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WA ENERGY SUMMIT 2007

Please see the attached presentation to be delivered by Dr Paul Simshauser, CEO of Babcock & Brown Power (ASX:BBP) at the WA Energy Summit 2007.

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About Babcock & Brown Power

Babcock & Brown Power (ASX:BBP) is a power generation business, with assets diversified by geographic location, fuel source, customers, contract types and operating mode. Its aim is to grow returns to its securityholders through optimisation of its existing power generation business and the addition of further generation assets and associated businesses via a combination of new construction and strategic acquisitions.

The portfolio has interests in thirteen operating power stations representing over 3,300 MW[1] of installed generation capacity and five power stations under construction. BBP owns a number of other associated power assets the largest being a 67% stake in the WA retail assets of AlintaAGL. Babcock & Brown has been developing, operating and acquiring the generation portfolio over a period of 10 years.

[1] Some assets have minority shareholders.

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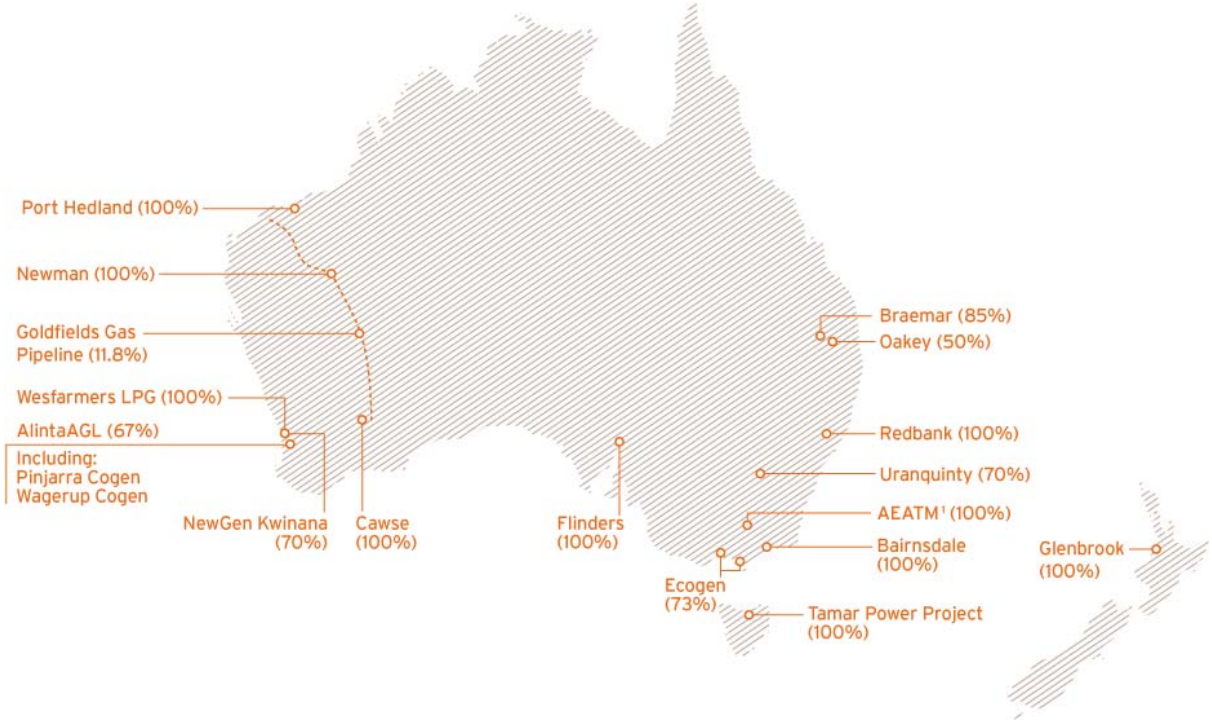
Portfolio Summary



