

# **ETS, toxic debt and the Australian power market**

Paul Simshauser

## **Overview**

- **The financing of power stations in Australia**
- **Template power station acquisition**
- **Sizing “Project Finance” for a power station & financial engineering**
- **Carbon pricing in 2004: ...you generators should have seen this coming...**
- **ETS in 2009: toxic debt**
- **Implications and policy options**

## Financing power stations

- **Australia currently has about 46,000MW of large-scale power station capacity**

Generation Technology	Number of sites (#)	Installed Capacity (MW)	Energy Produced (GWh)	Market share (%)	CO <sub>2</sub> Footprint (t/MWh)	Replacement Cost (\$/kW)	Replacement Value (\$m)	Average Fleet Age (Yrs)	Total Useful Life (Yrs)	Remaining Useful Life (Yrs)	Depreciated Value (\$m)
Brown Coal	8	7,335	55,506	24.8	1.1 - 1.55	2,750	20,171	28.1	50	21.9	8,842
Black Coal	21	21,994	128,386	57.3	0.8 - 1.0	2,250	49,487	23.8	50	26.2	25,968
Natural Gas	38	7,146	14,451	6.5	0.5 - 0.7	1,100	7,861	17.8	30	12.2	3,209
CCGT	10	2,303	11,812	5.3	0.40	1,550	3,570	6.9	30	23.1	2,747
Hydro	43	7,609	13,726	6.1	0.00	2,500	19,023	37.2	100	62.8	11,953
<b>TOTAL</b>	<b>120</b>	<b>46,387</b>	<b>223,881</b>	<b>100.0</b>	<b>1.00 avg</b>	<b>2,564</b>	<b>100,111</b>	<b>24.9</b>	<b>54</b>	<b>29.2</b>	<b>52,719</b>

- **224TWh, fleet average age of 25 years and sunk investment of c.\$53 billion spread across 120 sites**

## Financing power stations

- **Historically, capacity was added by State Electricity Commissions with financed backed or issued by State Govts or their Central Borrowing Agencies**
- **Monopoly pricing capability meant that capital was not critically scarce because of virtual certainty of recovery (which is why we deregulated!)**
- **All this changed, critically, in the early 1990s due to fiscal imbalances in Victoria**

## Financing power stations

- **Between 1993 and now, the private sector has gone from 0% to 39% plant stock ownership:**

PRIVATE SECTOR	Number of sites (#)	Installed Capacity (MW)	Energy Produced (GWh)	Market share (%)	CO2 Footprint (t/MWh)	Replacement Cost (\$/kW)	Replacement Value (\$m)	Average Fleet Age (Yrs)	Total Useful Life (Yrs)	Remaining Useful Life (Yrs)	Depreciated Value (\$m)
Brown Coal	8	7,335	55,506	24.8	1.1 - 1.55	2,750	20,171	28.1	50	21.9	8,842
Black Coal	5	3,669	19,114	8.5	0.8 - 1.0	2,250	8,254	17.1	50	32.9	5,438
Natural Gas	26	5,652	11,416	5.1	0.5 - 0.7	1,100	6,218	18.0	30	12.0	2,493
CCGT	6	1,463	6,858	3.1	0.4	1,550	2,268	6.9	30	23.1	1,743
Hydro	5	526	565	0.3	0.0	2,500	1,315	43.7	100	56.3	740
<b>TOTAL</b>	<b>50</b>	<b>18,645</b>	<b>93,459</b>	<b>41.7</b>	<b>1.06 avg</b>	<b>2,050</b>	<b>38,226</b>	<b>22</b>	<b>44</b>	<b>22.1</b>	<b>19,257</b>

- **The private sector has invested about \$19 billion, and empirically, on a basis consistent with MM's Proposition II. The fit is even better when their simplifying assumptions of no taxes and no capital market imperfections are lifted. That is: "max(debt\_capital)"**

