

RISING NATURAL GAS PRICES AND ELECTRICITY IN WESTERN AUSTRALIA

2003-04 to 2049-50

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Brian J. Fleay

bfleay@iinet.net.au

SUMMARY

The South West Interconnected System (SWIS) in 2004-5 had 3,385MW of generating capacity from private and public sources. 59 percent was coal-fired, 10 percent combined cycle gas-fired, and 29 percent single cycle gas. By 2009-10 this is expected to be 4,435MW with 38 percent coal fired, 34 percent combined cycle gas, 22 percent single cycle and 6 per cent renewable sources. The proportion of privately owned generation is increasing as competitive markets in generation and retail develop from July 2005. A significant shift from coal-fired to gas-fired plant for base load generation is underway, requiring a near doubling of gas consumption by 2010.

An international boom in liquid natural gas (LNG) production is underway, driven by declining natural gas production in North America and Europe, and to a lesser extent by Chinese demand. Rising sale prices for LNG are making sub-economic projects viable (e.g. Gordon and Browse Basin in WA). In 2006 these high LNG prices began feeding into the *domestic gas market* with new contracts rising from \$2.00-2.50/GJ to \$5.50-6.00/GJ. The cost of transporting natural gas as LNG is very energy intensive and costs up to ten times the equivalent for oil. Such energy investment in new LNG works is at the expense of energy available elsewhere in the economy. The volatility in these markets and associated construction costs is limiting new domestic gas contracts to 5 years against the past practice of 20-25 years. A buyers market has become a sellers market.

This paper *estimates* the impact of rising gas prices on fuel costs for power generation in SWIS to 2009-10 and the flow on to electric power charges. Indirect estimates were necessary, along with assumptions, as the key data needed was not available due to the confidential nature of the contracts involved, particularly on rise and fall clauses and contract durations. The higher gas prices *alone* could increase the domestic electric power price from 12.67c/kwh in 2007 to 14.67c/kwh in 2010, if the full impact of higher gas prices were applied to electric power generation. Other factors that will impact on electric power charges are not discussed, such as the transition to competitive markets in electric power and heavy investment upgrading of regional power networks—these have been neglected since the early 1990s. Adapting to Climate Change will add another dimension to electric power charges.

A greater focus on energy demand management and renewable energy in electric power is needed as well as greater transparency in contracts for fuel and electricity trading. The merits of competitive markets in electric power in SWIS need to be reviewed.

SOUTH WEST INTEGRATED SYSTEM

The role of natural gas in mineral processing has grown in Western Australia and for electric power generation in the South West Interconnected System (SWIS). The building and expansion of the Dampier Bunbury Gas Pipeline has been the driver. Major mineral industries generate their own electricity and use the waste heat from gas turbines for mineral processing. Some industries sell electricity into SWIS as well. Western Power undertook these initiatives for SWIS when it was an integrated supplier of electricity. This

role in SWIS ended when its generation role was transferred to state-owned Verve Energy on 1 July 2006¹. These investments were *most likely* made on the premise that natural gas prices would not increase significantly, a vision shattered since mid 2006. **This paper discusses the consequences for electric power prices in SWIS.**

Table 1 lists the generation capacity available to SWIS in 2004/05². Kwinana A&C were built as oil fired steam plants and were converted to coal and gas after the 1970s oil crises. Kwinana B was also oil-fired but only converted to gas. In an emergency the coal-fired plants and Kwinana C can run on fuel oil and the Kwinana, Geraldton and Pinjar gas turbines on distillate. Cockburn has combined cycle gas turbines. Verve Energy has a 50 percent share in the Worsley gas turbine at the Worsley alumina plant and owns the gas turbine at Tiwest. Western Power purchased 1,783 GWh from other sources in 2004/05.

