ECONOMIC IMPACTS OF DEVELOPMENT SCENARIOS FOR THE SOUTH-WEST COAST MINERALS FOR ENERGY DEVELOPMENT STUDY

Report by the Centre of Policy Studies to support a project undertaken by Sleeman Consulting for the WA Department of Industry and Resources

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1. Introduction

The Centre of Policy Studies (CoPS) has been commissioned to estimate the economic impacts of development scenarios for the *South-West Coast minerals for energy development study*. The analysis is undertaken using MMRF-Green, a multi-sector dynamic model of Australia's six states and two territories.

Aspects of simulation design are described in Section 2. Simulation results are reported in Section 3. Appendix A contains a description of the MMRF-Green model and of the enhancements required to facilitate simulations of the development scenarios. Appendix B contains detailed tables of results.

2. Simulation design

In generating our results, we model the following three scenarios that cover the period 2005 to 2020.

I. *Base Case.* The base case is a projection for the Australian and state economies, compiled from business-as-usual assumptions for minerals development. This scenario includes a number of developments in the South-west region of WA that are considered committed regardless of energy price initiatives. These include capacity expansions for the production of alumina, nickel, iron ore and steel (HiSmelt).

II. *Scenario 1*. This is a moderate growth scenario. It is equivalent to the base case plus brownfields expansions of synthetic rutile and silicon production, and the development of a coal char plant to supply char to the HiSmelt project replacing coal previously imported from the eastern states.

III. *Scenario 2*. This is a high growth scenario. It is equivalent to Scenario 1 plus greenfields developments plus a general five per cent lowering of gas prices to end use customers. The greenfields projects included in this scenario produce pig iron (plus magnetite), aluminium and ferro silicon.

We report the effects of Scenarios 1 and 2 as deviations between the values of variables in these scenarios and their values in the base case scenario.

Exogenous shocks

Our simulations are driven by imposing on the model annual changes in production and investment expenditure associated with the projects underlying Scenarios 1 and 2. The exogenous input is summarised in the table on the following page. Note that each scenario has three components. The components are:

1a: Increased synthetic rutile production associated with the use of coal briquettes;

1b: Supply of coal char to HiSmelt to displace imported coal;

1c: Silicon smelter expansion;

2a: Midwest pig iron production plus increased magnetite production;

2b: Aluminium smelter (2 plotlines); and

2c: Ferro silicon production.

Exogenous Shocks to Production and Investment
($ million, constant price, deviations from base case values)

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2013>
Scenario 1 projects										
Investment										
1a Synthetic rutile	10.0									
1b Coal char for HiSmelt		50.0	50.0							
1c Silicon smelter	35.0	40.0			35.0	40.0				
Total	*45.0*	*90.0*	*50.0*	*0.0*	*35.0*	*40.0*	*0.0*	*0.0*	*0.0*	*0.0*
Production										
1a Synthetic rutile		40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
1b Coal char for HiSmelt			15.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
1c Silicon smelter			38.9	58.3	77.8	77.8	116.7	136.1	155.6	155.6
Total	*0.0*	*40.0*	*93.9*	*128.3*	*147.8*	*147.8*	*186.7*	*206.1*	*225.6*	*225.6*
Additional projects in Scenario 2										
Investment										
2a Mid West pig iron				400.0	650.0	695.0				
2b Aluminium smelter			700.0	1200.0	1200.0	700.0				
2c Ferro silicon		40.0	40.0		40.0	40.0				
Total	*0.0*	*40.0*	*740.0*	*1600.0*	*1890.0*	*1435.0*	*0.0*	*0.0*	*0.0*	*0.0*
Production										
2a Mid West pig iron							339.2	413.0	450.9	450.9
2b Aluminium smelter						400.0	1000.0	1300.0	1350.0	1350.0
2c Ferro silicon				25.0	50.0	60.0	85.0	110.0	120.0	120.0
Total	*0.0*	*0.0*	*0.0*	*25.0*	*50.0*	*460.0*	*1424.2*	*1823.0*	*1920.9*	*1920.9*
All projects (Scenario 2)										
Investment	45.0	130.0	790.0	1600.0	1925.0	1475.0	0.0	0.0	0.0	0.0
Production	0.0	40.0	93.9	153.3	197.8	607.8	1610.7	2029.1	2146.5	2146.5

At the bottom of the table of exogenous shocks are estimates of new investment and production for all projects included in Scenario 2. Investment begins in 2005 with the brownfields expansion of synthetic rutile production and the early construction of the coal char plant. The peak investment years are 2008 to 2010 during which most of the construction of the pig iron plant and aluminium smelter occurs. No new investment occurs after 2010. Production from the new projects begins in 2006, and gradually ramps up to a value of about $200 million in 2009. Production from new projects jumps in 2010 when the aluminium smelter begins operation. Further increases in aluminium production and the start-up of the pig iron plant leads to annual production valued at over $2,000 million by 2013. We assume that the value of production remains at its 2013 value through to the end of the simulation period (2020). Note that nearly all of the new production is exported. The exception is production from the coal char plant, valued at $30 million per annum which is destined for the local HiSmelt plant.

Other assumptions

Labour markets

At the national level, we assume that the deviation in the consumer's real wage rate (i.e., the nominal wage rate deflated by the CPI) from its base case forecast level in Scenarios 1 and 2 increases in proportion to the deviation in employment from its base case level. The coefficient of proportionality is chosen so that the national employment effects of the minerals shocks to the economy are largely eliminated after five years. In other words, after about five years, the benefits of the new minerals projects are realised in the national labour market almost entirely as an increase in the real wage rate, rather than as an increase in employment. This labour market assumption reflects the idea that in the long-run national employment is determined by demographic factors (birth and death rates, the level of international migration, etc.) which are largely unaffected by the development of minerals projects in WA. It is also consistent with conventional macro-economic modelling in which the Non Accelerating Inflation Rate of Unemployment (NAIRU) is exogenous.

Although in our simulations the minerals projects do not affect Australia-wide employment in the long-run, they do affect the regional distribution of employment. We assume that labour moves between state economies so as to maintain inter-state wage and unemployment rate differentials at their base case levels. Accordingly, WA, which is favourably affected by the minerals projects will experience increased employment and population at the expense of regions that are less favourably affected.

Public expenditure, taxes and government budget balances

We assume that the shocks associated with the minerals developments make no difference to the paths of federal and state real public consumption expenditures. We also assume no deviation in the paths of existing tax and benefit rates. Government budgets (federal and state) are also fixed at their base case values. This is achieved by giving directly back to consumers any additional tax revenue associated with the new minerals projects.

Private consumption and investment

Consumption expenditure of the regional household moves in line with changes in Household Disposable Income (HDI). HDI is the sum of factor payments (wages and dividends) to Australian residents and government transfer payments (unemployment and other personal benefit payments) less direct income tax. In calculating the change in HDI due to the new minerals projects we take account of the income directly generated by the projects, the income indirectly generated via input/output linkages and induced income effects, and the handback by governments to consumers of additional taxation receipts. In calculating the income directly generated we net out income that accrues to foreigners. For example, we assume that the new aluminium smelter is 100 per cent overseas owned. Thus none of the *after-tax* profit from aluminium production accrues to domestic households.

We assume that in each year, investment in each regional industry will deviate from base in line with the deviation expected rate of return on the industry's capital stock. Investors are assumed to be myopic, implying that expected rates of return move with contemporaneously observed rates of return.

Rates of return on capital

In deviation simulations, MMRF-Green allows for short-run divergences in rates of return on industry capital stocks from their levels in the base case forecasts. Such divergences cause divergences in investment and hence capital stocks. The divergences in capital stocks gradually erode the divergences in rates of return, so that in the long-run rates of return on capital over all regional industries return to their base case levels.

Production technologies

MMRF-Green contains many types of technical change variables. In the deviation simulation we assume that all technology variables have the same values as in the base case simulation.

3. Effects

Deviations from base for Scenarios 1 and 2 are reported below in sections marked 3.1 Scenario 1 and 3.2 Scenario 2. We also simulated separately deviations from base for the six components of Scenarios 1 and 2. Values for these deviations are given in Appendix B. Note that the individual effects given in Appendix B do not sum exactly to the aggregate impacts shown below for Scenarios 1 and 2. This is because the model is non-linear, and because we do not report separately the effects of a lower gas price (which are included in the aggregate effects of Scenario 2).

3.1 Scenario 1

Table 1(S1) shows percentage deviations of a range of macroeconomic variables in Scenario 1 away from their values in the base case simulation. Corresponding absolute deviations ($million, or thousand persons) are shown in Table 2(S1). Table 3(S1) shows deviations in gross regional product and employment in the South West region. Table 4(S1) shows changes in tax collections for the federal and state governments.

Our explanation of results is given in a series of numbered points. The italicised headings to the numbered points highlight features of the results.

I. *The new minerals projects increase real GSP in WA in all years of the simulation.* Table 1(S1) shows that in the long-run year (2020) the projects included in Scenario 1 will increase real GSP in WA by 0.27 per cent relative to its level in the base case, or by $329 million (Table 2(S1)). This implies a GSP-multiplier from the stimulation to exports (ΔGSP/ΔExports) of 1.7.[1] The present value of the stream of changes in WA's real GSP between 2005 and 2020 is around $3,000 million[2], which compares to the up front investment cost of $260 million (see table of exogenous shocks).

II. *Real consumption in WA is also strongly stimulated throughout the period.* In the long-run year the Scenario-1 projects increase real consumption in WA by 0.30 per cent relative to its level in the base case, or by $179 million (Table 2(S1)). In these simulations, the impact on real consumption is a reliable guide to the impact on the welfare of the incumbent population. Thus, even though the projects have a significant degree of foreign ownership, they do lead to significant increases in welfare for the local population.

[1] In this calculation the change in exports is the exogenously imposed change valued at $195.6 million. This equals the value of new production in Scenario 1 (see the table of exogenous shocks) less the value of coal char sold to the HiSmelt producer.

[2] The present value calculation reported here and elsewhere in this report is based on a four per cent discount rate.

III. *Employment in WA is stimulated more in the short-run than in the long-run.* Investment activity is labour intensive relative to production activity directly associated with the new projects. Thus in the early years of the simulation, even though there is relatively little new production, new construction activity leads to a significant increase in new jobs. Table 2(S1) shows that 300 new full- and part-time jobs are created in 2005. This rises to over 1,400 new jobs in 2009. Through the production period after 2010, the average number of new jobs per annum is just under 1,000.

> ***Box 1: Calculating changes in persons employed***
>
> In our model, employment is measured in terms of hours worked, not persons employed. Accordingly, percentage changes in employment as simulated by the model, represent percentage changes in hours worked. To derive estimates of changes in the number of persons employed, we make a calculation outside of the model in which we assume that the exogenous shocks do not affect the ratio of employed hours to employed persons in each industry. Under this assumption, in each industry the percentage change in persons employed matches the percentage change in hours worked. In Scenario 1, the new projects increases employment (hours) in WA by 0.13 per cent in 2020 (Table 1(S1)). In the base case WA employment in 2020 is projected to be around 700 thousand persons. Thus, under the assumption of fixed hours per person, the increase of 0.13 per cent in hours worked implies an increase of around 900 in the number of full and part-time jobs.
>
> We qualify this estimate, however, by noting that the translation from hours to persons most probably overestimates the likely change in persons employed. This is because an increase in employment (hours) is likely to arise from a mix of increased hours worked per person and increased employment (persons). This needs to be kept in mind when interpreting the persons-data from our simulations.