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The WA Power Dilemma

Paul Simshauser

Perth

25 September 2007

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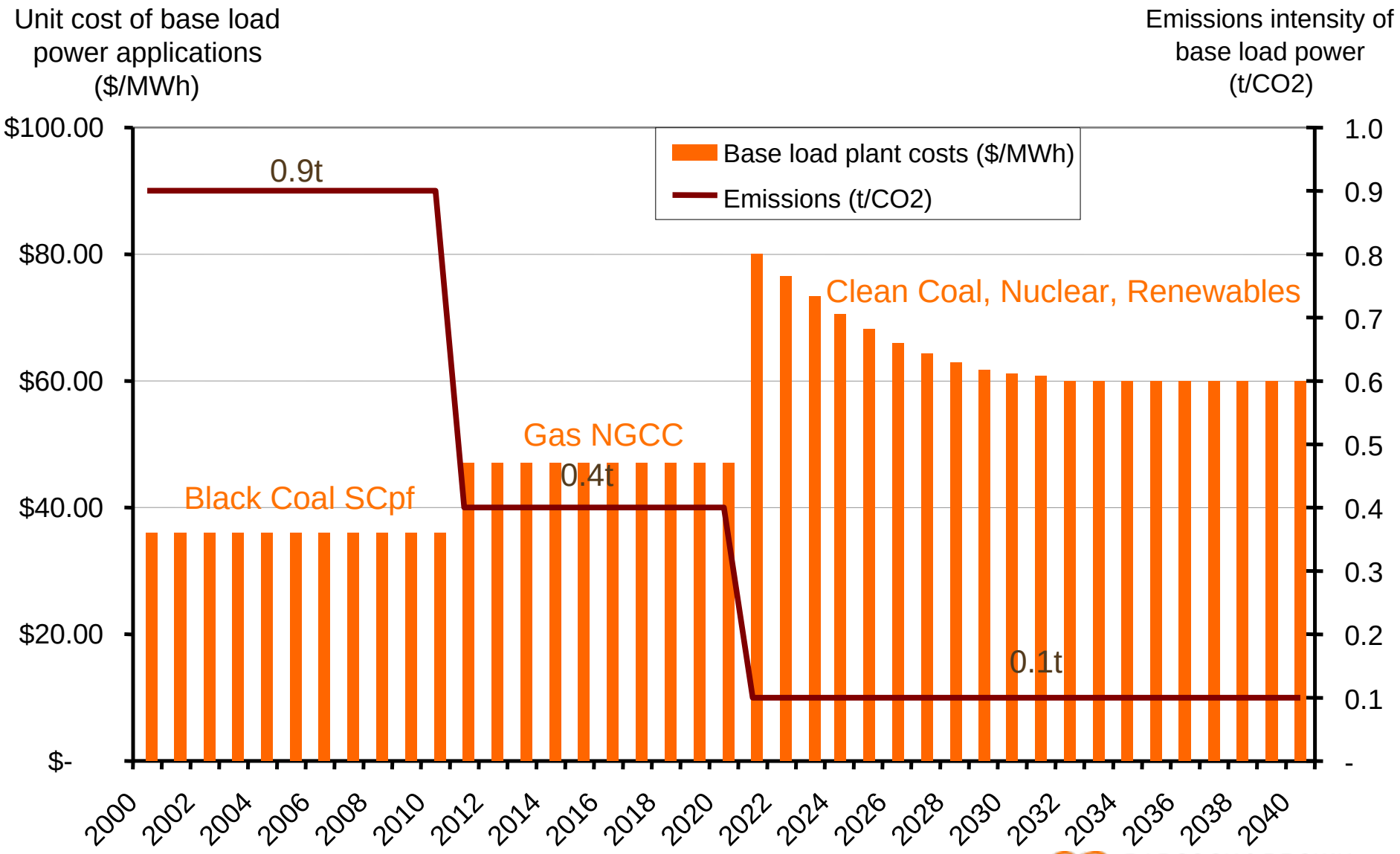
The challenges facing power generation in Australia

- Australia has one of the lowest cost power systems in the world and is key comparative advantage for the economy
  - Largely driven by Australia's vast low cost thermal reserves
  - Coal fired generation accounts for 80-85% of energy generated
  - Australia also has substantial low cost natural and coal seam gas
- The near-term challenge facing the power generation industry in Australia
  - Capacity stocks are largely exhausted
  - New capacity required is largely intermediate/peaking, thus Australia has a 'stay of execution' from an emissions perspective (gas generation being the lowest cost int./peak solution)
  - But by early/mid next decade, new base capacity is required, and Australia's supply-side must make the structural adjustment to the transitional fuel (viz. gas-fired generation) for base load duties – for this to occur, CO2 must carry a price
  - This implies Emissions Trading, permit allocation must ensure that energy security is not violated and that the system's world class economic performance is maintained
- The long-term challenge facing the power generation industry
  - Australia's power system will double between 2005 and 2030
  - By 2050, the incumbent thermal plant stock must be completely turned over
  - And gas is only a transitional fuel. Ultimately new technologies must be introduced to the Australian power system, and make the final transition to clean coal, nuclear and renewables, and reserve gas for intermediate and peaking duties