TABLE 1
SWIS Generation Plant 2004/05

Plant	Fuel	Capacity MW	GWh generated	Start-up
Collie	Coal	330	2,457	1999
Muja A & B	Coal	240	1,081	1965
Muja C	Coal	400	2,490	1981
Muja D	Coal	400	2,675	1985-6
Kwinana A & C	Coal & gas	640	1,858	1970-78
Kwinana B	Gas -- steam	240	221	1970-73
Cockburn WP	Gas Combined cycle	240	1,416	2003
Kwinana	Gas turbine	21	1	1972
Geraldton	Gas turbine	21	1	1973
Kalgoorlie	Fuel oil (turbine)	62	6	1984-90
Mungarra	Gas turbine	112	269	1990-91
Pinjar	Gas turbine	586	475	1990-96
Wellington Dam	Hydro	2	--	
Worsley/W.Power	Gas combined cycle	60	521	2000
Tiwest/W.Power	Gas combined cycle	36	147	1999
Albany WP	Wind farm	22	62	2002
Bremer Bay WP	Wind Farm	0.6	1	2005
Other renewable	Purchased	30+	137	
Purchased	Various, assumed gas	--	1,645	
Total		3,385	15,465	
Total coal-fired		2,010 (59%)	10,560 (68%)	
Total gas-fired		1,315 (39%)	4,700 (30%)	

An Office of Energy Fact Sheet says 1.5 percent of electricity generated in SWIS was generated from renewable sources (200 GWh) of which 138 GWh was purchased, some from those fueled by methane from rubbish tips and wastewater treatment plants. We assumed the remainder purchased came from gas-fired plants. Four percent of electricity generated was used "in-house". Electricity sent out was 14.8 TWh in 2004-05.

As at August 2006 installed generation capacity in Western Australia was 6192 MW (4.5 percent as renewable sources). This included generation in Western Power systems outside SWIS, but most of it as private generation capacity serving mines and mineral processing, most of it gas-fired. Some of the latter is located within the SWIS network and

¹ Western Power as an integrated supplier of electricity was broken up on 1 July 2006 into four companies. In the SWIS Western Power became an electric power network distributor, Verve Energy became the generation component, and Synergy was created as a retailer competing with others. Horizon Energy operates the independent regional electric power supply systems. All these are state-owned.

² Data source: Western Power Annual Report for 2005.

can both draw power from SWIS and feed into it. 1,100 MW of capacity was committed or under construction.

Table 2 lists the commitments to new and retired plant from 2004-05 to 2009³.

**TABLE 2
SWIS ADDITIONS AND DELETIONS TO
GENERATION CAPACITY 2004/05 TO 2009**

Site	New plant		Retired		Owner
	MW	Start-up date	MW	Date	
Collie Bluewater coal	208	Late 2008			Griffin Coal
Kwinana C.Cycle gas	240	Dec.2006			Verve Energy
Kwinana C.Cycle gas	320	Late 2008			New Gen
Kemerton gas	260	Nov. 2005			Transfield
Muja A&B coal & gas			240	April 2007	Verve Energy
Kwinana B gas - steam			240	Aug. 2008	Verve Energy
Kwinana A coal & gas			240	Aug. 2009	Verve Energy
Pinjarra 1 C.Cycle gas	140	2006			Alcoa/Alinta
Pinjarra 2 C.Cycle gas	140	2007			Aloca/Alinta
Wagerup 1 C.Cycle gas	350	Aug.2007			Alcoa/Alinta
Alinta wind Dongara	89	2006			B&B Wind Part.
Emu Downs wind	80	2006			Griffin/Stanwell
Total	1,827		720		

Table 3 integrates the data from Tables 1 and 2 to describe the SWIS generation sources expected in late 2009.

Muja A&B at Collie (~32 percent thermal efficiency) were retired in April 2007 because of their age, and replaced by combined cycle gas turbines at Kwinana in Dec. 2006 (>50 percent thermal efficiency).

Kwinana B (2x120 MW) was originally an oil-fired steam plant, converted to natural gas about 1980 (~32 per cent thermal efficiency). It will be replaced with combined cycle gas turbines in August 2008. Kwinana A was originally an oil fired steam plant (2x200 MW) that was converted to coal-fired from 1980-82 (2x160 MW) with an option for gas. The then State Energy Commission about 1990 was committed to a long-term take-or-pay coal contract that is finally reaching its end-point paving the way for Kwinana A to be replaced by more thermally efficient combined cycle gas turbines (320 MW in late 2008).

An Office of Energy Fact Sheet says that six percent of electricity generated in SWIS is planned to come from renewable energy sources in 2010, but with little detail. If wind power is a major source about 100 MW of additional capacity will be needed to that listed in Tables 1 and 2.