IV. *The stimulus to the national economy is less than the stimulus to WA.* Tables 1(S1) and 2(S2) clearly show that the stimulus due to the minerals projects at the national level is markedly less than the stimulus to WA. This is because the additional minerals exports *crowd-out* other export and import-competing sectors. The mechanism is real exchange rate adjustment. Additional minerals exports strengthen the real exchange rate, reducing the competitiveness of Australia's other traded-goods industries. Thus other export industries lose market share on foreign markets and import-competing industries lose out to foreign goods on local markets.

V. *The Scenario-1 projects increase real GRP in the South-West region by nearly four per cent, but their effect on regional employment is significantly less.* Table 3(S1) shows that the projects increase real GRP in the South-West region in the long-run year by 3.3 per cent, or $174 million. The stimulus to employment, though, is significantly less: 0.9 per cent, or 200 full- and part-time jobs. The increase in real GRP is not surprising given the location of the projects. The percentage increase in employment is relatively subdued due to the capital-intensive nature of the projects. Direct employment associated with the projects when fully operational is only around 100 persons. The remaining new jobs are located in related industries or industries stimulated via induced income effects.

Table 1(S1): Macroeconomic Variables: Scenario 1 (percentage deviations from base case values)

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Real gross value added (GDP/GSP)	Aus	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	WA	0.03	0.14	0.25	0.30	0.33	0.31	0.30	0.31	0.32	0.31	0.30	0.30	0.29	0.28	0.28	0.27
	ROA	0.00	-0.01	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
Real consumption	Aus	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	WA	0.05	0.18	0.31	0.36	0.41	0.39	0.35	0.35	0.35	0.34	0.33	0.32	0.32	0.31	0.30	0.30
	ROA	0.00	-0.01	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
Real investment	Aus	0.02	0.05	0.03	0.01	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	WA	0.25	0.58	0.58	0.43	0.55	0.49	0.30	0.30	0.29	0.26	0.24	0.22	0.21	0.19	0.18	0.17
	ROA	-0.01	-0.02	-0.04	-0.05	-0.05	-0.04	-0.03	-0.03	-0.03	-0.03	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
Real international exports	Aus	-0.02	-0.03	-0.01	0.02	0.00	0.00	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
	WA	-0.06	-0.05	0.03	0.12	0.11	0.11	0.22	0.25	0.27	0.27	0.27	0.27	0.26	0.26	0.26	0.25
	ROA	-0.01	-0.03	-0.02	0.00	-0.02	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
Real international imports	Aus	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	WA	0.09	0.23	0.27	0.24	0.28	0.26	0.21	0.22	0.22	0.21	0.20	0.19	0.19	0.18	0.18	0.18
	ROA	0.00	-0.01	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
Employment (hours)	Aus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	WA	0.06	0.16	0.23	0.22	0.26	0.24	0.18	0.18	0.18	0.17	0.16	0.15	0.15	0.14	0.14	0.13
	ROA	0.00	-0.01	-0.02	-0.02	-0.03	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02

Table 2(S1): Macroeconomic Variables: Scenario 1 (absolute deviations from base case values)

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Real gross value added (GDP/GSP)	Aus	9.0	48.5	84.7	99.9	108.6	101.3	106.4	117.3	129.9	132.4	134.4	136.4	138.3	140.3	142.0	143.6
($million, 2001 prices)	WA	24.5	102.8	191.9	240.8	273.3	269.2	272.0	289.9	307.6	310.3	313.0	316.1	319.3	322.7	326.0	329.2
	ROA	-15.5	-54.3	-107.2	-140.9	-164.7	-167.9	-165.6	-172.6	-177.7	-177.9	-178.6	-179.7	-181.0	-182.4	-184.0	-185.6
Real consumption	Aus	12.2	43.3	56.0	52.9	68.8	69.8	59.0	61.4	67.1	68.4	68.8	69.2	69.7	70.4	71.1	71.8
($million, 2001 prices)	WA	18.5	68.8	121.4	147.4	170.7	169.2	157.2	163.3	169.6	170.7	171.6	172.8	174.3	176.0	177.7	179.4
	ROA	-6.3	-25.5	-65.3	-94.5	-101.9	-99.4	-98.2	-101.9	-102.5	-102.3	-102.8	-103.6	-104.6	-105.6	-106.6	-107.6
Real investment	Aus	49.2	107.6	74.6	14.9	59.3	62.3	18.6	22.8	28.8	28.6	28.5	28.4	28.3	28.1	27.8	27.3
($million, 2001 prices)	WA	58.5	141.6	155.7	119.7	157.0	144.8	91.0	93.3	93.2	86.6	81.9	78.5	75.9	73.9	72.2	70.7
	ROA	-9.4	-34.0	-81.1	-104.9	-97.7	-82.5	-72.3	-70.4	-64.4	-58.0	-53.4	-50.1	-47.6	-45.8	-44.4	-43.4
Real international exports	Aus	-34.3	-60.2	-11.7	47.2	10.7	1.0	50.9	58.5	63.2	65.2	67.3	69.5	71.5	73.4	75.2	77.1
($million, 2001 prices)	WA	-19.5	-17.3	11.5	44.8	42.4	48.1	98.7	115.6	132.8	140.3	147.2	153.4	159.2	164.7	170.0	175.2
	ROA	-14.8	-42.9	-23.2	2.4	-31.7	-47.2	-47.9	-57.1	-69.6	-75.2	-79.9	-83.9	-87.7	-91.3	-94.8	-98.1
Real international imports	Aus	18.4	43.7	37.9	18.7	34.4	34.9	24.3	28.0	32.2	32.9	33.7	34.6	35.6	36.7	37.8	38.8
($million, 2001 prices)	WA	21.1	54.9	70.2	68.4	85.2	83.3	72.2	77.9	83.0	83.9	85.5	87.6	90.0	92.7	95.5	98.4
	ROA	-2.7	-11.2	-32.3	-49.7	-50.8	-48.3	-47.9	-49.9	-50.7	-51.0	-51.8	-53.0	-54.4	-56.0	-57.7	-59.6
Employment	Aus	0.1	0.2	0.1	0.0	0.1	0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
(thousands persons))	WA	0.3	0.8	1.2	1.2	1.4	1.3	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9
	ROA	-0.2	-0.6	-1.0	-1.2	-1.3	-1.2	-1.0	-1.0	-1.0	-1.0	-0.9	-0.9	-0.9	-0.9	-0.8	-0.8

Table 3(S1): GRP and Employment for the South-West region: Scenario 1 (deviations from base case values)

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Real gross value added	%	0.3	1.3	2.4	3.1	3.3	3.1	3.7	3.9	4.0	3.9	3.8	3.7	3.6	3.5	3.4	3.3
($million, 2001 prices)	$m	12.2	51.4	96.0	115.1	127.9	127.5	152.2	164.7	177.1	176.6	176.1	175.7	175.3	174.9	174.6	174.4
Employment	%	0.6	1.7	2.4	0.7	0.7	0.7	0.8	0.9	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9
(thousands persons)	'000	0.1	0.4	0.6	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2

Table 4(S1): Tax Revenue: Scenario 1 ($m changes from base case values)

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
GST collected in WA	1.5	5.5	9.7	11.8	13.7	13.5	12.6	13.1	13.6	13.7	13.7	13.8	13.9	14.1	14.2	14.4
GST collected in ROA	-0.5	-2.0	-5.2	-7.6	-8.2	-8.0	-7.9	-8.2	-8.2	-8.2	-8.2	-8.3	-8.4	-8.4	-8.5	-8.6
Total GST	1.0	3.5	4.5	4.2	5.5	5.6	4.7	4.9	5.4	5.5	5.5	5.5	5.6	5.6	5.7	5.7
Company tax – national	1.1	5.8	10.2	12.0	13.0	12.2	12.8	14.1	15.6	15.9	16.1	16.4	16.6	16.8	17.0	17.2
Labour tax - national	1.8	3.4	2.2	-0.2	2.1	1.8	-0.8	-0.3	0.2	0.4	0.5	0.6	0.7	0.7	0.8	0.8
Royalty revenue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other tax revenue collected in WA	0.6	2.6	4.8	6.0	6.8	6.7	6.8	7.2	7.7	7.8	7.8	7.9	8.0	8.1	8.1	8.2
Other tax revenue collected in ROA	-0.4	-1.4	-2.7	-3.5	-4.1	-4.2	-4.1	-4.3	-4.4	-4.4	-4.5	-4.5	-4.5	-4.6	-4.6	-4.6

3.2 Scenario 2

Table 1(S2) shows percentage deviations of a range of macroeconomic variables in Scenario 2 away from their values in the base case simulation. Corresponding absolute deviations ($million, or thousand persons) are shown in Table 2(S2). Table 3(S2) shows deviations in gross regional product and employment in the South West region. Table 4(S2) shows changes in tax collections for the federal and state governments.

Scenario 2 includes the projects in Scenario 1, plus several greenfields developments and a lower gas price to end-use customers. The greenfields projects together are much larger than the projects included in Scenario 1. Indeed, as shown in the table of exogenous shocks, the value of new production in Scenario 2 is about ten times the value of new production in Scenario 1. Thus we would expect to see the simulated effects being around ten times larger. In the end, the magnification is about eight times.

The following points summarise the key features of Scenario 2.

I. *In the long-run solution year, developments in Scenario 2 increase real GSP in WA by 2.18 per cent relative to its base case level, or by $2,626 million.* This implies a GSP-multiplier from the stimulation to exports (ΔGSP/ΔExports) of 1.2, somewhat below the GSP-multiplier for Scenario 1. There are two reasons for the lower multiplier: (a) weaker induced income impacts because the degree of foreign ownership in the Scenario-2 only projects is higher than that in the Scenario-1 projects; and (b) stronger crowding-out effects in WA due, in the main, to increased local demand for iron ore from the Mid-West pig iron plant causing exports of raw iron to fall. The present value of the stream of changes in WA's real GSP between 2005 and 2020 is around $17,000 million, which compares to the up front investment cost of $5,965 million (see table of exogenous shocks).

II. *In the long-run year real consumption in WA rises by 2.39 per cent relative to its level in the base case, or by $1,434 million.* As noted for Scenario 1, even though the projects being considered have a significant degree of foreign ownership, they do lead to significant increases the welfare of the local population.

III. *Around 9,000 new full- and part-time jobs are created in WA in the long-run year.* Job creation peaks in 2009 at the height of the construction phase with 13,700 new jobs in place.

IV. *Crowding-out effects in Scenario 2 are just as significant as in Scenario 1.* Again the mechanism is real exchange rate adjustment which causes the exogenous expansion in minerals exports to crowd-out production of other traded-goods industries.

V. *The Scenario-2 projects increase real GRP in the South-West region by around twenty-three per cent, and employment in the South-West region by around fourteen percent*. Similar percentage expansions occur in the Mid West where the new pig iron plant is located.