Graphically, this challenge looks as follows…



Data Source: BBP

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Introduction on the WA Power Dilemma

- In 2005 WA was at the start of a Golden era from a power system perspective
  - The 320MW baseload Kwinana NGCC plant had been awarded over two competing coal proposals
  - Followed the development of Cockburn and the Pinjarra CoGen units
- This was a remarkable result by Australian standards, cleaner burning gas-fired generation now dominated the efficient frontier for generation plant investment across all asset classes (i.e. base, intermediate and peak plant)
- Not an insignificant result for the 45,000MW Australian power industry, of which 85% of energy is produced from coal fired sources
- It came at the right time, with prospect of CO_2 pricing firming
- Then came 2007… gas landed in the SWIS increasing from circa $3.00/GJ to north of $5.50/GJ.

A brief overview of the SWIS

- While east-coast power sources have been dominated by coal-fired applications, the west-coast had been quietly chipping away with gas in the overall energy mix from 1984
  - Gas was about 1% of power production in 1984, and was 30%+ by 2005
  - Albeit, this has been primarily used in intermediate, peaking and remote power applications
- The addition of 320MW of NGCC plant at Kwinana would lift the share of gas to about 45% by 2009.
- Had WA remained on this trajectory, it would have been the envy of the Australian States, with considerable justification, given the looming commencement of CO_2 pricing
- But the market share of 45% in 2009 will represent an intermediate run peak until gas resources and infrastructure stabilise

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A brief overview of the SWIS

- The current medium term view of load in the SWIS is peak demand growth of 4.5% and energy demand growth of 3.4% (compounding)
- This is not entirely surprising based on economic fundamentals:
  - Household disposable incomes are rising rapidly, as they are in Qld
  - Industrial activity is robust, especially in the resources sector
  - Although, minimum aggregate system load in the SWIS is likely to remain a nightmare for all power industry stakeholders
- From a supply-side perspective, the SWIS has been in Sync with the balance of Australia
  - Around 2000 - 2001, oversupplied, with reserve plant margins at 28%+
  - The appropriate reserve margin is currently thought to be 18% (as an aside, this is relatively finely balanced by world standards for an isolated thermal system, but reflects the high degree of summer load volatility and poor system load factor)
  - But by 2006, the oversupply party was over

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A brief overview of the SWIS

- Like all jurisdictions in Australia, the system is stretched and will cycle between a state of mild oversupply and undersupply:

Demand/Supply		2002	2003	2004	2005	2006	2007	2008	2009
Maximum demand	(MW)	2,473	2,678	2,859	2,886	3,135	3,287	3,410	3,678
Reserve margin	(MW)	445	482	515	519	564	592	614	662
Total plant required	(MW)	2,900	3,200	3,400	3,400	3,700	3,900	4,000	4,300
Aggregate supply	(MW)	3,300	3,300	3,500	3,500	3,700	3,600	4,300	4,100
Over/Undersupplied	(MW)	400	100	100	100	0	-300	300	-200

Source: Simshauser & Wild, 2007, "The WA Power Dilemma".

- And one other point worth noting… the SWIS fleet is old by Australian standards. The remnant life of the power station fleet is about 16 years. The other resources state (Qld), for example, has a fleet with a 26-year remnant life. This means that new plant will be required for both growth and replacement in WA, and thus adds to investment-cycle stress.

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Defining the SWIS equilibrium

- Plant additions (i.e. asset class) need to be added carefully in a deregulated power system if they expect to make a profit
- Put more simply, plant cannot be added to the system based purely on minimum average cost at maximum rated capacity
- This is heightened in the case of the SWIS due to low min-loads
- There is ample evidence of power station ‘financial distress’ all over the world for those who have chosen to ignore this basic premise
- Because power system load varies by season and by anthropogenic patterns, there is a requirement for a mix of base, intermediate and peaking plant
- This ensures that the rich blend of fixed and variable costs are optimised to deliver the lowest cost of power possible to electricity consumers

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Defining the SWIS equilibrium

- The academic literature, and their subsequent applications to power system economics is vast, but two pieces of work stand out
  - 1949, Marcel Boiteux, EdF Chief Economist's publication on the Peak Load Pricing problem
  - 1967, Tom Berrie, CEGB Chief Economist's publication on the Optimal Plant Mix for large thermal power systems
- In applying this combined framework, and to illustrate the impact of the gas price shock, we need new entrant cost assumptions both before and after the 'X factor'