The installed capacity of gas-fired plant will increase by 50 percent to 2009-10, from 39 to 56 percent. Worsley, Tiwest, Pinjarra and Wagerup would sell directly to large customers and through the new retail market.

The original Alcoa own-use gas turbines at its Pinjarra alumina refinery would now be over 30 years old and approaching retirement. Those at Alcoa's Wagerup alumina refinery would be 25 years old. These plants have sold electricity into SWIS, but are no doubt being replaced with the new co-generation-process heat plants. We will assume these are being phased out in 2006-07, but that some lesser quantity may continue.

³ Sources: Western Power 2005 Annual Report, Office of Energy WA, www.energy.wa.gov.au, publications.

**TABLE 3
SWIS GENERATION SOURCES FROM AUGUST 2009**

Plant	Fuel	MW	Start-up
Collie	Coal	330	1999
Collie Bluewater	Coal	208	2008
Muja C & D ⁴	Coal	854	1981-86
Kwinana C	Coal & gas	320	1973-78
Kwinana gas turbine	Gas	21	1972
Kwinana combined cycle	Gas	240	2006
Kwinana combined cycle	Gas	320	2008
Cockburn combined cycle	Gas	240	2003
Pinjar gas turbine	Gas	586	1990-96
Kemerton gas turbine	Gas	260	2005
Geraldton gas turbine	Gas	21	1973
Mungara gas turbine	Gas	112	1990-91
Kalgoorlie turbine	Fuel oil	62	1984-90
Worsley combined cycle	Gas	60	1999
Tiwest combined cycle	Gas	36	2000
Pinjarra 1 combined cycle	Gas	140	2006
Pinjarra 2 combined cycle	Gas	140	2007
Wagerup 1 combined cycle	Gas	350	2007
Renewable		300	2002-06
Total coal-fired	Coal	1,712 (38%)	
Total combined cycle	Gas	1,526 (34%)	
Total open cycle	Gas	1,000 (22%)	
Total all sources		4,550	

Table 4 shows the *estimated* electric power *generated and sent out* to SWIS networks, actual figures for 2004-05⁵. Consumption growth was assumed to be three percent per annum under economic boom conditions (seven percent increase in 2004-05). This is converted to petajoules (PJ) and the proportions generated from combined cycle and single cycle gas turbines. These are in turn converted to the turbine gas input required in PJ for 53 and 35 percent thermal efficiency respectively, and finally to the gas input in PJ and billion cubic metres (Bcm) for electricity sent out. Data for 2004-05 is based on actual performance obtained from Western Power's 2005 Annual Report.

The estimates of the generation share to natural gas modes in 2009-10 took note of the new and retired plant listed in Tables 2 and 3, with combined cycle gas having *mainly* a base-load role and taking note of the distribution of load between fuel types that occurred during 2004-05. The *estimated* proportion of renewable energy generated in SWIS was taken from Office of Energy Fact Sheets, being 200, 600 and 1000 GWh in 2004-05, 2005-06 and 2009/10 respectively. Additional renewable sources equivalent to 130 MW of wind generation capacity would be needed to meet the 2009-10 target—a decision to proceed is needed in the next few months.

There may be a slight increase in the proportion of base load generation by 2010 due to demand from the new Boddington gold mine (100 MW) and the Water Corporation's two seawater desalination plants (50 MW). The allocation to single cycle gas turbines may be under-stated. The estimates for 2006-07 were derived in a similar way. Improved estimates will be possible when Verve Energy publishes its 2007 Annual Report. *The gas-fired electricity sent out in SWIS doubles over five years for a three percent per annum*

⁴ Two of the 200 MW Muja generators were upgraded to 454 MW in 2007.

⁵ 1 GWh equals 3.6 TJ. 1 GJ equals 26.3 million m³ of natural gas. GWh = gigawatt hours (10⁹ watt hours). GJ equals 10⁹ joules. PJ equals petajoules, 10¹⁵ joules. Joules are a measure of energy.

increase in electricity sent out. The proportion of gas-fired base-load capacity triples. The increase sent out in 2004-05 was seven per cent on 2003-04.