Table 1(S2): Macroeconomic Variables: Scenario 2 (percentage deviations from base case values)

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Real gross value added (GDP/GSP)	Aus	0.00	0.01	0.03	0.04	0.05	0.06	0.08	0.10	0.10	0.10	0.09	0.09	0.09	0.09	0.08	0.08
	WA	0.05	0.19	0.82	1.51	1.75	1.92	2.02	2.40	2.42	2.36	2.32	2.28	2.25	2.23	2.20	2.18
	ROA	0.00	-0.01	-0.06	-0.11	-0.14	-0.15	-0.14	-0.16	-0.16	-0.16	-0.16	-0.16	-0.17	-0.17	-0.17	-0.17
Real consumption	Aus	0.00	0.01	0.06	0.11	0.13	0.12	0.09	0.11	0.11	0.10	0.10	0.10	0.09	0.09	0.09	0.09
	WA	0.08	0.28	1.21	2.27	2.67	2.67	2.34	2.68	2.68	2.60	2.54	2.50	2.46	2.44	2.41	2.39
	ROA	0.00	-0.01	-0.05	-0.09	-0.11	-0.12	-0.12	-0.14	-0.14	-0.14	-0.14	-0.14	-0.15	-0.15	-0.15	-0.15
Real investment	Aus	0.03	0.08	0.41	0.79	0.94	0.72	0.11	0.13	0.11	0.10	0.09	0.08	0.08	0.07	0.07	0.07
	WA	0.30	0.89	4.38	8.17	9.42	7.63	2.36	2.73	2.44	2.15	1.99	1.87	1.79	1.72	1.66	1.61
	ROA	-0.01	-0.03	-0.14	-0.26	-0.28	-0.26	-0.23	-0.26	-0.24	-0.22	-0.21	-0.20	-0.19	-0.19	-0.18	-0.18
Real international exports	Aus	-0.02	-0.06	-0.35	-0.63	-0.71	-0.51	0.02	0.08	0.09	0.10	0.10	0.09	0.09	0.09	0.08	0.08
	WA	-0.07	-0.12	-1.00	-1.81	-1.85	-0.66	1.83	2.29	2.44	2.47	2.47	2.46	2.43	2.41	2.38	2.34
	ROA	-0.01	-0.05	-0.20	-0.36	-0.46	-0.47	-0.37	-0.40	-0.42	-0.42	-0.42	-0.42	-0.41	-0.41	-0.41	-0.40
Real international imports	Aus	0.01	0.04	0.18	0.33	0.38	0.30	0.06	0.08	0.08	0.07	0.07	0.07	0.07	0.06	0.06	0.06
	WA	0.12	0.37	1.78	3.35	3.82	3.22	1.37	1.61	1.57	1.50	1.47	1.44	1.43	1.42	1.41	1.40
	ROA	0.00	-0.01	-0.05	-0.10	-0.12	-0.13	-0.13	-0.15	-0.15	-0.15	-0.15	-0.15	-0.15	-0.15	-0.15	-0.15
Employment (hours)	Aus	0.00	0.01	0.04	0.06	0.06	0.02	-0.03	-0.01	-0.01	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00
	WA	0.08	0.26	1.25	2.31	2.54	2.21	1.38	1.69	1.65	1.56	1.50	1.46	1.43	1.41	1.40	1.38
	ROA	-0.01	-0.02	-0.09	-0.18	-0.21	-0.21	-0.18	-0.20	-0.19	-0.18	-0.17	-0.17	-0.17	-0.17	-0.16	-0.16

Table 2(S2): Macroeconomic Variables: Scenario 2 (absolute deviations from base case values)

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Real gross value added (GDP/GSP)	Aus	11.3	61.6	237.6	402.2	430.9	527.7	706.9	960.2	1003.2	990.5	980.8	974.2	970.0	967.0	964.0	960.7
($million, 2001 prices)	WA	33.6	144.6	632.8	1210.8	1465.6	1672.0	1827.9	2248.6	2341.5	2361.2	2395.1	2436.7	2482.4	2530.0	2578.0	2625.6
	ROA	-22.3	-83.0	-395.2	-808.6	-1034.7	-1144.3	-1121.0	-1288.4	-1338.3	-1370.7	-1414.3	-1462.5	-1512.4	-1563.0	-1614.0	-1664.9
Real consumption	Aus	18.1	67.1	282.6	541.8	652.4	633.9	490.6	585.7	604.7	591.2	577.5	567.4	560.5	555.5	551.2	547.0
($million, 2001 prices)	WA	27.9	106.0	472.0	923.6	1122.7	1158.7	1051.4	1247.9	1290.1	1294.3	1307.0	1327.2	1352.0	1379.0	1406.7	1434.3
	ROA	-9.8	-38.9	-189.5	-381.8	-470.3	-524.8	-560.8	-662.2	-685.4	-703.1	-729.5	-759.8	-791.5	-823.5	-855.5	-887.3
Real investment	Aus	55.6	165.7	916.9	1799.3	2145.5	1705.7	239.9	297.1	271.1	230.8	209.5	198.3	192.0	187.7	183.9	179.9
($million, 2001 prices)	WA	69.4	217.4	1182.9	2301.0	2689.6	2236.1	715.7	859.3	793.5	724.3	690.2	672.1	662.1	656.6	653.6	652.0
	ROA	-13.8	-51.7	-266.0	-501.7	-544.0	-530.4	-475.8	-562.2	-522.4	-493.5	-480.8	-473.8	-470.1	-468.9	-469.7	-472.1
Real international exports	Aus	-40.8	-104.9	-613.6	-1235.1	-1524.9	-1120.0	112.2	261.7	314.6	345.0	364.6	377.4	386.2	392.9	398.7	404.1
($million, 2001 prices)	WA	-21.9	-39.6	-333.3	-660.3	-733.4	-275.5	808.5	1066.1	1198.0	1276.8	1344.3	1405.6	1463.8	1520.8	1577.3	1634.1
	ROA	-18.9	-65.2	-280.3	-574.8	-791.5	-844.6	-696.3	-804.5	-883.4	-931.8	-979.7	-1028.2	-1077.7	-1127.9	-1178.7	-1230.0
Real international imports	Aus	21.9	68.4	372.7	770.9	910.7	743.4	160.2	216.9	224.3	218.3	218.6	222.8	229.3	236.9	245.0	253.1
($million, 2001 prices)	WA	26.3	85.7	459.0	967.7	1158.6	1024.5	464.1	576.8	596.2	603.5	623.1	649.7	680.3	713.7	749.0	785.7
	ROA	-4.4	-17.3	-86.3	-196.7	-247.9	-281.1	-303.9	-360.0	-371.9	-385.2	-404.6	-426.9	-451.1	-476.8	-504.0	-532.6
Employment	Aus	0.1	0.4	2.2	3.8	3.8	2.2	-0.9	0.0	0.3	0.3	0.4	0.4	0.5	0.5	0.6	0.6
(thousands persons))	WA	0.4	1.3	6.5	12.2	13.7	12.2	7.7	9.7	9.6	9.3	9.1	9.0	9.0	9.0	9.0	9.1
	ROA	-0.3	-0.9	-4.3	-8.4	-9.9	-10.0	-8.6	-9.7	-9.4	-8.9	-8.7	-8.6	-8.5	-8.5	-8.5	-8.5

Table 3(S2): GRP and Employment for the South-West region: Scenario 2 (deviations from base case values)

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Real gross value added	%	0.5	1.8	8.0	3.9	4.5	10.7	20.8	26.2	26.8	26.2	25.7	25.1	24.6	24.1	23.6	23.2
($million, 2001 prices)	$m	16.8	72.3	316.4	144.1	176.6	424.5	838.1	1085.1	1141.7	1148.6	1155.7	1163.1	1170.7	1178.5	1186.4	1194.6
Employment	%	0.8	2.6	12.6	2.0	2.6	5.8	10.8	14.0	14.6	14.4	14.3	14.2	14.1	14.0	13.9	13.8
(thousands persons)	'000	0.2	0.6	3.2	0.5	0.6	1.5	2.8	3.7	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9

Table 4(S2): Tax Revenue: Scenario 2 ($m changes from base case values)

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
GST collected in WA	2.2	8.5	37.8	73.9	89.8	92.7	84.1	99.8	103.2	103.5	104.6	106.2	108.2	110.3	112.5	114.7
GST collected in ROA	-0.8	-3.1	-15.2	-30.5	-37.6	-42.0	-44.9	-53.0	-54.8	-56.2	-58.4	-60.8	-63.3	-65.9	-68.4	-71.0
Total GST	1.4	5.4	22.6	43.3	52.2	50.7	39.2	46.9	48.4	47.3	46.2	45.4	44.8	44.4	44.1	43.8
Company tax – national	1.4	7.4	28.5	48.3	51.7	63.3	84.8	115.2	120.4	118.9	117.7	116.9	116.4	116.0	115.7	115.3
Labour tax - national	2.2	5.7	32.3	57.5	57.2	32.8	-12.9	0.1	4.3	5.2	5.8	6.5	7.3	8.0	8.6	9.0
Royalty revenue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other tax revenue collected in WA	0.8	3.6	15.8	30.3	36.6	41.8	45.7	56.2	58.5	59.0	59.9	60.9	62.1	63.2	64.4	65.6
Other tax revenue collected in ROA	-0.6	-2.1	-9.9	-20.2	-25.9	-28.6	-28.0	-32.2	-33.5	-34.3	-35.4	-36.6	-37.8	-39.1	-40.4	-41.6

Appendix A: The MMRF-Green model

MMRF-Green is a very detailed dynamic, multi-sectoral, multi-regional model of Australia. The standard version of the model distinguishes 49 industries, 54 products, 8 states/territories and 56 sub-state regions. Industries in the standard version are described in Table A.

MMRF-Green is founded on the Monash Multi-Regional (MMR) model[3], and was built in three stages. In the first stage, MMR was transformed into a dynamic system through the inclusion of dynamic mechanisms. These were added as self-contained blocks, allowing MMRF-Green to include MMR as a special case. The second stage involved a range of developments designed to enhance the model's capacity for environmental analysis. In the third stage, a regional disaggregation facility was added, which allows state-level results to be disaggregated down to sub-state regions.

Section A1 provides an overview of MMR. The dynamic mechanisms added to the model are described in Section A2. Section A3 overviews the enhancements for environmental analysis, while Section A4 explains the regional disaggregation facility. Additions for the present study are described in Section A5.

A1 Overview of MMR

MMR divides Australia into the six states and two territories. There are five types of agents in the model: industries, capital creators, households, governments, and foreigners. The number of industries is limited by computational constraints. For each industry in each region there is an associated capital creator. The sectors each produce a single commodity and the capital creators each produce units of capital that are specific to the associated sector. Each region in MMR has a single household and a regional government. There is also a federal government. Finally, there are foreigners, whose behaviour is summarised by export demand curves for the products of each region and by supply curves for international imports to each region.

MMR determines regional supplies and demands of commodities through optimising behaviour of agents in competitive markets. Optimising behaviour also determines industry demands for labour and capital. Labour supply at the national level is determined by demographic factors, while national capital supply responds to rates of return. Labour and capital can cross regional borders so that each region's stock of productive resources reflects regional employment opportunities and relative rates of return.

The specifications of supply and demand behaviour coordinated through market clearing equations comprise the general equilibrium (GE) core of the model. There are two blocks of equations in addition to the core. They describe regional and federal government finances and regional labour markets.

A1.1 Data requirements for MMR

The GE core of MMR requires a multi-regional input-output table together with values for the elasticities of substitution in the CES nests of the specifications of technologies and preferences. The government finance block requires data on regional and Federal government revenues and outlays. The regional labour market block requires regional demographic, employment and labour force data.

The Australian Bureau of Statistics (ABS) publishes suitable regional data for the government finance and labour market blocks. However, it does not compile multi-regional input-output (IO) tables. Disaggregating the national IO table used in the national GE model, MONASH, created IO data for the

[3] A progress report on the development of the MMR model is given in Meagher and Parmenter (1993). In 1996, MMR was adapted for forecasting by the inclusion of enough dynamics to accumulate variables such as capital stocks and foreign debt over medium-run periods. This version was called the MMR Forecasting (MMRF) model.