Generation technology	Capital cost in 2005 ($/kW)	Capital cost in 2007 ($/kW)	Unit size (MW)	Variable O&M ($/MWh)	Fixed O&M ($M pa)	Useful life (Yrs)	Heat rate (kJ/kWh)	Fuel cost in 2005 ($/GJ)	Fuel cost in 2007 ($/GJ)	Auxiliary load (%)
SCpf	1,500	2,000	350	1.00	12.0	40	9,800	1.75	1.75	7.00
NGCC	1,100	1,500	300	2.50	4.5	30	7,800	3.20	5.50	1.00
OCGT	750	850	150	8.00	2.0	30	11,500	4.00	6.00	0.00
	Cost of capital	11.00%		Annual Inflation	2.50%					

- Note the step change in plant costs also…

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The cost of entry in the SWIS @ 92% ACF

- Using levelised cost modelling at the appropriate marginal efficiency of capital, the long run marginal cost of SCpf and NGCC plant in the SWIS can be defined as follows:

Technology	2005	2007	Change
SCpf	$45.24	$51.72	$6.48
NGCC	$45.08	$69.25	$24.17
Difference	$0.16	-$17.54	

- This differential will shift with ACF based on the mix of fixed and variable costs. For example, using 2005 stats:
  - At an ACF of 77.5%, NGCC is $48.01 v. SCpf at $49.81
  - At 94% ACF, SCpf is $44.72 v. NGCC at $44.75
  - But the Boiteux/Berrie framework gives the clearest view:

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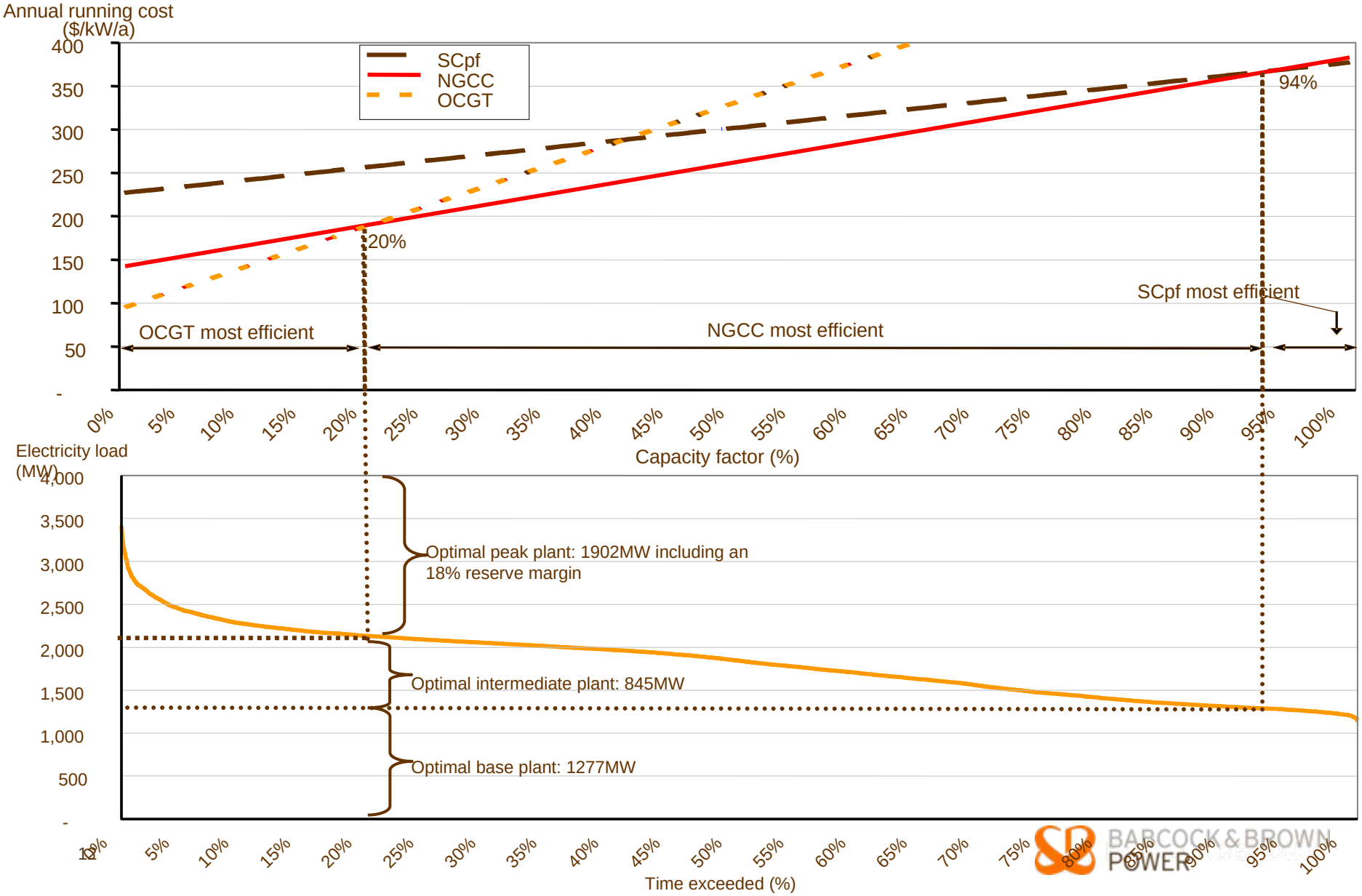
Boiteux/Berrie Framework: SWIS with CY05 costs