TABLE 4
ESTIMATED GAS INPUT TO GENERATION IN SWIS
2004-05 to 2009-10

Including from purchased power

	2004-05	2006-07	2009-10
*Generated, fossil fuel, GWh	13,810	15,140	16,740
Used "in house", GWh	840	840	840
<i>Net fossil fuel generated, GWh</i>	<i>12,970</i>	<i>14,300</i>	<i>15,900</i>
*Purchased, gas assumed, GWh	1,645	800	200
Total fossil fuel sent out, GWh	14,615	15,100	16,100
Renewable all sources, GWh	200	600	1,000
Sent out to SWIS network, GWh	14,815	15,700	17,100
*Total fossil fuel generated, GWh	15,450	15,950	17,000
<i>Total fossil fuels petajoules, PJ</i>	<i>55.6</i>	<i>57.4</i>	<i>61.2</i>
<i>Gas fired generation, PJ</i>	<i>17.2</i>	<i>24</i>	<i>34.3</i>
Combined cycle generation, PJ	7.7	13	22.3
Single cycle generation, PJ	9.5	11	12
Combined cycle @ 53% efficiency	14.5	21	42
Single cycle @ 35% efficiency	27.1	31.4	34.3
<i>Gas input to all generation, PJ</i>	<i>41.5</i>	<i>52.5</i>	<i>76.5</i>
Gas input in billion m ³ per year	1.1	1.4	2.1

DOMESTIC NATURAL GAS PRICE CRISIS IN WESTERN AUSTRALIA

A fundamental change in the domestic natural gas market emerged in Western Australia in mid 2006 that fore shadows a dramatic increase in the domestic gas sale price in the near future. Estimating the impact on electric power prices is difficult because of the many confidential contracts of varying duration, both for gas supply and electricity, further compounded by a similar situation for regulated gas shipping contracts in the DBNGP.

Natural gas has become a significant fuel in WA since 1985 when the North West Shelf Joint Venture (NWSJV) began operations offshore from Karratha in the Carnarvon Basin and the Dampier Bunbury Natural Gas Pipeline was constructed by the then State Energy Commission of WA to deliver gas to the south west. The economics were such that the gas price was customer dominated based on 20-year contracts with the two major users, Alcoa alumina and SECWA. *Subsequently the NWSJV developed and expanded its capacity to export liquid natural gas (LNG), now its major business focus.*

Other local industries based on natural gas are developing and minor gas producers now supply the local market as well, but in a secondary role to the NWSJV. In the mid 1990s the Goldfields Gas Pipeline was built from Karratha to Kalgoorlie. The new Economic Regulation Authority (ERA) now regulates gas transport markets by pipelines.

Natural gas production in North America and Europe has commenced decline this decade and since 2004 has inspired a massive global expansion of LNG capacity for export, including in Australia. The international sale price of natural gas and LNG has increased dramatically. This has coincided with the end of the initial 20-year domestic gas supply contracts referred to above. The global LNG boom and resources boom in Western Australia to supply minerals to China has inflated construction costs and increased uncertainty in LNG sales prices, the main reason why the NWSJV now wishes to set five-year limits on gas contracts.

The market has shifted to one where the NWSJV profits arising from LNG exports in a market of rising prices foreshadows significant price rises for gas in the domestic market.

The background to these issues is comprehensively covered in my paper *Natural Gas: "Magic Pudding" or Depleting Resource*⁶.

The Chamber of Commerce and Industry (CCIWA) responded to these challenges in a 2007 report, *Meeting the Future Gas Needs of Western Australia*. It says that the average price of gas to wholesale consumers in WA in 2005-06 was \$2.34/GJ and reports now reveal prices in the range \$5.50-6.00/GJ. These prices do not include the transport cost of gas to the south west of WA. The CCIWA says natural gas fueled 60 percent of electricity generation in WA in 2005-06⁷.

Many mineral and resource projects use natural gas to generate electricity for their own needs. A report by the ERA on the subject says the present netback price for domestic natural gas in WA is \$5.80/GJ⁸. The net back price is that where the company makes an equivalent profit from domestic gas sales as it does from sale of LNG overseas. *The NWSJV's priority is now the sale of LNG and it is only interested in contracts that are up to five years duration due to market volatility. The domestic market has shifted from buyer price control to a sellers market.*

Before estimating the impact of these new gas prices on the cost of electric power in SWIS we must attempt to identify the gas transport costs for the DBNGP.