## Financing power stations

- **Power sector is the 3<sup>rd</sup> largest borrower after Govt & the Financial Services Sector itself.**
- **Debt is maximised in a power project capital structure via a Project Finance.**
  - **A single asset lending (mostly)**
  - **Long expected useful life (25yrs+)**
  - **Debt is long-dated money (12yr term and notional repayment of 25yrs)**
  - **Structured as a limited resource loan**
  - **Various debt covenants**
    - **Technical plant parameters, reserve accounts, MAC clauses, review events... and**
    - **Financial ratios: DSCR, LLCR & Gearing**

## Financing power stations

- **With a project finance, investors can obtain 60-80% from a syndicate or club**
  - **Volatility of Cash Flows (merchant v PPA)**
  - **Regulatory regime, plant technology, economic life, system dd-ss, barriers to entry, position in aggregate ss function**

Power Plant	Plant Capacity (MW)	Plant Age (Yrs)	Total Debt (\$M)	Debt closed (Yr)	Debt margins (bps)	Refi Amount (\$M)	Refi Date (Yr)	Lead Project Finance Banks (i.e. excluding syndication banks)
Hazelwood	1,600	39	1,207	2001	155-185	445	2010	BA, RBS, SocGen, ANZ*
Tarong North	450	6	363	2002	100-160	162	2006	BOTM, ANZ*, Mizuho, Fortis,
Millmerran	852	6	1,025	2002	110-160	467	2012	ANZ*, Banca Intesa, Calyon, Fortis, HSBC, KBC, Mizuho, RBS, SMBC, UOB, WestLB
Loy Yang A~	2,120	22	2,650	2004	140-185	313	2010	ABN, BOTM, Calyon, ANZ*, Mizuho, NAB*, RBS, Sumitomo, WestLB, Westpac*
Yallourn	1,480	30	2,500	2005	75-85	650	2009	NAB*, CBA*, JP Morgan (NB, Corporate-style facility)
Loy Yang B``	1,000	13	1,100	2006	50-80	620	2012	BOTM, BNP, CBA, ANZ, NAB
Callide C	900	8	390	2007		90	2012	BNP, BOSI, BA, Fortis, NAB*, Mizuho
Transfield^	180	30	800	2008	115-120	800	2011	Westpac*, ANZ*, CBA*, RBS
Bluewaters I & II	430	0	950	2008	115-145	250	2014	ANZ*, NAB*, WestLB, SocGen
BBP#	780	23	2,700	2008	190-210	1,600	2011	ANZ*, BNP, CBA*, Dexia, NAB*, Natixis, SocGen, HVB, WestLB, Suncorp*, BOSI
<b>Total</b>	<b>9,792</b>	<b>21</b>	<b>13,685</b>		<b>120-140</b>	<b>5,397</b>		<b>25 MLA Banks: 5 Australian, 20 Foreign</b>

`` Loy Yang B also had approximately \$200m of Subordinated Debt within its capital structure. \*Domestic Bank

# BBP has \$400m in Mezzanine Debt in its capital structure. ^ Transfield facility refinanced in 2008.

~ Loy Yang A also has Senior Debt provided by a large number of CPI Bond Holders.

Source: Reuters *BasisPoint*.

## Financing power stations

- **\$13,700m in senior debt (\$11.2b PF) and about \$5,400m due for refinancing over the next 3-4 years**
- **This is a problem – all debt has been sized on a BAU scenario, not on an ETS scenario**
- **To see how ETS would impact a PF'ed power station, we must turn to the acquisition and debt sizing**

## The valuation of power station assets

- Assume we purchase a 1000MW brown coal power station in 2004:

Inflation			Taxation		
- CPI	(%)	2.75	- Tax rate	(%)	30.00
- Elec Prices	(%)	2.06	- Useful life	(Yrs)	30