GE core. The regional disaggregation of the national IO table involved three steps: (i) splitting of columns using regional proportions of industry outputs and final demands; (ii) splitting of rows using inter-regional trade data available from published sources (e.g., Quinlan, 1991); and (iii) application of mathematical re-balancing procedures to ensure equality in the multi-regional input-output table between the outputs and sales of regional sectors.

For values of primary-factor and domestic-import substitution elasticities, MMR relies on the MONASH national database. There are no reliable estimates of substitution elasticities between domestic products from different regional sources. High numbers are assumed to be appropriate - five times the values for domestic/import substitution elasticities. This means that different domestic varieties of a good are closer substitutes than are domestic and imported varieties.

A1.2 Computing solutions for MMR

MMR is a system of non-linear equations. It is solved using GEMPACK, a suite of programs for implementing and solving economic models. A linear, differential version of the MMR equation system is specified in syntax similar to ordinary algebra. GEMPACK then solves the system of non-linear equations as an Initial Value problem, using a standard method, such as Euler or midpoint. For details of the algorithms available in GEMPACK, see Harrison and Pearson (1996).

A2 From MMR to MMRF-Green: dynamics

There are two main types of inter-temporal links incorporated into MMRF-Green: physical capital accumulation and lagged adjustment processes.

A2.1 Physical capital accumulation

It is assumed that investment undertaken in year t becomes operational at the start of year t+1. Thus, given a starting point value for capital in t=0, and with a mechanism for explaining investment through time, the model can be used to trace out the time paths of industry capital stocks.

Investment in industry i in state/territory s in year t is explained via a mechanism that relates investment to expected rates of return. The expected rate of return in year t can be specified in a variety of ways. In MMRF-Green two possibilities are allowed for, static expectations and forward-looking model-consistent expectations. Under static expectations, it is assumed that investors take account only of current rentals and asset prices when forming current expectations about rates of return. Under rational expectations the expected rate of return is set equal to the present value in year t of investing $1 in industry i in region r, taking account of both the rental earnings and depreciated asset value of this investment in year t+1 as calculated in the model.

A2.2 Lagged adjustment processes

One lagged adjustment processes is included in MMRF-Green. This relates to the operation of the labour market in year-to-year policy simulations.

In comparative static analysis, one of the following two assumptions is made about the national real wage rate and national employment:

1. the national real wage rate adjusts so that any policy shock has no effect on aggregate employment; or
2. the national real wage rate is unaffected by the shock and employment adjusts.

MMRF-Green's treatment of the labour market allows for a third, intermediate position, in which real wages can be sticky in the short run but flexible in the long-run and employment can be flexible in the short-run but sticky in the long-run. For year-to-year policy simulations, it is assumed that the deviation in the national real wage rate increases through time in proportion to the deviation in aggregate employment from its base case-forecast level. The coefficient of adjustment is chosen so that

the employment effects of a shock are largely eliminated after about ten years. This is consistent with macroeconomic modelling in which the NAIRU is exogenous.

A3 MMRF-Green: Environmental enhancements

MMRF-Green has been enhanced in a number of areas to improve its capability for environmental analysis. These enhancements include:

1. an energy and gas emission accounting module, which accounts explicitly for each of the 49 industries and eight regions recognised in the model;
2. equations that allow for inter-fuel substitution in electricity generation by region; and
3. mechanisms that allow for the endogenous take-up of abatement measures in response to greenhouse policy measures.

A3.1 Emissions accounting

MMRF-Green tracks emissions of greenhouse gases at a detailed level. It breaks down emissions according to:

- emitting agent (49 industries and residential);
- emitting state or territory (8); and
- emitting activity (5).

Most of the emitting activities are the burning of fuels (black coal, natural gas, brown coal or petroleum products[4]). A residual category, named Activity, covers emissions such as fugitives and agricultural emissions not arising from fuel burning.

The resulting 49 x 8 x 5 matrix of emissions is designed to include all emissions except those arising from land clearing. Emissions are measured in terms of carbon dioxide equivalents, $C0_2$-e. The main source of data for the matrix of emissions is the 1999 National Greenhouse Gas Inventory published by AGO.

A3.2 Inter-fuel substitution

Inter-fuel substitution in electricity generated is handled using the "technology bundle" approach (e.g., Hinchy and Hanslow, 1996). A variety of power-generating industries are distinguished based on the type of fuel used (see Table A). There is also an end-use supplier (*Electricity Supply*). The electricity generated in each state/territory flows directly to the local end-use supplier, which then distributes electricity to local and inter-state users. The end-use supplier can substitute between the different generation technologies in response to changes in their production costs. For example, the Electricity supply industry in NSW might reduce the amount of power sourced from coal-using generators and increase the amount sourced from gas-fired plants. Such substitution is price-induced; the elasticity of substitution between the various types of electricity used by the Electricity supply industry in each state is set to 5.

For other energy-intensive commodities used in industry, MMRF-Green allows for substitution possibilities by including a weak form of input-substitution specification. If the price of say, Cement, rises by 10 per cent relative to other inputs to construction, the Construction industry will use 1 per cent less Cement and, to compensate, a little more of labour, capital and other materials. In most cases, as in the Cement example, we have imposed a substitution elasticity of 0.1. For important energy goods, Petroleum products, Electricity supply, and Urban gas distribution, the substitution elasticity in

[4] Each of these fuels is identified as a separate commodity within the model.

industrial use is 0.25. This input substitution is driven by price changes, and so is especially important in emission-policy scenarios, which makes outputs of emitting industries more expensive.

A4 MMRF-Green: Disaggregation to sub-state regions

Few multi-regional models of the Australian economy have the level of sectoral detail supported by MMRF-Green. This detail is usually more than adequate for contributions to public discussions on the effects of changes in policies concerning taxes, trade and the environment. However, people wanting to use MMRF-Green in business and public sector planning are often frustrated by the lack of relevant regional detail. This applies especially to people interested in regional adjustment issues.

It is with these people in mind that we have incorporated into MMRF-Green a tops-down method that enables disaggregation of state-level results for output, employment and greenhouse-gas emissions down to projections for 56 sub-state regions (Figure A). The method is an adaptation of the regional disaggregation method first devised by Leontief *et al*. (1965).

These regions are based on the Statistical divisions defined in the Australian Standard Geographical Classification (ABS catalogue number 1216.0). Our division structure differs slightly from that of the ABS. We combine the ABS's Darwin and *Northern Territory - balance* divisions into one division, Northern Territory. Similarly, Canberra and *ACT - balance* are combined into one division, Australian Capital Territory. Note that both territories are distinguished as separate regions in MMRF-Green. Hence, the tops-down disaggregation facility provides no additional detail for them. We also adopt a slightly different regional classification for WA than that defined by the ABS. Our WA regions are based on the classification used by the WA department of Commerce. Finally, we identify the energy intensive La Trobe Valley in Victoria as a separate region (region 24), with 23 Gippsland defined to include all areas in the ABS statistical division *Gippsland* other than the La Trobe Valley.

A4.1 Methodology

The methodology for tops-down regional disaggregation involves firstly classifying each of MMRF-Green's industries (Table 1) into one of two categories: state and local. State industries produce commodities that are readily traded across sub-state regional boundaries. Examples are most agricultural and mining industries. The regional outputs of industries producing state commodities are assumed to move in line with the state-wide percentage rates of change calculated by MMRF-Green.

Local industries produce commodities for which demand within each sub-state region is satisfied mainly from production in that region. Examples include perishable items and services like wholesale and retail trade. The outputs in each region of industries producing local commodities are modelled as depending mainly on demand within the region. In calculating the local demand for the output of local industry j, MMRF-Green takes account of:

intermediate and investment demands both by local industries and by state industries located in the sub-state region;

the region's household demands, which are a function of population and employment changes and of the change in consumption at the state level;

government demand; and

(if industry j's output is a margin commodity like transport) the usage of industry j's product in facilitating the flow of local and state commodities within the sub-state region and international export flows out of the region.

This gives our regional calculations a multiplier property: the effect on a sub-state region's overall level of activity of a favourable mix of state industries is multiplied through induced effects on the output and employment of the region's local industries.

In the regional disaggregation we allow for the possibility of some demand for local commodities outside the region of their production, but not from outside the state in which the region is located. This is because our data imply that for almost all commodities there is at least some imbalance at the sub-state regional level between demand and supply.

A5 Enhancements for this study

There are two broad approaches to modelling a new minerals project in a model like MMRF-Green. One approach is to treat the new project as an expansion of an existing industry. For example, the new Pig iron plant would be modelled as an expansion in the existing steel industry in WA. The second approach is to create within the model a new industry producing a new product. The new industry would have an input/output structure specific to the new project and would be located in the same sub-state region. For this study we have adopted the second approach, mainly because most of the new projects have input/output structures that are significantly different from the industries to which they would be attached if the first approach were adopted.

There are six components of the development scenarios. Accordingly, we have introduced six new industries and products into our model. The input structures of these new industries resemble those of the brownfieds or greenfields projects that they represent. For example, the greenfields development of an aluminium smelter is represented by a new industry, located in the South West region, with significant inputs of WA-refined alumina and North-West gas. The gas is used primarily on-site to generate the 1120 MW of electricity required to supply 2 potlines. Gas and alumina are the main intermediate inputs, while capital is the main primary input. Given the likely ownership of the new smelter, we assume that 100 per cent of the after-tax return on capital (i.e., 100 per cent of the after-tax profit) goes overseas.

Sales of the newly introduced industries are, with one exception, to export. The exception is the coal char facility (part of Scenario 1) which produces for the local HiSmelt producer, replacing char previously sourced from Eastern states.

Appendix A References

Dixon, P.B and M.T. Rimmer (2001), “Forecasting, Policy, History and Decomposition: The Monash Model of the Australian Economy”, *mimeo*. Available from the Centre of Policy Studies, Monash University.

Harrison W.J. and K.R. Pearson (1996) "Computing solutions for Large General Equilibrium Models Using GEMPACK", *Computational Economics*, Vol. 9, pp. 83-127.

Hinchy, M. and K. Hanslow (1996), *The MEGABARE Model: Interim Documentation*, Australian Bureau of Agricultural and Resource Economics, Canberra.

Leontief, W., A. Morgan, K. Polenske, D. Simpson and E. Tower (1965), ‘The Economic Impact -- Industrial and Regional -- of an Arms Cut’*, Review of Economics and Statistics*, XLVII, August, pp. 217-41.

Meagher, G.A. and Brian R. Parmenter (1993), "Monash-MR: A Multiregional CGE Model of Australia", *mimeo*, paper presented to the Venice Workshop on Transportation and Spatial CGE Models, Venice, 18-20 May, pp. 25.

National Greenhouse Gas Inventory (1998), *National Greenhouse Gas Inventory, 1998*, Australian Greenhouse Office, Canberra.

Quinlan, H. (1991), Australia's Domestic Freight, 1986-87, Centre for Transportation Policy Analysis, Wollongong University, Wollongong.