Dampier Bunbury Gas Pipeline gas shipper contracts

The pipeline was built and owned in 1981-85 by SECWA on the basis of NWSJV gas supply contracts with SECWA and Alcoa, in the case of SECWA as a take-or-pay contract. By the mid 1990s SECWA had paid several hundred million dollars for gas it had not yet received. In 1995 SECWA was split into Western Power for electricity and a new state-owned entity, Alinta Gas that assumed ownership of the DBNGP and responsibility for retail sales. The gas contract with the NWSJV was renegotiated to split between Western Power and Alinta Gas, including apportioning the gas paid for but not yet received. Separate supply contracts were made by the NWSJV with other major users who paid Alinta Gas for its transport. In 1997 Alinta Gas extended its contract with the NWSJV to 2020. The Goldfields Gas Pipeline was built diversifying the gas market and minor gas companies began selling gas from fields located around Varianus Island in the Carnarvon Basin.

Shortly after the government sold the pipeline to Epic Energy and the pipeline market became subject to federal competition legislation as well as state regulation. In 2000 Alinta Gas was privatised to become Alinta. During this period expansion of the DBNGP capacity began by installing more gas-fired compressors. In 2003 Epic Energy sold the pipeline to a new consortium, Dampier Bunbury Pipeline (DBP) in which Alinta and Alcoa hold a 20 percent share⁹.

The original SECWA 20-year gas contracts with the NWSJV expired in 2005. There is a lack of information in Western Power Annual Reports on past and new terms in natural gas and coal contracts—these are confidential. The 2005 Annual Report (p.13) does say a new long-term shippers contract was negotiated with the DBNGP in 2004-05 that would

⁶ Fleay, B. 2007, *Natural Gas: "Magic Pudding" or Depleting Resource*, www.aspo-australia.org.au, Bibliography.

⁷ The Chamber of Commerce and Industry, *Meeting the Future Gas Needs of Western Australia*, p.143 & 41.

⁸ ERA 2007, *Discussion Paper: Gas Issues in Western Australia*, Economic Regulation Authority, Western Australia, June 2007, www.era.wa.gov.au.

⁹ Information from issues of *Energy Western Australia*, Office of Energy WA 1997 and 2003.

have an “enormous bearing on the price of electricity” and also related to expansion of its capacity and Western Power’s access to it. These contracts would now be with the new state-owned generator Verve Energy.

Of critical importance to the discussion below on future gas prices are the basis and formula for price determinations and their variations, and the time span of the contracts. The shipper’s contracts would be subject to ERA regulations that take account of the status of shipping contracts prior to 2005, when the ERA was formed and assumed responsibility for oversight of earlier contracts. *However, the ERA’s charter does not extend to gas purchase contracts.* If prices in gas supply contracts relate to international prices for petroleum fuels these may even be outside the legal framework of the Australian Competition and Consumer Commission (ACCC).

The most recent published prices for principal gas transport charges were in 1997 based on two Tranches, T1 and T2. T1 is firm capacity with a minimum of 98 percent supply probability. T2 is capacity with supply probability lower than 98 percent but greater than 92 percent. In 1997 the charges were,

- T1: \$1.03/GJ capacity reservation plus 0.23c/GJ commodity charge;
- T2: \$0.98/GJ capacity reservation charge plus 0.23c/GJ commodity charge¹⁰.

The capacity reservation relates to hire of pipeline capacity and the commodity charge presumably covers the cost of gas used to fuel the compressors on the pipeline. In 1997 there were eight compressor stations, increased to ten in 1999. There are other Tranches for short term trading.

It is difficult to obtain information on contract prices since the mid 1990s as the gas market became more complex and commercial confidentiality is the rule. The regulations have become complex as the number of gas buyers and supplier’s increases and capacity expansion takes place.

Estimated electricity price rises to 2009-10

We will attempt to estimate two gas price regimes to 2009, one based on continuation of historical prices, the other based on prices rising to the new \$5.80/GJ from 2006-07. The actual prices will be somewhere in between depending on the specific terms of contracts and their termination dates that allow the new international prices to work their way through to the SWIS generation plant. The impact of rise and fall clauses will be significant.