Plant Costs & Prices			Debt Sizing Parameters		
- Plant size	(MW)	1,000	- DSCR	(times)	1.8 to 2.2
- Acquisition Price	(\$M)	1,900	- LLCR	(times)	1.8 to 2.2
- Electricity Price	(\$/MWh)	36.00	- Gearing	(%)	67.5
- CCGT 2004\$	(\$/MWh)	44.00	- Lockup	(times)	1.35
- CCGT 2009\$	(\$/MWh)	51.00	- Default	(times)	1.10
- Heat rate	(kJ/kWh)	13,300	Facilities		
- Unit fuel	(\$/GJ)	0.30	- Tranche 1 (Bullet)	(Yrs)	5
- O&M costs	(\$M)	36.7	- Tranche 1 Refi	(Yrs)	20
- Capex	(\$M)	5.0	- Tranche 2 (Amort.)	(Yrs)	12
- CO2 footprint	(t/MWh)	1.32	- Tranche 2 Refi	(Yrs)	13
- Remnant life	(Yrs)	40	- Notional amortisation	(Yrs)	25

Cost of Capital			Debt Costs		
- Post Tax Equity	(%)	15.00	- 5 year swap	(%)	6.01
- Pre Tax Equity	(%)	21.00	- 12 year swap	(%)	6.14
- Pre Tax Debt	(%)	7.42	- 5yr Margins/BBSW	(%)	1.20
- Pre Tax WACC	(%)	11.80	- 12yr Margins/BBSW	(%)	1.40
			- Refinance (Headline)	(%)	7.50

## The valuation of power station assets

- EBITDA of \$199m, pre-tax WACC of 11.80%, Post-tax Ke 15% (+50bps)**

Valuation Metrics		Enterprise Valuation
EBITDA Multiple	9.5x	1,893,227
DCF Pre-Tax, Ungeared	11.8%	1,895,841
DCF Post-Tax Equity	15.0%	1,915,455
\$/kW Multiple	\$1,900	\$ 1,900,000
Average:		1,901,131
Assumed Acquisition Price:		1,900,000
Running Equity Yield		12%

- LYB was acquired for slightly below \$2b in 2004, so the metrics stack up well**

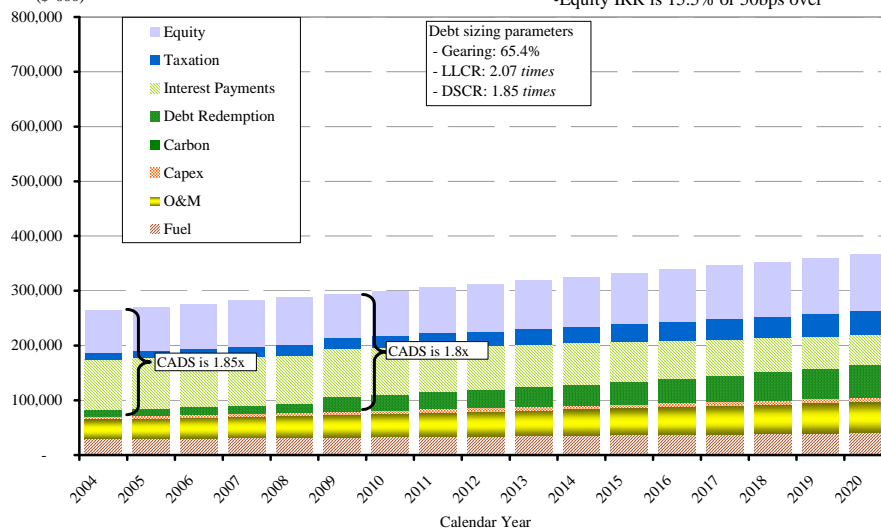
## Sizing a PF

- In the previous table, the equity IRR (at 15.50%) was calculated with an implied \$1,240m PF in place
  - DSCR 1.8 to 2.2 (lockup 1.35x, default 1.1x)
  - LLCR 1.8 to 2.2
  - Gearing:  $\leq 67.5\%$
  - Debt structured in two tranches (25yr notional term)
    - Tranche 1: 5 yr bullet, 6.01BBSY + 120bps
    - Tranche 2: 12yr amort, 6.14BBSY + 140bps