Table A: Industries in the Standard Version of MMRF-Green*

Product name	Product description
1. Agriculture	All primary agricultural activities plus fishing
2. Forestry	All forestry activities, including logging and management
3. Iron ore	Mining of iron ore
4. Non-iron ore	Mining of non-iron ores, including gold and base ores
5. Black coal	Mining of black coal - thermal and metallurgical
6. Crude oil	Production of crude oil
7. Natural gas	Production of natural gas at well
8. Brown coal	Mining of brown coal
9. Food, beverages and tobacco	All secondary agricultural activities
10. Textiles, clothing, footwear	Manufacture of textiles, clothing and footwear
11. Wood and paper products	Manufacture of wood (including pulp) and paper products
12. Chemical prods. excl. petrol	Manufacture of basic chemicals and paints
13. Petroleum products	Manufacture of petroleum products
14. Building prods (not cement & metal)	Manufacture of non-metallic building products excl. cement
15. Cement	Manufacture of cement
16. Iron and steel	Manufacture of primary iron and steel.
17. Alumina and aluminium	Manufacture of alumina and aluminium
18. Other metal products	Manufacture of other metal products
19. Motor vehicles and parts	Manufacture of motor vehicles and parts
20. Other manufacturing	Other manufacturing including electronic equipment
21. Electricity – black coal	Electricity generation from black coal thermal plants
22. Electricity – brown coal	Electricity generation from brown coal thermal plants
23. Electricity – gas	Electricity generation from natural gas thermal plants
24. Electricity – oil prods.	Electricity generation from oil products thermal plants
25. Electricity – hydro	Electricity generation from renewable sources – hydro
26. Electricity – biomass	Electricity generation from renewable sources – biomass
27. Electricity – biogas	Electricity generation from renewable sources – biogas
28. Electricity – solar	Electricity generation from renewable sources – solar
29. Electricity - wind	Electricity generation from renewable sources – wind
30. Electricity supply	Distribution of electricity from generator to user
31. Urban gas distribution	Urban distribution of natural gas
32. Water and sewerage services	Provision of water and sewerage services
33. Construction services	Residential building and other construction services
34. Trade services	Provision of wholesale and retail trade services
35. Road transport services – passenger	Provision of road passenger transport services
36. Road transport services – freight	Provision of road freight transport services
37. Rail transport services – passenger	Provision of rail passenger transport services
38. Rail transport services – freight	Provision of rail freight transport services
39. Water transport services – passenger	Provision of water passenger transport services
40. Water transport services – freight	Provision of water freight transport services
41. Air transport services – passenger	Provision of air passenger transport services
42. Air transport services – freight	Provision of air freight transport services
43. Other transport services	Provision of water, air and rail transport services
44. Communication services	Provision of communication services
45. Financial/business services	Provision of financial and business services
46. Dwelling ownership	Services of dwellings
47. Public services	Provision of public services
48. Other services	Provision of all other services
49. Private motor vehicle ownership	Services of private motor vehicles

*** For most of the products identified in this table there is an obvious correspondence to one or more standard categories in the Australian and New Zealand Standard Industrial Classification (ANZSIC). The exceptions are: industries 21 to 30, which together comprise ANZSIC 3610 *Electricity Supply*; industry 46, which is equivalent to the *Ownership of dwellings* industry in the industrial classification of the official Input/Output statistics; and industry 49 which is unique to MMRF-Green. Industry 49 produces the services of the stock of private motor vehicles. It is analogous to industry 46, which produces the services of the stock of dwellings.**

Appendix B: Separate effects of individual projects

Table 1(S1a): Macroeconomic Variables: Scenario 1 – synthetic rutile (percentage deviations from base case values)

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Real gross value added (GDP/GSP)	Aus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	WA	0.01	0.08	0.08	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.05	0.05
	ROA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Real consumption	Aus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	WA	0.01	0.09	0.09	0.09	0.09	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.06
	ROA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Real investment	Aus	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	WA	0.06	0.10	0.09	0.07	0.06	0.06	0.05	0.05	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03
	ROA	0.00	-0.01	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Real international exports	Aus	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	WA	-0.01	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.05
	ROA	0.00	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Real international imports	Aus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	WA	0.02	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
	ROA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Employment (hours)	Aus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	WA	0.02	0.05	0.05	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02
	ROA	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 2(S1a): Macroeconomic Variables: Scenario 1 – synthetic rutile (absolute deviations from base case values)

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Real gross value added (GDP/GSP)	Aus	2.3	33.1	34.6	35.0	35.0	34.7	34.3	34.0	33.8	33.7	33.6	33.6	33.7	33.6	33.5	33.5
($million, 2001 prices)	WA	6.8	55.7	58.1	58.5	58.3	58.5	58.9	59.3	59.7	60.2	60.6	61.1	61.6	62.0	62.4	62.8
	ROA	-4.5	-22.6	-23.5	-23.5	-23.3	-23.8	-24.6	-25.3	-25.9	-26.5	-27.0	-27.5	-27.9	-28.4	-28.9	-29.3
Real consumption	Aus	3.3	19.7	23.3	24.6	24.5	24.4	24.1	23.7	23.4	23.2	23.0	22.8	22.8	22.6	22.4	22.3
($million, 2001 prices)	WA	5.2	32.3	36.5	37.1	36.7	36.7	36.8	36.9	36.9	37.1	37.4	37.6	37.8	38.1	38.3	38.4
	ROA	-2.0	-12.6	-13.2	-12.6	-12.2	-12.3	-12.7	-13.2	-13.6	-14.0	-14.4	-14.8	-15.1	-15.5	-15.9	-16.2
Real investment	Aus	11.0	9.2	10.6	9.8	8.6	7.9	7.3	6.8	6.5	6.1	5.8	5.5	5.3	4.9	4.6	4.3
($million, 2001 prices)	WA	13.8	24.8	23.0	20.1	17.5	16.3	15.5	14.8	14.1	13.6	13.2	12.7	12.3	12.0	11.6	11.2
	ROA	-2.8	-15.6	-12.3	-10.3	-8.9	-8.4	-8.2	-8.0	-7.7	-7.6	-7.3	-7.2	-7.0	-7.1	-7.0	-6.9
Real international exports	Aus	-8.3	9.9	7.0	6.8	7.9	8.4	8.6	8.9	9.2	9.5	9.8	10.1	10.3	10.7	10.9	11.2
($million, 2001 prices)	WA	-4.6	22.2	22.4	23.9	25.7	26.8	27.8	28.7	29.7	30.5	31.4	32.2	33.0	33.7	34.5	35.3
	ROA	-3.7	-12.3	-15.3	-17.1	-17.8	-18.5	-19.2	-19.8	-20.5	-21.0	-21.6	-22.1	-22.7	-23.1	-23.6	-24.1
Real international imports	Aus	3.7	6.1	7.4	7.5	7.1	6.9	6.7	6.7	6.7	6.8	6.9	6.9	7.0	7.0	7.1	7.2
($million, 2001 prices)	WA	4.6	11.9	12.8	13.2	12.6	12.5	12.7	13.0	13.2	13.6	13.9	14.3	14.7	15.2	15.6	16.0
	ROA	-0.9	-5.8	-5.4	-5.7	-5.5	-5.6	-6.0	-6.3	-6.5	-6.8	-7.1	-7.5	-7.8	-8.2	-8.5	-8.9
Employment	Aus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(thousands persons))	WA	0.1	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1
	ROA	-0.1	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.1	-0.1	-0.1	-0.1	-0.1

Table 3(S1a): GRP and Employment for the South-West region: Scenario 1 – synthetic rutile (deviations from base case values)

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Real gross value added	%	0.1	0.7	0.7	0.9	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.6
($million, 2001 prices)	$m	3.4	27.9	29.0	32.9	32.8	32.7	32.6	32.5	32.4	32.3	32.2	32.1	32.0	31.9	31.8	31.7
Employment	%	0.2	0.6	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(thousands persons)	'000	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 4(S1a): Tax Revenue: Scenario 1 – synthetic rutile ($m changes from base case values)

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
GST collected in WA	0.4	2.6	2.9	3.0	2.9	2.9	2.9	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.1	3.1
GST collected in ROA	-0.2	-1.0	-1.1	-1.0	-1.0	-1.0	-1.0	-1.1	-1.1	-1.1	-1.1	-1.2	-1.2	-1.2	-1.3	-1.3
Total GST	0.3	1.6	1.9	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8
Company tax – national	0.3	4.0	4.1	4.2	4.2	4.2	4.1	4.1	4.1	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Labour tax - national	0.5	0.3	0.6	0.5	0.4	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.2
Royalty revenue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other tax revenue collected in WA	0.2	1.4	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.6	1.6	1.6
Other tax revenue collected in ROA	-0.1	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7

Table 1(S1b): Macroeconomic Variables: Scenario 1 – displace imported coal for HiSmelt (percentage deviations from base case values)

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Real gross value added (GDP/GSP)	Aus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	WA	0.00	0.03	0.12	0.15	0.12	0.10	0.10	0.09	0.08	0.08	0.08	0.07	0.07	0.07	0.07	0.07
	ROA	0.00	0.00	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Real consumption	Aus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	WA	0.00	0.05	0.16	0.19	0.16	0.14	0.12	0.11	0.10	0.10	0.10	0.09	0.09	0.09	0.08	0.08
	ROA	0.00	0.00	-0.01	-0.02	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Real investment	Aus	0.00	0.03	0.02	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	WA	0.00	0.27	0.41	0.25	0.16	0.12	0.10	0.08	0.07	0.06	0.06	0.05	0.05	0.05	0.04	0.04
	ROA	0.00	-0.01	-0.03	-0.04	-0.03	-0.02	-0.02	-0.02	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Real international exports	Aus	0.00	-0.02	-0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	WA	0.00	-0.07	-0.09	-0.03	-0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02
	ROA	0.00	-0.01	0.00	0.02	0.02	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Real international imports	Aus	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	WA	0.00	0.10	0.17	0.13	0.10	0.08	0.07	0.07	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.05
	ROA	0.00	0.00	-0.01	-0.02	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Employment (hours)	Aus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	WA	0.00	0.06	0.13	0.12	0.08	0.06	0.06	0.05	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03
	ROA	0.00	0.00	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.00

Table 2(S1b): Macroeconomic Variables: Scenario 1 – displace imported coal for HiSmelt (absolute deviations from base case values)

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Real gross value added (GDP/GSP)	Aus	0.0	9.3	30.3	32.6	17.6	11.2	8.4	7.4	7.3	8.4	9.8	11.4	13.0	14.7	16.3	17.8
($million, 2001 prices)	WA	0.0	25.1	90.7	118.9	100.5	91.0	86.0	83.0	80.7	80.2	79.9	79.9	79.9	80.0	80.1	80.1
	ROA	0.0	-15.8	-60.4	-86.3	-82.9	-79.8	-77.6	-75.6	-73.4	-71.8	-70.1	-68.5	-66.9	-65.3	-63.8	-62.3
Real consumption	Aus	0.0	12.7	22.1	12.5	6.1	3.3	1.7	0.8	0.1	0.3	0.7	1.5	2.4	3.5	4.5	5.6
($million, 2001 prices)	WA	0.0	19.2	62.0	77.4	65.9	58.8	54.7	52.2	50.0	49.3	49.0	49.0	49.0	49.1	49.2	49.3
	ROA	0.0	-6.5	-39.9	-64.9	-59.8	-55.5	-53.0	-51.4	-49.8	-49.0	-48.3	-47.5	-46.6	-45.7	-44.7	-43.7
Real investment	Aus	0.0	54.7	54.3	-8.2	-11.2	-10.4	-8.7	-6.5	-4.6	-2.4	-0.5	1.0	2.3	3.3	4.0	4.6
($million, 2001 prices)	WA	0.0	64.8	109.7	69.5	44.7	34.4	29.2	25.9	22.6	21.4	20.2	19.3	18.4	17.7	16.9	16.2
	ROA	0.0	-10.1	-55.4	-77.7	-55.9	-44.7	-37.9	-32.5	-27.2	-23.8	-20.7	-18.3	-16.1	-14.4	-12.9	-11.7
Real international exports	Aus	0.0	-37.7	-25.1	27.8	21.4	17.8	15.9	14.8	14.2	14.1	14.2	14.6	15.0	15.5	16.1	16.8
($million, 2001 prices)	WA	0.0	-22.2	-30.6	-10.6	-5.1	-1.9	0.3	2.2	4.3	5.6	6.9	8.1	9.3	10.3	11.3	12.2
	ROA	0.0	-15.5	5.5	38.4	26.4	19.7	15.6	12.6	10.0	8.5	7.3	6.5	5.7	5.2	4.8	4.6
Real international imports	Aus	0.0	20.9	23.4	0.7	-1.0	-0.7	-0.2	0.6	1.2	2.0	2.8	3.5	4.1	4.7	5.2	5.6
($million, 2001 prices)	WA	0.0	23.6	44.5	36.5	28.9	25.9	25.0	24.6	24.2	24.4	24.8	25.1	25.5	25.9	26.2	26.5
	ROA	0.0	-2.7	-21.1	-35.8	-29.9	-26.7	-25.2	-24.1	-23.0	-22.5	-22.0	-21.7	-21.4	-21.2	-21.0	-20.9
Employment	Aus	0.0	0.1	0.1	-0.1	-0.1	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(thousands persons))	WA	0.0	0.3	0.7	0.6	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	ROA	0.0	-0.2	-0.6	-0.7	-0.5	-0.4	-0.4	-0.3	-0.3	-0.3	-0.3	-0.2	-0.2	-0.2	-0.2	-0.2