The Western Power 2005 Annual Report says the cost of *gas purchases* in 2004-05 was \$158.6 million for 43.7 million GJ, or \$3.63/GJ (pp.17&28). A minor quantity would be used outside SWIS. Applying the total 1997 T1 price of \$1.26/GJ for transport gives a purchase price for the gas of \$2.37/GJ, about equal to the average price quoted by the CCIWA.

The owners of the pipeline have made substantial investment since 1997 in expanding its capacity and transport charges in 2004-5 could have been higher, and the gas purchase price lower than quoted above. *But increased shipping charges arising from this investment are only applied to new contracts based on the new capacity under ERA regulations.* We will assume that capacity charges are based on the capital charges of the original pipeline to 2006-07. The regulations allow shipper contracts to take account of inflation. Appendix 1 outlines some of the main features of the highly regulated gas transport market.

We will assume for the *2004-05 base case* a one per cent per year rise in these 1997 prices for T1 to \$1.10/GJ for the capacity charge and 29c/GJ for the commodity charge

¹⁰ Office of Energy WA 1997, *Energy Western Australia*, p.18.

(two more compressors). The total shipping charge would be \$1.39/GJ leaving \$2.24/GJ for purchase of the gas.

In 2006-07 we will similarly apply a one percent per year increase making the capacity charge \$1.12/GJ and the commodity charge 29c/GJ for a total of \$1.41/GJ shippers charge, and a gas purchase charge of \$2.30/GJ to a total of \$3.71/GJ. For 2009-10 we will assume the full impact of the \$5.80/GJ is in operation and these prices increase to \$1.16/GJ and \$0.75/GJ for a total shipping charge of 1.91/GJ. The total charge for gas delivered to SWIS generators would be \$7.71/GJ.

Table 5 translates these prices into gas purchase costs covering both private generators and government owned ones. *We are making an assumption that the private operators will have the same contract terms as the government owned ones and that the contract terms with the Alcoa-Tiwest generation plants are equivalent to stand-alone combined cycle gas turbines.* Gas price rises will translate into both sale prices of electricity to SWIS and process heat and electricity for these industries. These are crude estimates. *However, we should get some indication of the fuel cost rises if these became fully effective by 2009-10.*

There will be a decline in coal-fired generation by 2009-10, with remaining plant more thermally efficient than retired plant (Table 3). Western Power used 4.9 million tonnes of coal in 2004-05 at a cost of \$270 million, equivalent to \$55/tonne¹¹. A base-load role for coal-fired generation was used to estimate the cost of coal in 2006-07 and 2009-10. A one percent increase in the coal price per year was assumed.

**TABLE 5
GAS PRICES AND COSTS FOR GENERATION IN SWIS
2004-05 TO 2009-10**

	2004-05 est.	2006-07 est.	2009-10 est.
Gas purchased PJ, Table 4	41.5	52.5	76.5
Gas price, delivered \$/GJ	3.63	3.71	7.71
Cost of gas, \$million	151	195	590
Coal M.tonnes	4.9	4.6	4
Coal \$/tonne	\$55	\$56	\$58
Cost of coal	270	258	235
Total gas & coal \$ million	421	453	825
Sent out in GWh	14,818	15,700	17,100
Fuel cost per GWh sent out	\$28,500	\$28,900	\$48,000
Fossil fuel cost cents/kwh	2.85	2.9	4.83

The current price of electricity to households in SWIS is 12.67c/kwh of which fossil fuel costs by this study are 22 per cent. This price incorporates a subsidy to customers outside SWIS and to regional customers within SWIS. Adding 2c/kwh for higher fuel prices to the 2007 price gives 14.67c/kwh in 2010, other factors being unchanged.

The increase is driven by increased use of natural gas and its higher price, modified by the higher efficiency of combined cycle generation and an increase in renewable energy generation. Fuel costs increase to 33 percent of the household charge that also increases by 16 percent. Failure to expand renewable energy input to the 2010 target would add two percent to the estimate for 2009-10 gas consumption.

¹¹ Western Power Annual Report 2004-05, pp. 17&28.

DISCUSSION

Fuel contracts

The Western Power 2005 Annual Report discusses its long-term take-or-pay contracts for natural gas and coal, but their confidential nature prevents the publishing of informed detail. It would seem that Western Power taking delivery of gas that it has already paid for may have helped keep electricity prices stable this decade, but this era is certainly ending. The corresponding contract for coal dates back to 1992. It was to supply coal to a new 600 MW Collie power station, finally commissioned in 1999 at 330 MW. Western Power has been accumulating coal stocks under this contract that apparently will expire in 2010. In 2006-07 Western Power sold some of these coal stocks to Worsley Alumina. A new contract has been let to Premier coal to 2030.