Debt sizing covenant		Tranche 1 Bullet (\$M)	Tranche 2 Amortising (\$M)	Aggregate Term Debt (\$M)
DSCR	at 1.8x	434	806	1,240
LLCR	at 1.8x	498	926	1,424
Gearing	at 67.5%	449	834	1,283
Min Result:	DSCR			1,240

## Sizing a PF

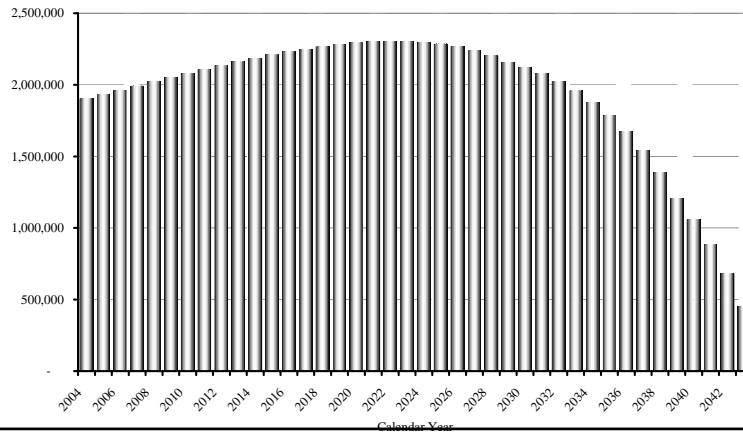
Expected annual earnings  
(\$ '000)



## Financial engineering

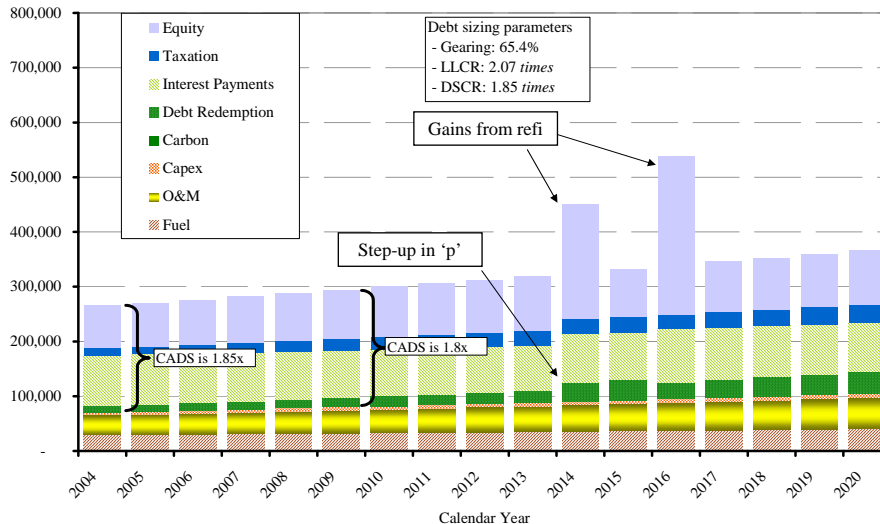
- **Thus is the 'bank case'. The equity case will look a little different. Higher prices, different refi assumptions, because of variances in forward expectations**

Moving pre-tax valuation (\$)



## Financial engineering

Expected annual earnings (\$ '000)