Table 3(S1b): GRP and Employment for the South-West region: Scenario 1 – displace imported coal for HiSmelt (deviations from base case values)

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Real gross value added	%	0.0	0.3	1.1	1.2	1.1	1.1	1.0	1.0	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.7
($million, 2001 prices)	$m	0.0	12.5	45.3	44.2	43.8	43.5	43.2	42.9	42.6	42.4	42.2	42.0	41.9	41.7	41.6	41.5
Employment	%	0.0	0.6	1.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1
(thousands persons)	'000	0.0	0.2	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 4(S1b): Tax Revenue: Scenario 1 – displace imported coal for HiSmelt ($m changes from base case values)

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
GST collected in WA	0.0	1.5	5.0	6.2	5.3	4.7	4.4	4.2	4.0	3.9	3.9	3.9	3.9	3.9	3.9	3.9
GST collected in ROA	0.0	-0.5	-3.2	-5.2	-4.8	-4.4	-4.2	-4.1	-4.0	-3.9	-3.9	-3.8	-3.7	-3.7	-3.6	-3.5
Total GST	0.0	1.0	1.8	1.0	0.5	0.3	0.1	0.1	0.0	0.0	0.1	0.1	0.2	0.3	0.4	0.5
Company tax – national	0.0	1.1	3.6	3.9	2.1	1.3	1.0	0.9	0.9	1.0	1.2	1.4	1.6	1.8	2.0	2.1
Labour tax - national	0.0	1.8	1.6	-1.0	-1.4	-1.3	-1.1	-0.9	-0.7	-0.5	-0.4	-0.2	-0.1	0.0	0.0	0.1
Royalty revenue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other tax revenue collected in WA	0.0	0.6	2.3	3.0	2.5	2.3	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Other tax revenue collected in ROA	0.0	-0.4	-1.5	-2.2	-2.1	-2.0	-1.9	-1.9	-1.8	-1.8	-1.8	-1.7	-1.7	-1.6	-1.6	-1.6

Table 1(S1c): Macroeconomic Variables: Scenario 1 – silicon smelter (percentage deviations from base case values)

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Real gross value added (GDP/GSP)	Aus	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	WA	0.02	0.03	0.06	0.08	0.14	0.14	0.14	0.16	0.17	0.17	0.17	0.16	0.16	0.16	0.16	0.15
	ROA	0.00	0.00	0.00	0.00	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Real consumption	Aus	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	WA	0.04	0.05	0.06	0.08	0.16	0.17	0.15	0.16	0.17	0.17	0.17	0.16	0.16	0.16	0.15	0.15
	ROA	0.00	0.00	0.00	0.00	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Real investment	Aus	0.02	0.02	0.00	0.01	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	WA	0.19	0.21	0.08	0.11	0.33	0.32	0.15	0.17	0.17	0.15	0.14	0.13	0.12	0.12	0.11	0.11
	ROA	0.00	0.00	-0.01	-0.01	-0.02	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Real international exports	Aus	-0.01	-0.02	0.00	0.01	-0.01	-0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	WA	-0.05	-0.05	0.06	0.09	0.06	0.06	0.16	0.18	0.20	0.20	0.20	0.20	0.19	0.19	0.19	0.18
	ROA	-0.01	-0.01	-0.01	-0.01	-0.02	-0.03	-0.02	-0.02	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
Real international imports	Aus	0.01	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	WA	0.07	0.08	0.05	0.06	0.14	0.14	0.10	0.11	0.12	0.11	0.11	0.11	0.10	0.10	0.10	0.10
	ROA	0.00	0.00	0.00	0.00	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Employment (hours)	Aus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	WA	0.04	0.05	0.04	0.06	0.14	0.14	0.09	0.10	0.11	0.10	0.09	0.09	0.09	0.08	0.08	0.08
	ROA	0.00	0.00	0.00	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01

Table 2(S1c): Macroeconomic Variables: Scenario 1 – silicon smelter (absolute deviations from base case values)

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Real gross value added (GDP/GSP)	Aus	6.6	6.1	20.0	32.3	55.6	54.8	63.3	75.4	88.2	89.7	90.3	90.6	91.0	91.3	91.6	91.8
($million, 2001 prices)	WA	17.6	21.9	43.1	63.4	114.0	119.1	127.0	147.4	167.1	169.9	172.4	175.0	177.8	180.6	183.5	186.3
	ROA	-11.0	-15.8	-23.1	-31.1	-58.4	-64.3	-63.7	-72.0	-78.9	-80.2	-82.1	-84.4	-86.8	-89.3	-91.9	-94.5
Real consumption	Aus	8.9	11.1	10.7	16.1	38.2	42.0	33.4	37.0	43.6	45.0	45.0	44.8	44.6	44.4	44.2	44.0
($million, 2001 prices)	WA	13.3	17.4	22.8	32.9	67.8	73.3	65.6	74.1	82.7	84.2	85.1	86.2	87.4	88.7	90.2	91.6
	ROA	-4.3	-6.3	-12.0	-16.7	-29.5	-31.2	-32.2	-37.1	-39.0	-39.2	-40.1	-41.3	-42.7	-44.3	-45.9	-47.6
Real investment	Aus	38.2	43.8	9.5	13.1	60.8	63.8	19.7	22.3	26.8	24.7	23.0	21.6	20.7	19.8	19.2	18.5
($million, 2001 prices)	WA	44.8	51.9	22.8	30.0	93.7	93.1	46.2	52.4	56.4	51.6	48.6	46.6	45.3	44.4	43.8	43.3
	ROA	-6.6	-8.1	-13.3	-16.9	-32.9	-29.4	-26.5	-30.1	-29.7	-26.9	-25.6	-24.9	-24.6	-24.6	-24.6	-24.8
Real international exports	Aus	-26.0	-32.3	6.4	12.5	-17.6	-24.3	26.7	35.1	39.9	41.5	43.2	44.7	45.9	47.0	47.9	48.7
($million, 2001 prices)	WA	-14.9	-17.3	19.7	31.4	22.1	23.5	70.5	84.5	98.8	104.1	108.8	113.0	116.9	120.5	124.1	127.6
	ROA	-11.1	-15.1	-13.4	-18.9	-39.8	-47.8	-43.8	-49.4	-58.9	-62.5	-65.5	-68.2	-70.9	-73.5	-76.2	-78.9
Real international imports	Aus	14.7	16.8	7.1	10.6	28.1	28.6	17.7	20.8	24.6	24.6	24.6	24.7	25.1	25.5	26.0	26.5
($million, 2001 prices)	WA	16.5	19.5	12.8	18.7	43.3	44.5	34.4	40.2	45.5	45.9	46.8	48.1	49.8	51.7	53.7	55.8
	ROA	-1.8	-2.7	-5.7	-8.1	-15.2	-15.9	-16.7	-19.4	-20.9	-21.3	-22.2	-23.4	-24.7	-26.2	-27.7	-29.3
Employment	Aus	0.1	0.1	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(thousands persons))	WA	0.2	0.2	0.2	0.3	0.8	0.7	0.5	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5
	ROA	-0.1	-0.2	-0.2	-0.3	-0.6	-0.6	-0.5	-0.5	-0.6	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5

Table 3(S1c): GRP and Employment for the South-West region: Scenario 1 – silicon smelter (deviations from base case values)

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Real gross value added	%	0.2	0.3	0.5	1.0	1.3	1.3	1.9	2.1	2.4	2.3	2.3	2.2	2.1	2.1	2.0	2.0
($million, 2001 prices)	$m	8.8	11.0	21.5	38.0	51.2	51.2	76.3	89.2	102.0	101.8	101.6	101.4	101.3	101.2	101.1	101.1
Employment	%	0.4	0.5	0.5	0.3	0.4	0.4	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
(thousands persons)	'000	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2

Table 4(S1c): Tax Revenue: Scenario 1 – silicon smelter ($m changes from base case values)

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
GST collected in WA	1.1	1.4	1.8	2.6	5.4	5.9	5.2	5.9	6.6	6.7	6.8	6.9	7.0	7.1	7.2	7.3
GST collected in ROA	-0.3	-0.5	-1.0	-1.3	-2.4	-2.5	-2.6	-3.0	-3.1	-3.1	-3.2	-3.3	-3.4	-3.5	-3.7	-3.8
Total GST	0.7	0.9	0.9	1.3	3.1	3.4	2.7	3.0	3.5	3.6	3.6	3.6	3.6	3.6	3.5	3.5
Company tax – national	0.8	0.7	2.4	3.9	6.7	6.6	7.6	9.1	10.6	10.8	10.8	10.9	10.9	11.0	11.0	11.0
Labour tax - national	1.3	1.2	0.0	0.4	3.0	2.7	0.0	0.3	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.6
Royalty revenue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other tax revenue collected in WA	0.4	0.5	1.1	1.6	2.8	3.0	3.2	3.7	4.2	4.2	4.3	4.4	4.4	4.5	4.6	4.7
Other tax revenue collected in ROA	-0.3	-0.4	-0.6	-0.8	-1.5	-1.6	-1.6	-1.8	-2.0	-2.0	-2.1	-2.1	-2.2	-2.2	-2.3	-2.4

Table 1(S2a): Macroeconomic Variables: Scenario 2 – Mid West pig iron plant (percentage deviations from base case values)