It is unclear what all this means for future coal prices and when accumulated stocks will be reduced to acceptable quantities.

Verve Energy's financial woes and electricity prices

Western Power was broken up as an integrated electricity supplier from 1 July 2006 into four state-owned companies, Verve Energy with generation, Western Power with electricity transmission and distribution, and Synergy with retailing functions in SWIS. Horizon Power has taken over integrated electric power supply in the Pilbara and independent Regional supply. This was part of the Government's program to introduce competitive markets in both generation and retailing in SWIS. The Government promised to hold electric power charges unchanged to 2009 to get these changes through Parliament. Verve Energy is forced to sell 95 percent of its electricity at a 95 percent discount to Synergy at a significant discount to the cost of producing that power under "vesting" contracts it inherited from the Western Power split¹². There is also a government strategy to reduce Verve Energy's domination of generation to get a more competitive market in supply.

An immediate consequence is that Verve energy is losing money at a rate of about \$1 million per week and may struggle to meet its interest bill on debts of about \$900 million. An increase in electric power charges is inevitable after 2009. The question is by how much?

What does Synergy now pay for natural gas and to what extent are the higher gas prices discussed above contributing to its debt problems? The West Australian article did not raise this issue. The journalist probably was unaware of it.

In 2006-08 a substantial shift to natural gas and privately owned generation is under way—see Tables 1 and 2. Verve energy is left with ageing coal-fired plant. 630 MW is gas-fired generation at two of Alcoa alumina plants and jointly owned by Alinta and Alcoa—who also jointly own 20 percent of Dampier Gas Pipeline, the new owners of the DBNGP. Alinta also owns a 89 MW wind farm at Dongara. Griffin Coal owns the Bluewater coal-fired power station at Collie and has a share in the Emu Downs 80 MW wind farm. Transfield owns the Kemerton single cycle gas turbine plant.

This is hardly a competitive market in generation. Is it likely to change much? The SWIS is too small to sustain some semblance of a workable competitive market.

What impact will the reduction of Verve Energy's generation capacity have on its commercial viability, leaving it with ageing coal-fired plant? What will the impact be on the reliability of the SWIS power supply system? How will the competitive market introduce new generation capacity and replacements for ageing plants, especially for peak demand plant some of which is only used for a few hours on hot summer days?

¹² West Australian 2007, *Power bills to soar as utility hits cash crisis*, 1 September, p.1.

Western Power is engaged in a massive upgrade of neglected regional transmission systems in regional SWIS, where customers are subsidised by metropolitan consumers. Will this program also push up electric power charges? The monopoly position of Western Power in transmission and distribution, necessary for this function, gives it a competitive advantage over Verve Energy.

Accountability

Western Power's 2006 Annual Report only covers the April-June 2006 period when it began to function strictly as a transmission and distribution utility in preparation for the split into four utilities on 1 July 2006. There is not an Annual Report on the website covering the integrated Western Power utility from 1 July 2005 to 31 March 2006. Will the 2007 Verve Energy Annual Report at least partially cover this period?

The introduction of competitive markets in gas supply, electricity generation and retail trading is leading to a proliferation of confidential supply and service contracts that severely impedes accountability of the electric power system from fuel sources to retail markets. It is becoming difficult to obtain a statistical overview of the systems performance. This was very apparent in writing this paper.

Since it was established in the mid 1990s the Office of Energy in WA has published an annual *Energy in Western Australia*, a valuable source of information. The last one was in 2003. Their website is now preoccupied with the emerging energy markets in electric power and natural gas. *Is the Office of Energy becoming overwhelmed in supervising markets at a time when the resources boom is putting extreme pressure on the availability of skilled staff? Is market confidentiality and the proliferation of sources eroding access to the information needed and creating an excessive workload?*

Has the time arrived to challenge the legitimacy of confidential contracts in the interests of the greater common good?