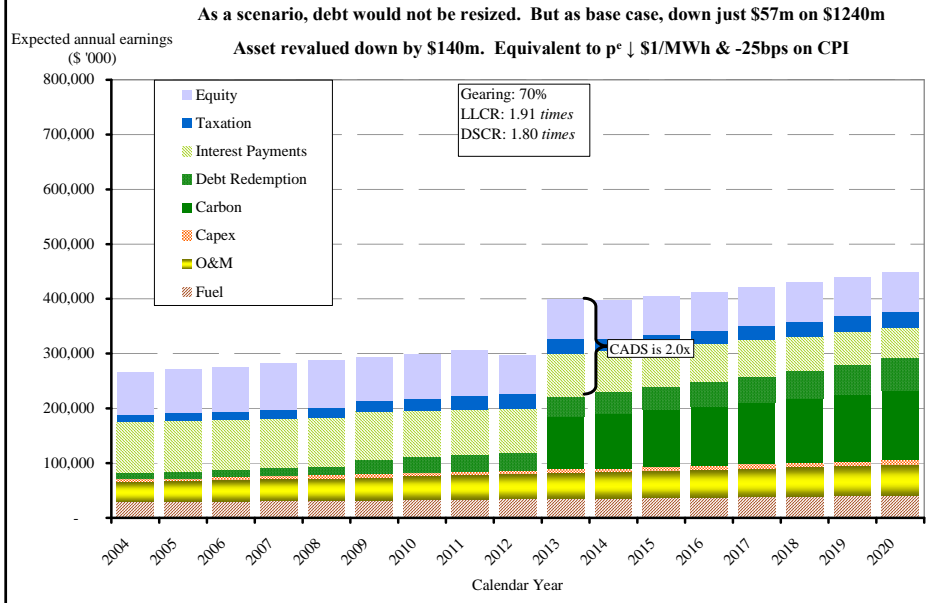
## **Carbon pricing in 2004: you generators...**

- **The subject of continuous revision... you generators should have seen this coming:**
  - IPCC in 1993, Federal Govt in 1999, 2004 and 2007 (PMT), ΣStates in 1996 (NETT)
  - But formal position until mid-2007 was, not until the technology exists, & not on our own (read: not before 2012)
  - “The fact that all equity and debt market participants used BAU economics is the practical evidence of how govt policy was interpreted”
  - And then on 3 June 2007 the PM made his statement, all generators that existed prior to this date will qualify for ‘compensation’

## **Carbon pricing in 2004**

- **I believe that industry accepted ETS would be in force between 2012-2015**
- **But I also believe that:**
  - Not likely pre-2012
  - CO2 prices do not have a long history at high levels (\$5/t in Millmerran 1999, \$10/t in ESAA 2003, \$12/t avg of 100 peer-reviewed studies in IPCC 2007)
  - 95% of permits allocated for free to EU15 Gencos until quite recently, and for 8 years (2005-2012)
  - Urgency of the task is relatively new, post Stern & in our case, Garnaut.
- **So how would our \$1240m debt be resized in 2004 given what we knew then? (\$10/t, 2012 start, CCGT at \$44)**