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Real gross value added (GDP/GSP)	Aus	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	WA	0.00	0.00	0.05	0.32	0.47	0.48	0.35	0.37	0.37	0.36	0.35	0.34	0.33	0.33	0.32	0.32
	ROA	0.00	0.00	0.00	-0.02	-0.03	-0.04	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
Real consumption	Aus	0.00	0.00	0.00	0.02	0.04	0.04	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01
	WA	0.00	0.00	0.05	0.46	0.71	0.74	0.48	0.48	0.48	0.45	0.44	0.42	0.42	0.41	0.40	0.39
	ROA	0.00	0.00	0.00	-0.02	-0.03	-0.03	-0.02	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
Real investment	Aus	0.00	0.00	0.00	0.20	0.31	0.32	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	WA	0.00	0.00	0.09	1.95	2.99	3.04	0.44	0.45	0.41	0.35	0.32	0.30	0.28	0.26	0.25	0.24
	ROA	0.00	0.00	-0.01	-0.05	-0.07	-0.07	-0.04	-0.05	-0.04	-0.04	-0.04	-0.03	-0.03	-0.03	-0.03	-0.03
Real international exports	Aus	0.00	0.00	0.01	-0.14	-0.21	-0.22	-0.03	-0.02	-0.01	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00
	WA	0.00	0.00	0.05	-0.40	-0.59	-0.57	0.28	0.33	0.36	0.37	0.37	0.37	0.37	0.37	0.36	0.36
	ROA	0.00	0.00	-0.01	-0.08	-0.13	-0.15	-0.09	-0.09	-0.09	-0.09	-0.09	-0.08	-0.08	-0.08	-0.08	-0.08
Real international imports	Aus	0.00	0.00	0.00	0.09	0.14	0.14	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	WA	0.00	0.00	0.05	0.85	1.28	1.29	0.27	0.30	0.30	0.28	0.27	0.27	0.26	0.26	0.26	0.25
	ROA	0.00	0.00	0.00	-0.02	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
Employment (hours)	Aus	0.00	0.00	0.00	0.01	0.01	0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	WA	0.00	0.00	0.02	0.27	0.38	0.36	0.13	0.14	0.14	0.14	0.13	0.13	0.13	0.12	0.12	0.12
	ROA	0.00	0.00	0.00	-0.02	-0.03	-0.03	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.01	-0.01	-0.01

Table 2(S2a): Macroeconomic Variables: Scenario 2 – Mid West pig iron plant (absolute deviations from base case values)

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Real gross value added (GDP/GSP)	Aus	0.0	0.0	22.9	99.8	136.2	117.9	74.9	87.7	92.5	87.5	84.4	82.2	80.7	79.2	77.7	76.0
($million, 2001 prices)	WA	0.0	0.0	40.1	254.4	391.7	421.6	320.0	350.1	362.3	358.5	359.1	362.1	366.5	371.6	377.0	382.6
	ROA	0.0	0.0	-17.2	-154.6	-255.5	-303.7	-245.1	-262.4	-269.8	-271.0	-274.7	-279.9	-285.8	-292.3	-299.3	-306.5
Real consumption	Aus	0.0	0.0	9.9	117.6	188.1	195.8	101.6	98.5	97.8	91.5	86.8	83.6	81.3	79.4	77.7	75.9
($million, 2001 prices)	WA	0.0	0.0	19.7	186.7	297.1	321.6	214.9	224.8	229.4	225.6	224.7	225.9	228.2	231.0	234.2	237.3
	ROA	0.0	0.0	-9.8	-69.1	-109.0	-125.7	-113.3	-126.3	-131.6	-134.1	-137.9	-142.3	-146.9	-151.6	-156.5	-161.4
Real investment	Aus	0.0	0.0	9.6	448.3	712.2	747.3	43.3	41.8	37.8	30.3	26.4	24.3	22.9	21.7	20.4	19.0
($million, 2001 prices)	WA	0.0	0.0	23.0	548.6	853.6	890.5	134.2	142.9	134.5	119.3	111.1	106.1	102.9	100.6	99.0	97.7
	ROA	0.0	0.0	-13.4	-100.3	-141.5	-143.2	-90.9	-101.2	-96.7	-89.0	-84.6	-81.8	-79.9	-78.9	-78.5	-78.6
Real international exports	Aus	0.0	0.0	10.0	-270.0	-453.3	-501.6	-46.7	-24.0	-11.7	-3.9	1.0	4.3	6.5	8.1	9.4	10.5
($million, 2001 prices)	WA	0.0	0.0	18.3	-144.3	-233.8	-237.3	124.0	155.0	177.8	191.1	202.3	212.5	222.2	231.7	241.2	250.8
	ROA	0.0	0.0	-8.3	-125.7	-219.5	-264.2	-170.7	-179.0	-189.5	-195.0	-201.3	-208.2	-215.7	-223.6	-231.8	-240.3
Real international imports	Aus	0.0	0.0	7.0	209.9	329.0	341.4	28.7	35.2	39.3	39.0	39.9	41.1	42.7	44.2	45.7	47.0
($million, 2001 prices)	WA	0.0	0.0	11.6	245.0	388.0	411.5	92.5	105.9	112.0	112.6	115.5	119.7	124.5	129.8	135.4	141.2
	ROA	0.0	0.0	-4.6	-35.1	-58.9	-70.0	-63.8	-70.6	-72.7	-73.5	-75.6	-78.5	-81.8	-85.6	-89.7	-94.2
Employment	Aus	0.0	0.0	0.0	1.1	1.4	1.1	-0.5	-0.3	-0.2	-0.1	0.0	0.0	0.0	0.1	0.1	0.1
(thousands persons))	WA	0.0	0.0	0.2	2.8	4.1	4.0	1.4	1.6	1.7	1.6	1.6	1.6	1.6	1.6	1.6	1.6
	ROA	0.0	0.0	-0.2	-1.7	-2.7	-2.9	-1.9	-1.9	-1.9	-1.7	-1.6	-1.6	-1.5	-1.5	-1.5	-1.5

Table 3(S2a): GRP and Employment for the South-West region: Scenario 2 – Mid West pig iron plant (deviations from base case values)

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Real gross value added	%	0.0	0.0	0.5	0.7	0.7	0.7	0.9	1.0	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8
($million, 2001 prices)	$m	0.0	0.0	20.1	26.7	27.9	28.2	38.9	41.6	42.5	42.2	42.1	42.1	42.1	42.1	42.2	42.3
Employment	%	0.0	0.0	0.5	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4
(thousands persons)	'000	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

Table 4(S2a): Tax Revenue: Scenario 2 – Mid West pig iron plant ($m changes from base case values)

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
GST collected in WA	0.0	0.0	1.6	14.9	23.8	25.7	17.2	18.0	18.3	18.0	18.0	18.1	18.3	18.5	18.7	19.0
GST collected in ROA	0.0	0.0	-0.8	-5.5	-8.7	-10.1	-9.1	-10.1	-10.5	-10.7	-11.0	-11.4	-11.8	-12.1	-12.5	-12.9
Total GST	0.0	0.0	0.8	9.4	15.0	15.7	8.1	7.9	7.8	7.3	6.9	6.7	6.5	6.4	6.2	6.1
Company tax – national	0.0	0.0	2.8	12.0	16.3	14.1	9.0	10.5	11.1	10.5	10.1	9.9	9.7	9.5	9.3	9.1
Labour tax - national	0.0	0.0	0.6	16.0	21.5	16.9	-6.9	-4.5	-2.5	-1.5	-0.6	0.0	0.6	1.0	1.2	1.4
Royalty revenue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other tax revenue collected in WA	0.0	0.0	1.0	6.4	9.8	10.5	8.0	8.8	9.1	9.0	9.0	9.1	9.2	9.3	9.4	9.6
Other tax revenue collected in ROA	0.0	0.0	-0.4	-3.9	-6.4	-7.6	-6.1	-6.6	-6.7	-6.8	-6.9	-7.0	-7.1	-7.3	-7.5	-7.7

Table 1(S2b): Macroeconomic Variables: Scenario 2 – Aluminium smelter (percentage deviations from base case values)

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Real gross value added (GDP/GSP)	Aus	0.00	0.00	0.02	0.02	0.02	0.03	0.05	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06
	WA	0.00	0.00	0.49	0.84	0.82	0.97	1.21	1.53	1.52	1.48	1.44	1.41	1.39	1.36	1.34	1.31
	ROA	0.00	0.00	-0.04	-0.06	-0.07	-0.07	-0.08	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09
Real consumption	Aus	0.00	0.00	0.04	0.07	0.07	0.06	0.05	0.06	0.06	0.06	0.05	0.05	0.05	0.04	0.04	0.04
	WA	0.00	0.00	0.75	1.32	1.29	1.24	1.22	1.51	1.49	1.44	1.40	1.37	1.34	1.32	1.30	1.27
	ROA	0.00	0.00	-0.03	-0.05	-0.05	-0.05	-0.06	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.09
Real investment	Aus	0.00	0.00	0.35	0.57	0.56	0.33	0.05	0.07	0.05	0.04	0.03	0.03	0.02	0.02	0.02	0.02
	WA	0.00	0.00	3.45	5.58	5.33	3.56	1.25	1.53	1.30	1.12	1.02	0.95	0.89	0.84	0.80	0.76
	ROA	0.00	0.00	-0.08	-0.14	-0.13	-0.12	-0.12	-0.15	-0.14	-0.13	-0.12	-0.12	-0.11	-0.11	-0.11	-0.11
Real international exports	Aus	0.00	0.00	-0.31	-0.48	-0.46	-0.23	0.06	0.11	0.11	0.11	0.11	0.11	0.10	0.10	0.09	0.09
	WA	0.00	0.00	-0.96	-1.47	-1.27	-0.14	1.30	1.66	1.74	1.73	1.71	1.68	1.65	1.61	1.57	1.54
	ROA	0.00	0.00	-0.16	-0.26	-0.27	-0.25	-0.21	-0.23	-0.24	-0.24	-0.23	-0.23	-0.23	-0.23	-0.22	-0.22
Real international imports	Aus	0.00	0.00	0.15	0.23	0.21	0.13	0.03	0.04	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02
	WA	0.00	0.00	1.34	2.15	2.01	1.41	0.67	0.84	0.79	0.75	0.72	0.70	0.69	0.68	0.67	0.66
	ROA	0.00	0.00	-0.02	-0.05	-0.05	-0.06	-0.07	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08
Employment (hours)	Aus	0.00	0.00	0.03	0.04	0.03	0.00	-0.02	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	WA	0.00	0.00	0.90	1.44	1.28	1.01	0.74	0.98	0.93	0.87	0.83	0.81	0.78	0.77	0.75	0.74
	ROA	0.00	0.00	-0.06	-0.11	-0.11	-0.10	-0.10	-0.11	-0.11	-0.10	-0.10	-0.10	-0.09	-0.09	-0.09	-0.09

Table 2(S2b): Macroeconomic Variables: Scenario 2 – Aluminium smelter (absolute deviations from base case values)