Carbon trading and energy efficiency

The great debate on carbon trading has begun as part of a strategy to combat anthropomorphic-induced climate change from combustion of fossil fuels as sources of energy. Increases in energy prices from fossil fuel sources are inevitable. This raises the importance of achieving energy efficiency in all applications of energy at all levels. The ABCTV program *Carbon Cops* has revealed the substantial scope for this in the domestic arena for comparatively minor effort.

But the vision for competition in electricity markets implies that participants should 'grow' and expand their businesses, to expand sales. *Does too strong a focus on competition in energy markets conflict with the imperative to reduce greenhouse gas emissions; for an electricity utility to promote energy efficiency at the expense of expanding electricity sales?*

A new vision is required for the electric power industry.

APPENDIX

ECONOMIC REGULATION AUTHORITY

The Economic Regulation Authority (ERA) in Western Australia is a body independent of government and industry set up by legislation to regulate and license utility markets where monopoly services tend to prevail. It covers natural gas, electricity, water and rail markets. It assumed responsibility for electric power in the SWIS on 30 November 2005, and licensing of gas, electricity and water services from 1 January 2005. It has powers to hold inquiries and make reports. The ERA's first annual report was for the 2003-04 year. Its Chairman is Lyndon Rowe.

The comments below were obtained from an ERA report, *Gas Issues in Western Australia*, June 2007, together with comments by Lyndon Rowe at a presentation on this topic to the Australian Institute of Energy, WA Branch, on 13 June 2007. www.era.wa.gov.au

Dampier Bunbury Natural Gas Pipeline Standard Shipping Contracts (SSC)

- These are for a minimum of 15 years versus a maximum of 5 years for *new* gas supply contracts since mid 2006. The long life of pipelines influences the choice of 15 years. The different time frames pose a dilemma for shippers whose projects often have a life beyond 15 years.
- Small companies have credit difficulties and tend to be excluded by the Dampier Gas Pipeline (DGP), owner of the pipeline.
- The DGP is difficult to negotiate with due to poor resources.
- There is a lack of an aggregator who can negotiate on behalf of small companies.
- The ERA is making little difference.
- The ERA's terms of reference do not cover gas suppliers.

The ERA has the following concerns following consultations with stakeholders:

- Capital recovery of pipeline expansions is uncertain, increasing risks.
- The terms for *new buyers* of SSC's are based on the capital cost of *new expansion*. Old buyers are charged based on the original capital cost. This raises equity issues.
- The recent sale of the DBNGP has led to the need for agreements on tariffs with shippers in previously regulated tariffs to 2010—the DBP cannot afford to add excess capacity to 2016.
- Commitment to new demand is needed for capacity expansion, with the uncertainty leading to a lack of trust.
- The high heating value (HHV) standards for SSC contracts are a constraint. The HHV of gas from Macedon are below these standards. Low HHV gas reduces the capacity of the pipeline.

Major changes since mid 2006

- Before mid 2006 contracts were for 20-25 years.
- Contracts are now for a maximum of 5 years and a minimum rate of 10TJ/day.
- In December 2006 Harriet Joint Venture at Varianus Island could not deliver on a contract for 66TJ/day for 20 years—had to declare a force majeure on the contract.
- Varianus Island and the NWSJV are close to capacity for domestic gas sales.
- There are three possible options, Macedon (4-5 years), Gorgon (7 years) and Pluto.

Natural gas prices—domestic market

- Since early 2006 these have been \$5.50-\$6.00/GJ, prior to that \$2.00-2.50/GJ.
- Gas prices on the east coast fell from \$3.50/GJ to \$3.00/GJ in Victoria and NSW and to \$2.50/GJ in Queensland when supply from Queensland coal seam gas became available.
- There will be a short-term supply squeeze until 2008-09 in Western Australia.
- Extra supply *could* be possible from Varianus Island by 2010-11, but *could* be tight up to 2014. Higher gas prices may make some adjacent small gas fields viable.

Lyndon Rowe's comments

- Natural gas supplies 40 percent of Western Australian energy consumption.
- The initial high capacity cost of pipelines favours 25-year contracts.
- In 1998 the netback price of domestic gas supply was 60 percent higher than that for LNG. It is now three times higher.
- The focus is on developing large offshore gas fields. [Comment, BJB: 90 percent of the gas reserves in the Carnarvon Basin are in large gas fields—40 percent in deepwater offshore]