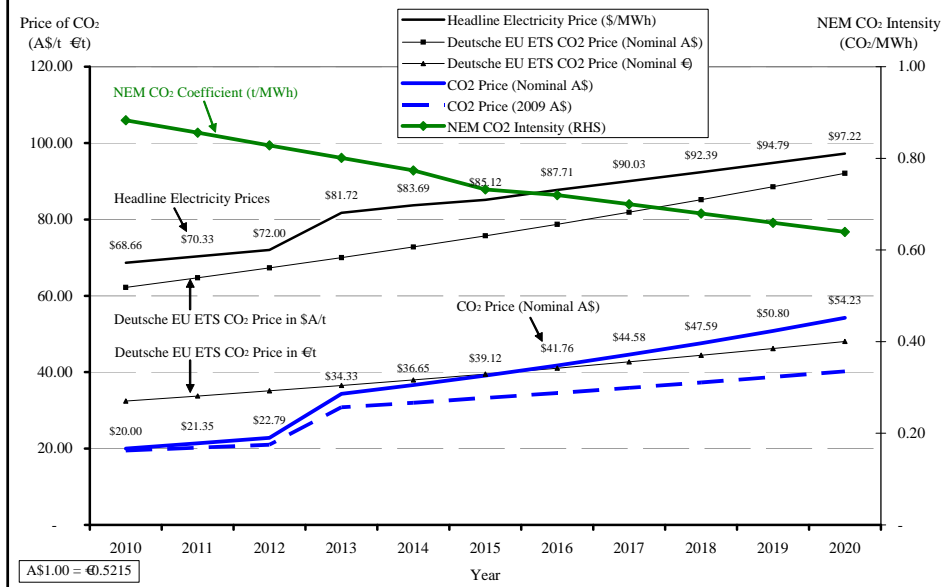
## Carbon pricing in 2004



## ETS in 2009: creating toxic debt

- **2009 is a very different environment**
  - Task of abatement more urgent
  - Quantity cuts much greater
  - $e(p)$  CO<sub>2</sub> is materially higher
- **To analyse the effect, this study uses three key variables for revenue;**
  - NEM CO<sub>2</sub> intensity from Simshauser, Doan and Lacey (2007) and CRAI (2007)
  - $p^e$  of electricity commodity at \$51/MWh and
  - CO<sub>2</sub> at \$20/t plus \$10/t shift in 2013, and cost of carry escalation at CPI+4%

## ETS in 2009: creating toxic debt



## ETS in 2009: creating toxic debt

- **The ramifications for our 1000MW brown coal power station are very material**
  - **DSCR will not be breached, so the usual triggers of financial distress are not present**
  - **The triggering actually occurs via the Directors of the firm under the Corporations Act 2001(Cth)**
    - **S.295, 296 and 297 re financial statements**
    - **S.344, 1308 and 1309 in Chapter 2M**
    - **Driven by AASB136 Impairment of Assets**
  - **The application triggers to covenants**
    - **Gearing ratio (103% vs 67.5%)**
    - **LLCR (0.91x vs. 1.1x default)**

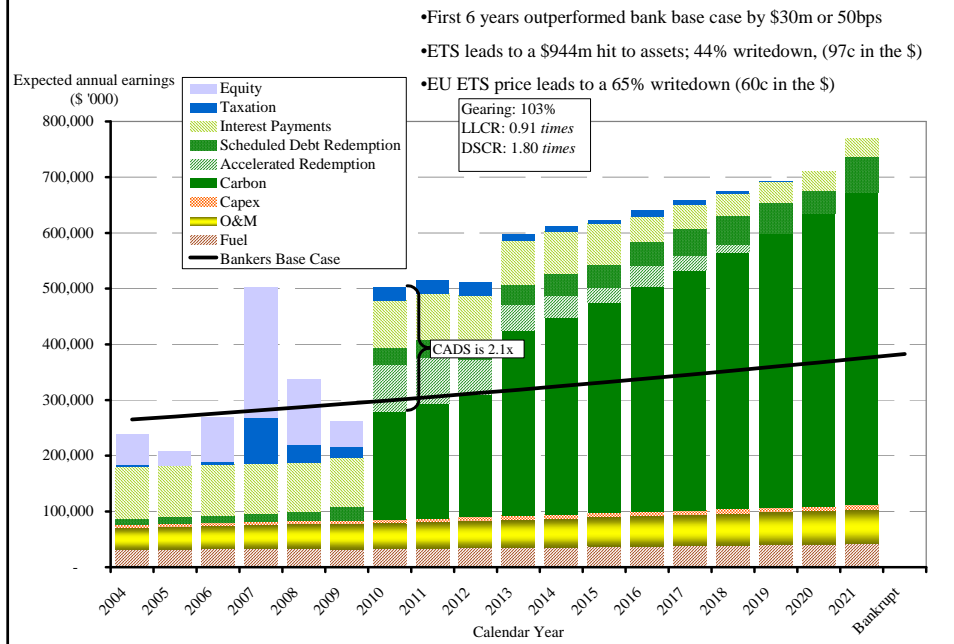
## **ETS in 2009: creating toxic debt**

- **At this point, the asset is written down by \$900m or 44%; from \$2040m (pv valuation) to \$1140m**
- **Orinarily owners would need to step in and cure the default, but as Harvin & Dell noted in 2003:**
  - *It is naïve to expect that project sponsors will contribute additional capital to avoid the default, especially if there has been deterioration in the long-term credit quality of the project... Examples include difficulty in complying with evolving environmental policy and the introduction of more efficient technologies. It is conceivable that technology deficiencies can be resolved with capital infusion. More likely, however, the reduction in annual cash flow is permanent... Equity investors have walked away from projects, essentially turning over the keys to debt-holders...*

