Induced	Total
Agriculture, Forestry and Fishing	$0.01	$0.01	$0.02	$0.03	$0.00	$0.01	$0.01	0	0	0
Mining	$0.00	$0.00	$0.01	$0.01	$0.00	$0.00	$0.00	0	0	0
Manufacturing	$0.47	$0.13	$0.06	$0.19	$0.07	$0.03	$0.11	1	0	1
Electricity, Gas, Water and Waste Services	$0.05	$0.02	$0.04	$0.06	$0.01	$0.01	$0.02	0	0	0
Construction	$0.60	$0.18	$0.05	$0.23	$0.09	$0.03	$0.12	1	0	2
Wholesale Trade	$0.05	$0.02	$0.03	$0.05	$0.02	$0.02	$0.03	0	0	0
Retail Trade	$0.16	$0.09	$0.05	$0.14	$0.06	$0.03	$0.09	1	1	2
Accommodationand Food Services	$0.15	$0.07	$0.03	$0.10	$0.04	$0.02	$0.07	1	0	1
Transport, Postal & Warehousing	$0.23	$0.10	$0.04	$0.13	$0.05	$0.02	$0.07	1	0	1
Information Media & Telecommunications	$0.02	$0.01	$0.01	$0.02	$0.00	$0.00	$0.01	0	0	0
Finance and Insurance Services	$0.03	$0.02	$0.02	$0.04	$0.01	$0.01	$0.02	0	0	0
Ownership of Dwellings	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0	0	0
Property and Business Services (L, M, N)	$0.16	$0.07	$0.09	$0.16	$0.05	$0.06	$0.11	1	1	1
Public Administration & Safety	$0.08	$0.04	$0.01	$0.05	$0.04	$0.01	$0.04	0	0	0
Education & Training	$0.09	$0.07	$0.03	$0.09	$0.06	$0.02	$0.08	1	0	1
Health care and social assistance	$0.03	$0.02	$0.02	$0.04	$0.02	$0.02	$0.03	0	0	0
Arts and recreation services	$0.06	$0.02	$0.01	$0.03	$0.01	$0.00	$0.02	0	0	0
Other Services	$0.00	$0.00	$0.02	$0.02	$0.00	$0.02	$0.02	0	0	0
Total	**$2.19**	**$0.87**	**$0.52**	**$1.40**	**$0.54**	**$0.31**	**$0.85**	**8**	**4**	**12**

Source: Modelled Result

Table 6c: Estimates of Economic Activity for the LGA's of Yass Valley and Boorowa

	Total GSP Impact (3 yrs)	Average Annual GSP Impact	Total Jobs Impact (Person Years - over 3 yrs)	Average Annual Jobs Impact
Construction Phase				
• Direct	$14 million	$4.7 million	121	40
• Indirect	$7.5 million	$2.5 million	65	22
• Total	$21.5 million	$7.2 million	186	62
Operating Phase				
• Direct		$0.9 million		8
• Indirect		$0.5 million		4
• Total		$1.4 million		12

Source: Modelled Result

Note – these numbers are rounded versions of the numbers in the tables above, as the modelling should be interpreted in terms of order of magnitude, but it means that not al numbers are exactly additive.

5. Additional Economic Impacts

This report focusses primarily on the potential employment and income benefits of the proposed Rye Park Wind Farm Project. Job creation is an important community benefit and, at the regional level, the level of job creation is dependent upon two key factors:

1. The amount of investment and operational activity that can be captured by the region; and

2. The preparedness of the region and its people to apply for and accept available job vacancies. Having suitably trained people and geared up companies will maximize regional employment and incomes.

Examples of jobs created in the construction phase include:

- Project developers
- Field engineers
- Environmental managers and consultants
- Legal support
- Administrative and office support
- Numerous construction-related positions
- Transportation managers
- Contract and sub-contract managers
- On-site quarry operation
- Project controls engineers

- Safety technicians

Examples of jobs created in the operational phase include:

- Project managers
- Project coordinators
- Production managers
- Wind turbine technicians
- Wind turbine maintenance
- Environmental consultants
- Administrative and office support

Wind farms generally can have positive and negative socio-economic impacts depending on a variety of factors and the specific communities being impacted by the developments. For example, farmers hosting turbines may receive positive financial benefits while other communities might be subject to negative visual impacts. Other than employment and income generation, two of the most significant externalities of wind farms are on property values and carbon emissions. These are discussed below.

Property Values

Many studies by independent organisations around the world have failed to find any correlation between wind turbines and declining property values. Some studies found positive property value impacts associated with:

- Improved regional amenities and infrastructure including local roads, firefighting access roads, etc.

- Increased regional incomes, jobs and property demand (as assessed above).

- Additional rental income from hosting towers.

- Provision of a drought-proofing income streams.

- Provision of post-retirement income for farmers.

- Improved biodiversity via less intensive farm activity.

- Prevention of land subdivision and slowing down the process of productive agricultural land changing to rural residential uses in the short to medium term with the shift caused by the additional income generated from the wind farm making agricultural use more viable.