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Real gross value added (GDP/GSP)	Aus	0.0	0.0	137.8	211.8	170.3	283.9	505.7	724.9	743.0	727.6	713.9	702.3	692.2	682.9	673.9	664.8
($million, 2001 prices)	WA	0.0	0.0	379.5	671.5	685.8	845.5	1097.0	1430.8	1473.2	1478.9	1492.2	1509.5	1528.5	1548.1	1567.3	1585.8
	ROA	0.0	0.0	-241.7	-459.7	-515.5	-561.5	-591.3	-705.9	-730.2	-751.3	-778.3	-807.2	-836.3	-865.1	-893.4	-921.0
Real consumption	Aus	0.0	0.0	191.8	342.7	332.4	292.5	257.7	339.8	342.4	327.3	312.1	299.0	288.1	278.4	269.2	260.1
($million, 2001 prices)	WA	0.0	0.0	294.1	534.1	542.7	539.0	549.6	702.1	719.8	717.5	719.9	726.4	735.5	745.7	756.0	766.0
	ROA	0.0	0.0	-102.3	-191.4	-210.3	-246.5	-291.9	-362.3	-377.4	-390.2	-407.8	-427.4	-447.4	-467.3	-486.8	-505.9
Real investment	Aus	0.0	0.0	773.6	1306.0	1273.4	788.5	117.4	156.0	122.0	90.2	71.2	59.0	50.5	43.6	37.6	31.7
($million, 2001 prices)	WA	0.0	0.0	933.3	1572.4	1522.6	1042.5	380.2	481.8	423.0	378.1	354.1	339.3	329.2	321.5	315.1	309.6
	ROA	0.0	0.0	-159.7	-266.4	-249.2	-254.0	-262.7	-325.9	-301.0	-287.9	-282.9	-280.3	-278.7	-277.9	-277.6	-277.9
Real international exports	Aus	0.0	0.0	-542.5	-956.4	-973.3	-508.4	183.0	312.1	352.6	371.7	383.4	390.4	394.6	397.1	398.6	399.7
($million, 2001 prices)	WA	0.0	0.0	-319.9	-537.1	-500.7	-59.3	575.1	775.7	851.7	894.8	930.5	961.9	990.7	1018.1	1044.6	1070.7
	ROA	0.0	0.0	-222.6	-419.3	-472.6	-449.1	-392.1	-463.6	-499.1	-523.1	-547.1	-571.4	-596.1	-621.0	-646.0	-670.9
Real international imports	Aus	0.0	0.0	303.3	524.9	499.0	313.0	67.2	103.1	96.3	86.2	80.4	77.0	75.1	73.8	72.8	71.7
($million, 2001 prices)	WA	0.0	0.0	346.9	621.8	610.6	447.7	227.7	301.5	300.9	299.8	305.8	315.6	327.4	340.5	354.2	368.4
	ROA	0.0	0.0	-43.6	-96.9	-111.6	-134.7	-160.5	-198.4	-204.6	-213.5	-225.4	-238.5	-252.3	-266.6	-281.4	-296.7
Employment	Aus	0.0	0.0	1.8	2.7	1.9	0.6	-0.5	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3
(thousands persons))	WA	0.0	0.0	4.6	7.6	6.9	5.5	4.2	5.6	5.4	5.2	5.0	5.0	4.9	4.9	4.9	4.9
	ROA	0.0	0.0	-2.8	-4.9	-5.0	-4.9	-4.7	-5.5	-5.2	-5.0	-4.8	-4.8	-4.7	-4.7	-4.6	-4.6

Table 3(S2b): GRP and Employment for the South-West region: Scenario 2 – Aluminium smelter (deviations from base case values)

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Real gross value added	%	0.0	0.0	4.9	0.1	0.1	6.3	15.2	20.0	20.3	19.8	19.3	18.9	18.5	18.1	17.7	17.3
($million, 2001 prices)	$m	0.0	0.0	189.7	4.4	4.5	241.0	598.0	810.1	843.7	847.3	850.8	854.3	857.9	861.4	865.0	868.7
Employment	%	0.0	0.0	8.9	0.5	0.5	3.5	8.1	10.9	11.2	11.1	11.0	10.9	10.8	10.8	10.7	10.6
(thousands persons)	'000	0.0	0.0	2.3	0.1	0.1	0.9	2.2	2.9	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0

Table 4(S2b): Tax Revenue: Scenario 2 – Aluminium smelter ($m changes from base case values)

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
GST collected in WA	0.0	0.0	23.5	42.7	43.4	43.1	44.0	56.2	57.6	57.4	57.6	58.1	58.8	59.7	60.5	61.3
GST collected in ROA	0.0	0.0	-8.2	-15.3	-16.8	-19.7	-23.4	-29.0	-30.2	-31.2	-32.6	-34.2	-35.8	-37.4	-38.9	-40.5
Total GST	0.0	0.0	15.3	27.4	26.6	23.4	20.6	27.2	27.4	26.2	25.0	23.9	23.0	22.3	21.5	20.8
Company tax – national	0.0	0.0	16.5	25.4	20.4	34.1	60.7	87.0	89.2	87.3	85.7	84.3	83.1	82.0	80.9	79.8
Labour tax - national	0.0	0.0	27.5	40.4	29.0	9.5	-7.5	2.0	3.4	3.1	2.9	3.0	3.2	3.5	3.7	3.9
Royalty revenue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other tax revenue collected in WA	0.0	0.0	9.5	16.8	17.1	21.1	27.4	35.8	36.8	37.0	37.3	37.7	38.2	38.7	39.2	39.6
Other tax revenue collected in ROA	0.0	0.0	-6.0	-11.5	-12.9	-14.0	-14.8	-17.6	-18.3	-18.8	-19.5	-20.2	-20.9	-21.6	-22.3	-23.0

Table 1(S2c): Macroeconomic Variables: Scenario 2 – Ferro Silicon production (percentage deviations from base case values)

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Real gross value added (GDP/GSP)	Aus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	WA	0.00	0.03	0.03	0.03	0.06	0.07	0.08	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
	ROA	0.00	0.00	0.00	0.00	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Real consumption	Aus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00
	WA	0.00	0.04	0.05	0.04	0.09	0.10	0.12	0.14	0.15	0.15	0.14	0.14	0.14	0.14	0.13	0.13
	ROA	0.00	0.00	0.00	0.00	0.00	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Real investment	Aus	0.00	0.02	0.02	0.00	0.02	0.02	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	WA	0.00	0.21	0.19	0.05	0.21	0.21	0.14	0.17	0.16	0.14	0.13	0.12	0.12	0.11	0.11	0.11
	ROA	0.00	0.00	0.00	-0.01	-0.01	-0.01	-0.01	-0.02	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Real international exports	Aus	0.00	-0.02	-0.02	0.00	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
	WA	0.00	-0.05	-0.05	0.02	0.00	0.01	0.05	0.06	0.06	0.07	0.07	0.07	0.07	0.08	0.08	0.08
	ROA	0.00	-0.01	-0.01	-0.01	-0.01	-0.02	-0.02	-0.02	-0.02	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
Real international imports	Aus	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	WA	0.00	0.08	0.08	0.03	0.09	0.09	0.07	0.09	0.09	0.08	0.08	0.08	0.08	0.08	0.08	0.08
	ROA	0.00	0.00	0.00	0.00	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Employment (hours)	Aus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	WA	0.00	0.05	0.05	0.03	0.08	0.09	0.09	0.12	0.12	0.11	0.10	0.10	0.10	0.09	0.09	0.09
	ROA	0.00	0.00	0.00	0.00	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01

Table 2(S2c): Macroeconomic Variables: Scenario 2 – Ferro Silicon production (absolute deviations from base case values)

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Real gross value added (GDP/GSP)	Aus	0.0	7.4	6.0	1.4	10.8	13.0	12.8	17.3	19.2	18.9	18.0	17.2	16.6	16.2	15.9	15.6
($million, 2001 prices)	WA	0.0	20.1	22.2	21.9	51.0	59.9	70.4	89.9	97.0	99.0	101.2	103.8	106.7	109.9	113.3	116.7
	ROA	0.0	-12.7	-16.2	-20.5	-40.2	-46.9	-57.6	-72.6	-77.8	-80.2	-83.2	-86.6	-90.1	-93.7	-97.4	-101.1
Real consumption	Aus	0.0	10.1	11.5	4.9	15.7	19.4	19.1	24.8	30.0	31.1	30.9	30.6	30.2	29.8	29.5	29.0
($million, 2001 prices)	WA	0.0	15.3	18.1	16.2	37.6	45.0	51.9	66.3	71.3	72.4	73.2	74.3	75.6	77.1	78.8	80.4
	ROA	0.0	-5.2	-6.6	-11.3	-21.9	-25.6	-32.8	-41.5	-41.3	-41.3	-42.3	-43.7	-45.4	-47.3	-49.3	-51.4
Real investment	Aus	0.0	43.7	44.1	2.4	35.1	36.5	11.4	15.2	18.6	17.5	16.6	15.9	15.6	15.2	15.0	14.6
($million, 2001 prices)	WA	0.0	51.9	52.4	14.8	60.5	61.5	41.9	53.1	51.8	48.1	45.9	44.7	44.0	43.7	43.6	43.6
	ROA	0.0	-8.1	-8.3	-12.4	-25.4	-25.0	-30.5	-38.0	-33.2	-30.7	-29.3	-28.7	-28.4	-28.5	-28.7	-29.0
Real international exports	Aus	0.0	-30.2	-33.3	-4.1	-25.1	-26.8	-10.8	-14.0	-20.2	-21.8	-22.7	-23.2	-23.7	-24.0	-24.2	-24.2
($million, 2001 prices)	WA	0.0	-17.8	-17.9	6.0	-1.6	2.6	21.0	26.6	31.7	35.0	38.2	41.3	44.5	47.6	51.0	54.5
	ROA	0.0	-12.4	-15.5	-10.2	-23.5	-29.4	-31.8	-40.7	-51.9	-56.8	-60.9	-64.6	-68.2	-71.7	-75.2	-78.7
Real international imports	Aus	0.0	16.7	17.4	2.1	16.2	17.1	8.0	10.3	11.6	10.9	10.4	10.2	10.2	10.3	10.6	10.8
($million, 2001 prices)	WA	0.0	18.9	20.3	8.2	27.5	29.6	24.6	31.7	33.3	33.5	34.2	35.5	37.1	39.1	41.2	43.5
	ROA	0.0	-2.2	-2.9	-6.1	-11.3	-12.5	-16.6	-21.4	-21.8	-22.6	-23.8	-25.3	-27.0	-28.8	-30.7	-32.8
Employment	Aus	0.0	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
(thousands persons))	WA	0.0	0.2	0.2	0.2	0.5	0.5	0.5	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	ROA	0.0	-0.1	-0.2	-0.2	-0.4	-0.4	-0.5	-0.6	-0.6	-0.6	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5

Table 3(S2c): GRP and Employment for the South-West region: Scenario 2 – Ferro production (deviations from base case values)

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Real gross value added	%	0.0	0.3	0.3	0.4	0.7	0.8	1.2	1.5	1.5	1.5	1.5	1.4	1.4	1.4	1.3	1.3
($million, 2001 prices)	$m	0.0	10.0	11.1	13.5	27.1	32.6	46.3	60.0	65.5	65.5	65.7	65.8	66.1	66.3	66.6	66.9
Employment	%	0.0	0.5	0.5	0.4	0.7	0.8	1.1	1.5	1.6	1.6	1.5	1.5	1.5	1.5	1.5	1.5
(thousands persons)	'000	0.0	0.1	0.1	0.1	0.2	0.2	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4

Table 4(S2b): Tax Revenue: Scenario 2 – Aluminium smelter ($m changes from base case values)

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
GST collected in WA	0.0	1.2	1.5	1.3	3.0	3.6	4.2	5.3	5.7	5.8	5.9	5.9	6.0	6.2	6.3	6.4
GST collected in ROA	0.0	-0.4	-0.5	-0.9	-1.8	-2.0	-2.6	-3.3	-3.3	-3.3	-3.4	-3.5	-3.6	-3.8	-3.9	-4.1
Total GST	0.0	0.8	0.9	0.4	1.3	1.6	1.5	2.0	2.4	2.5	2.5	2.4	2.4	2.4	2.4	2.3
Company tax – national	0.0	0.9	0.7	0.2	1.3	1.6	1.5	2.1	2.3	2.3	2.2	2.1	2.0	1.9	1.9	1.9
Labour tax - national	0.0	1.5	1.2	-0.3	1.1	1.2	0.8	1.2	1.4	1.3	1.2	1.1	1.0	1.0	0.9	0.9
Royalty revenue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other tax revenue collected in WA	0.0	0.5	0.6	0.5	1.3	1.5	1.8	2.2	2.4	2.5	2.5	2.6	2.7	2.7	2.8	2.9
Other tax revenue collected in ROA	0.0	-0.3	-0.4	-0.5	-1.0	-1.2	-1.4	-1.8	-1.9	-2.0	-2.1	-2.2	-2.3	-2.3	-2.4	-2.5