## **ETS in 2009: creating toxic debt**

- **At this point, the banks will establish a workout committee with a view to sell the asset or place it in administration**
  - **Between 2002, there were 57 Project Financings. No Bank has ever lost principle in Australia.**
  - **They did in UK on Drax, with consequences for the industry**
  - **In our case, it is a ‘cents in the dollar’ exercise for the project banks**
  - **97cents on our base forecast or 60cents if you switch to the Deutsche f'cast of CO2.**
  - **Equity is in lockup (default) immediately and the plant is forecast to be bankrupt in 2022.**

## ETS in 2009: creating toxic debt



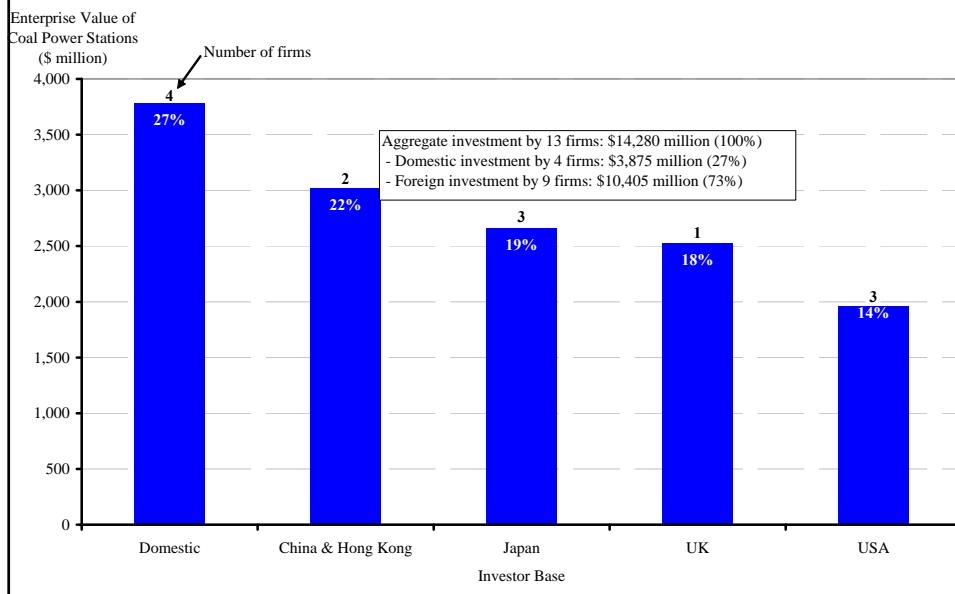
## Policy Implications

- **Without stating the obvious, this is seriously bad on sovereign risk grounds**
- **\$15b collective hit on \$35b aggregate coal plant stock; 43% loss on average**
- **Policy makers know losses are inevitable, hence ESAS**
- **But it is unlikely to provide 100% of the 'asset hit'. Equity participants will exit and be replaced seamlessly, because that's what microeconomic theory tells us (in a world where firms are passive variables in a GEM and do not supply an essential service)**
- **Policy changes occur all the time without adjustment assistance, although rarely with such intensity**

## Policy implications

- **Following ETS and RET, the investment task facing the power sector has been increased. Between now and 2020, the median forecast is c.\$35 billion.**
- **Given current forecasts of wealth transfers, a sovereign risk tag for the Australian Power Sector is both more than a theoretical possibility and non-trivial in every sense...**
- **Vast parts of the industry have drawn on foreign equity and foreign debt, and our reliance on this source of capital is critical on cost competitiveness grounds...**