- Erosion control and passive wind protection for stock from sub stations and turbine tower structures.

A report on community acceptance of rural wind farms by the CSIRO's Science into Society found that rural landowners with wind farms on their properties stood to gain from such benefits.[13]

For properties without wind turbines but in the line of sight of turbines, statistical evidence supports that property values do not perform worse than properties in comparable regions without wind turbines. In many cases, property values have actually gone up faster than values in the comparable regions.

A study conducted by the NSW Department of Lands looked at properties located near eight wind farms and found no evidence that wind turbines caused property values to drop. The report found that wind farms "do not appear to have negatively affected property values in most cases". The report also found that "no reductions in sale price were evident for rural properties or residential properties located in nearby townships with views of the wind farm".[14]

Internationally, a decade long study across nine different states in the US by the Lawrence Berkeley National Research Laboratory found no negative relationship between wind turbines and property values. The study found "neither the view of the wind facilities nor the distance of the home to those facilities is found to have any consistent, measurable, and statistically significant effect on home sales prices".[15]

Also, the University of New Hampshire's Impact of the Lempster Wind Power Project on Local Residential Property Values from January 2012 found no evidence that the project had an impact on property values in the region. The study also said "this is consistent with the near unanimous findings of other studies—based their analysis on arms-length property sales transactions—that have found no conclusive evidence of wide spread, statistically significant changes in property values resulting from wind power projects".[16]

While the above studies and evidence support that wind farms have no long term detrimental impact on overall property values, it must be recognised that over time many other factors impact property values such as general market conditions, population trends and the local property supply/demand balance.

[13] CSIRO report http://www.csiro.au/Organisation-Structure/Flagships/Energy-Transformed-Flagship/Exploring-community-acceptance-of-rural-wind-farms-in-Australia.aspx, reported in Wind Energy the Facts, Clean Energy Council, March 2013.
[14] NSW Department of Lands report http://www.lpi.nsw.gov.au/__data/assets/pdf_file/0018/117621/t0L51WT8.pdf reported in Wind Energy the Facts, Clean Energy Council, March 2013.
[15] Lawrence Berkeley study, United States http://eetd.lbl.gov/ea/ems/reports/lbnl-2829e.pdf, reported in Wind Energy the Facts, Clean Energy Council, March 2013. This study was further confirmed in the August 2013 study by the Berkley National Laboratory "A Spatial Hedonic Analysis of the Effects of Wind Energy Facilities on Surrounding Property Values in the United States" which used data for 50,000 home sales across the USA for homes from within 1 mile ot within 10 miles of a wind farm to conclude that "we find no statistical evidence that home values near turbines were affected in the post-construction or post-announcement/pre-construction periods"
[16] *Impact of the Lempster Wind Power Project on Local Residential Property Values*, January 2012 http://antrim-wind.com/files/2012/05/14B_lempster_property_value_impacts_final-copy-copy.pdf reported in Wind Energy the Facts, Clean Energy Council, March 2013

There will be localised positive and negative impacts associated with wind farms depending on individual property locations and characteristics. Some may appreciate faster than market trends due to improved farm incomes from hosting towers (offsetting the loss of productive land) and improved access to infrastructure. Some may fail to keep pace with market trends due to perceptions of visual and noise impacts. Potential disruption during tower assembly and infrastructure establishment is also noted. However, the evidence supports no overall long term negative impact on property values associated with wind farm developments.

Carbon Emissions

Renewable wind energy generation has significant environmental benefits through carbon emissions reduction where it replaces coal or gas generated electricity. The debate in this area comes down conclusively on the carbon reduction benefits of wind farms relative to fossil fuels[17]

To estimate the value of this reduction it is assumed that the Rye Park Wind Farm will have the following operating characteristics:

- Total wind farm capacity of 327 megawatts.
- Annual average utilisation rate of 34%.
- Total generation of 973 Gigawatt hours per annum.

Wind farms generate miniscule carbon emissions in operation and maintenance, whereas it can be (conservatively from a modelling perspective) assumed that coal generated electricity produces 0.8 tonnes of carbon per megawatt hour[18], this would produce in the order of 0.779 million tonnes of carbon emissions. At a conservative carbon price of $20 per tonne (conservative relative to international trading schemes and Australia's carbon tax of $23 per tonne), the value of carbon emission savings associated with the Rye Park Wind Farm is therefore estimated to be $15.6 million per annum or a present value of $165 million over a 20 year period (discount rate of 7%).

[17] The arguments re carbon emissions in wind versus fossil fuels generated electricity is summarized by Professor Barry Brooks (University of Adelaide) at http://bravenewclimate.com/2010/09/01/wind-power-emissions-counter/

[18] Annual carbon emissions from the National Electricity Market fell by over 12 million tonnes (CO2-e) between June 2012 and May 2013. They fell by only around 1.5 million tonnes over the previous twelve-month period. Carbon pollution per megawatt-hour has also fallen: from 0.86 to 0.81 tonnes per unit of output, or a little over 5 per cent. Source: Then Climate Institute – www.climateinstitute.org.au