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Equilibrium results for FY08 using CY05 conditions

2005 Conditions	Optimal	Actual	Portfolio Balance
Baseload	1,400	2,400	1,000 MW Overweight
Intermediate	1,000	600	-400 MW Underweight
Peaking	1,600	1,300	-300 MW Underweight
Aggregate	4,000	4,300	300 MW Oversupplied

- Note that the system is marginally oversupplied in aggregate
- But base plant is heavily over-represented as an asset class
- Only flexible NGCC and OCGT plant would be required for a period of at least ten years, if the CY05 conditions held into perpetuity… But they did not.

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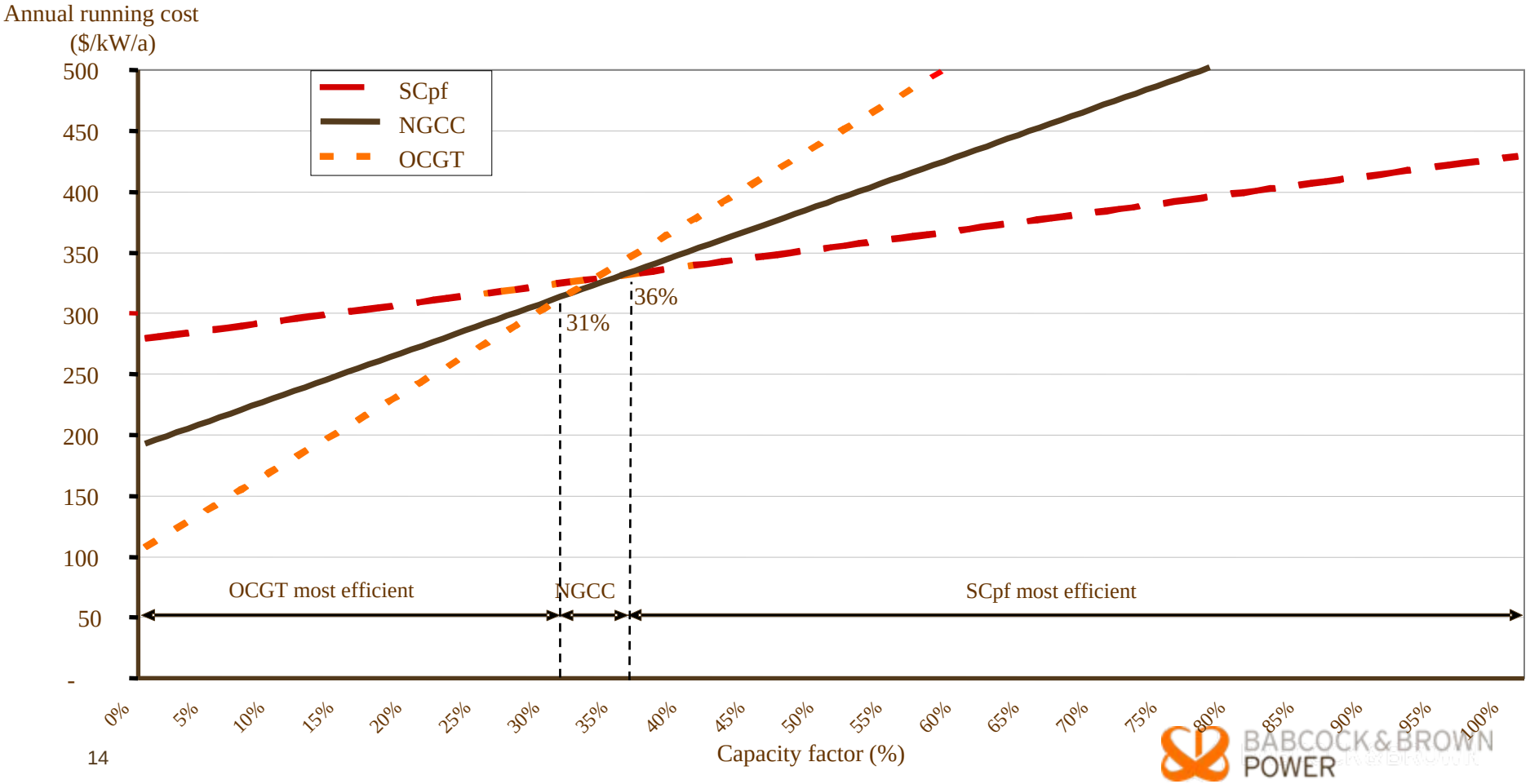
Boiteux/Berrie Framework: SWIS with CY07 costs