## Policy Implications



## **Policy Implications**

- **So, 13 firms invested in coal fired assets and 9 of them (73% by value) are foreign**
- **And there are only 22 generators in Australia (18 private and 4 State Govts)**
- **Banks... Just 25 listed on Slide 7.**
  - **It is not hard to see this number drop below 10 in the current (unrelated) crisis**
  - **Memory of banks under loss-making conditions is not like equity. The memory runs much, much longer; bear in mind there is nowhere near the level of diversification (infinite equity investors vs. 25 banks).**

## **Policy Implications**

- **Our 5 domestic banks are simply incapable of writing the debt necessary to finance \$35 billion in power assets**
  - **To give this some perspective; Uranquinty. Great project, right NEM region, right technology etc etc**
  - **\$500m Investment, \$340m term facility**
  - **3 MLA's – Suncorp, nabCapital & KBC**
  - **3 further syndication banks (all foreign)**
  - **So one simple peaking project involved 2 local banks and 4 foreign banks (importantly, pre-financial crisis. It would take more banks now.)**
  - **And the banks have other homes. In 2008 despite the financial crisis, M&A activity topped A\$115 billion and the forecast greenfield development between now and 2030 is US\$6,800 billion**

## **Survey of Project Bankers**

- **Sent to 23 Project Finance and Syndication Bankers. 16 responses received from 4 domestic & 9 foreign banks**
- **Survey sought historic experience and expectations on margins, term, participation and key drivers**
- **On margins: 120-140bps in 2005, currently 250-300bps, 200-250bps by 2011 after the crisis**
- **On term: 12 yrs in 2005, currently 5 years max, up to only 7 yrs in 2011**
- **On participation for a \$1240m term facility: 4-6 lead banks plus 4-8 syndication banks in 2005; now club deal with >9 banks; in 2011, 7-8 lead banks plus >9 syndication banks**

## **Survey of Project Bankers**

- **Market participation: 27 banks in 2005; in 2008 have reduced to just 14, and only 17 expected to be around in 2011**
- **In the event of a power project insolvency due to ETS policy; 50% will exit from coal finance; 36% from gas-fired finance and 14% would exit entirely (including renewables)**
- **Key drivers: health of market and players; stabilisation of financial markets; stability of regulations; margins; performance of committed facilities**

## **Policy Implications**

- **ESAS is likely to comprise an allocation of permits, and probably over a 5 year time frame**
- **This will suit some generators, but not all generators**
- **Given the assumptions in this paper, our 1000MW plant would need 75% of its 9.6mtpa CO2 permits allocated to restore covenants, and 110% to restore equity**
- **The pool of funds for the ESAS is limited; and competing with households and EITEI**
- **So this being the case, there are two residual policy alternatives:**
  1. **Quickly adjust the NEM mechanisms to include a supplementary capacity payment to coal generators**
  2. **Do nothing, and accept a Wounded-Bull Scenario per Simshauser & Doan (2009); which is code for price shift from the current c.\$45/MWh to c.\$100/MWh (including CO2) at the wholesale level.**

## **Concluding remarks**

- **In the absence of a suitable adjustment package, it seems we are likely to create toxic debt**
- **Private sector holds 39% of power station capacity worth \$19 billion. \$13.3 billion in senior debt supporting this**
- **CO2 only became this big a problem fairly recently, i.e. from 2007, not before.**
- **In the case of our 1000MW brown coal generator with 1.32t CO2, equity is wiped out and debt recovery is 60-97 cents in the dollar**
- **20 of the 25 project banks are foreign**
- **9 of the 13 equity investors are foreign**
- **Sovereign risk therefore seems both more than a theoretical possibility, and given the magnitude of the funds and potential impact on values, is non-trivial in every sense.**
- **The form and quantum of ESAS is critical.**