- By early CY07, higher gas prices and plant costs led to a situation whereby NGCC plant was 'squeezed out' of the new plant mix…



Equilibrium results for FY08 using CY07 conditions

2007 Conditions	Optimal	Actual	Portfolio Balance
Baseload	2,200	2,400	200 MW Overweight
Intermediate	0	600	600MW Overweight
Peaking	1,800	1,300	-500 MW Underweight
Aggregate	4,000	4,300	300 MW Oversupplied

- The absolute plant capacity has not changed, but the asset classes have… substantially, as a result of the structural change in costs
- The excess in the base plant category has been shifted to the intermediate class portfolio
- And the requirement for new base plant (at a 60% ACF) has been brought forward by five years, from 2015 to 2010
- Thus planning for new plant is required now. And this is, of course, problematic, in light of imminent CO_2 pricing

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A change in base load bias…

- Over this two year period, the SWIS transformed from being an NGCC-biased system, to a SCpf-biased system, at least for now…

Technology	tCO2 / MWh	CO2 $17.50	2005	2007	Change
SCpf	0.90	$15.75	$60.99	$67.47	$6.48
NGCC	0.40	$7.00	$52.08	$76.25	$24.17
Difference	0.50	$8.75	$8.91	-$8.79	

- If the gas price remained constant in the SWIS, CO2 prices would need to reach $30/t to reverse the economics of SCpf and NGCC plant
- New coal plant locks in more than 70Mt over the life of the plant by comparison to an NGCC plant
- Thus is “The WA Power Dilemma”

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Policy Options for WA

- A renewables push would seem both logical and inevitable, based on the European Union experience. This may provide a degree of breathing space, but ultimately new conventional applications will be required for security of supply reasons
- DomGas reserving also has a degree of logic, and has a precedence (Qld 'Tops'), but will only add to security of supply rather than efficiency of supply
- Facilitation of 'e' (exploration) seems enormously important, and the so-called 'hoarding of retention leases' requires further debate
- An overhaul of regulatory economics as it relates to essential infrastructure (poles & pipes, in this case) would also seem necessary

Conclusion

- By 2005, the outlook for the SWIS was very favourable
- Gas price movements over the past two years has reversed this outlook for the medium term. But this is problematic for the SWIS due to medium term plant requirements
- Whereas NGCC plant dominated the efficient frontier for new plant investment for any (credible) level of production above 20%, it is being squeezed out of the new entrant market
- This loss of flexibility in plant dispatch will be felt by the industry and consumers in WA because a new coal plant will need to compete for what little overnight load exists, and consequently, new coal developments will always be developed sub-optimally relatively to steady state conditions

Conclusion

- But coal is not without risk:
- At $30/t, the economics reverse
- The date has been set for CO_2 baselines: 3 June 2007
- This means that all future coal plant in WA will face the full wraith of emissions trading, and in consequence, any synchronisation of schemes with the EU will create a level playing field with netback-priced gas
- The most recent plant cost estimates from the engineering firms appear to be pointing towards substantially higher increases in the EPC cost of coal plant
- With a degree of risk on all sides, discount rates for coal plant will also rise relative to other forms of generation
- So ultimately, it will be back to gas...