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Carbon pricing meets energy markets –
Australia's evolving energy + climate policy context

Iain MacGill

Associate Professor, School of Electrical Engineering and Telecommunications
Joint Director (Engineering), CEEM

National Consumer Roundtable on Energy Meeting
University of NSW
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www.ceem.unsw.edu.au

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Climate change context

- Generally worsening scientific prognosis for warming, impacts
- Increasing global emissions
- An evident weakening international response

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No breakthrough in Bonn as climate divide deepens

Stephen Minas

Published 6:55 AM, 21 Jun 2011
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Tags
Bonn, UN climate talks, Policy & Science

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Two weeks of United Nations talks to prepare a new global framework to deal with climate change ended on Friday with little progress made. Countries remain at odds over the future of the Kyoto Protocol, the first period of which expires at the end of 2012. There was no movement on emissions reduction targets, despite a growing chorus of experts and activists warning that current pledges are insufficient and put the world on a hazardous pathway.

Modest progress was achieved on some aspects of the climate regime, but disagreement persisted on much else. The slow pace of talks bodes ill for the end-of-year meeting in Durban, South Africa – the deadline set by parties to give effect to much of December's Cancun Agreements.

Worst ever carbon emissions leave climate on the brink

Exclusive: Record rise, despite recession, means 2C target almost out of reach

Fiona Harvey, Environment correspondent
guardian.co.uk, Sunday 29 May 2011 22.00 BST

A larger | smaller

Economic recession has failed to curb rising emissions, undermining hope of keeping global warming to safe levels
Photograph: Dave Reede/All Canada Photos/Corbis

Greenhouse gas emissions increased by a record amount last year, to the highest carbon output in history, putting hopes of holding global warming to safe levels all but out of reach, according to unpublished estimates from the International Energy Agency.

The shock rise means the goal of preventing a temperature rise of more than 2 degrees Celsius – which scientists say is the threshold for potentially "dangerous climate change" – is likely to be just "a nice Utopia", according to Fatih Birol, chief economist of the IEA. It also shows the most serious global recession for 80 years has had only a minimal effect on emissions, contrary to some predictions.

Last year, a record 30.6 gigatonnes of carbon dioxide poured into the atmosphere, mainly from burning fossil fuel – a rise of 1.6Gt on 2009, according to estimates from the IEA regarded as the gold standard for emissions data.

"I am very worried. This is the worst news on emissions," Birol told the Guardian. "It is becoming extremely challenging to remain below 2 degrees. The prospect is getting bleaker. That is what the numbers say."

Australian energy policy objectives

ENHANCING AUSTRALIA'S ECONOMIC PROSPERITY
ENERGYWHITEPAPER

Providing secure, affordable and sustainable energy is critical to maintaining Australia's prosperity. For this reason the Government is committed to finalising an Energy White Paper in 2012.

As one of only three net energy exporting OECD countries, Australia is well positioned with many sources of energy to support our domestic requirements and the creation of jobs and income from export opportunities, particularly in the Asia Pacific region. With almost 20 per cent of OECD gas reserves, we must ensure that our energy resources are developed efficiently and sustainably in order to optimise the overall benefit for the Australian community.

The Government recognises that the energy sector is currently facing major challenges. Australia's economy is growing strongly, and demand for Australia's energy – both domestically and for export – is also growing strongly. However, this grow[illegible]ting upward press[illegible]ance of repla[illegible]pacity and there[illegible]

Possible policy implications: **Where are the formal affordability policies, climate must join the queue**

Continued security of, and access to a competitively priced energy supply for households and industry is a critical priority. Alongside this, Australia needs to continue the transition to a low emissions and environmentally sustainable economy. This will require the development and deployment of new and cleaner low emission technologies supported through actions such as the introduction of a price on carbon. The Energy White Paper will deliver a clear and robust whole-of-government policy framework to provide certainty for investors as well as reliability and security for the

Energy policy needs?

- One possible framework for determining policy interventions: *correct 'correctable' market failures*
- Energy sectors can exhibit all possible market failures
  - Market power
    - Generally concentrated supply-side (and potentially retail), Considerable shared infrastructure
  - Issues associated with nature of goods or their exchange
    - public goods and 'common-pool' resources – *eg. networks*
    - agency problems – *eg. retailer objectives*
    - informational asymmetry – *eg. supply vs demand-side participants*
  - **Externalities**
    - Many and varied external costs and benefits

Possible policy implications: **from an energy policy perspective, a carbon price is a complementary policy. What about affordability?**

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Energy consumer perspectives

Complex, uncertain and dynamic views on climate change

Fig. 7: Federal government's efforts to address climate change

And now about the current Federal government's efforts to address climate change. Do you think the current has done a good job, or a poor job, in addressing climate change?

Fig. 8: Willingness to pay to help solve climate change

One suggested way of tackling climate change is to increase the price of electricity. If it helped solve climate change how much extra would you be willing to pay each month on your electricity bill? Please say an amount, rounded off to the nearest ten dollars.

(Lowy Institute, 2011)

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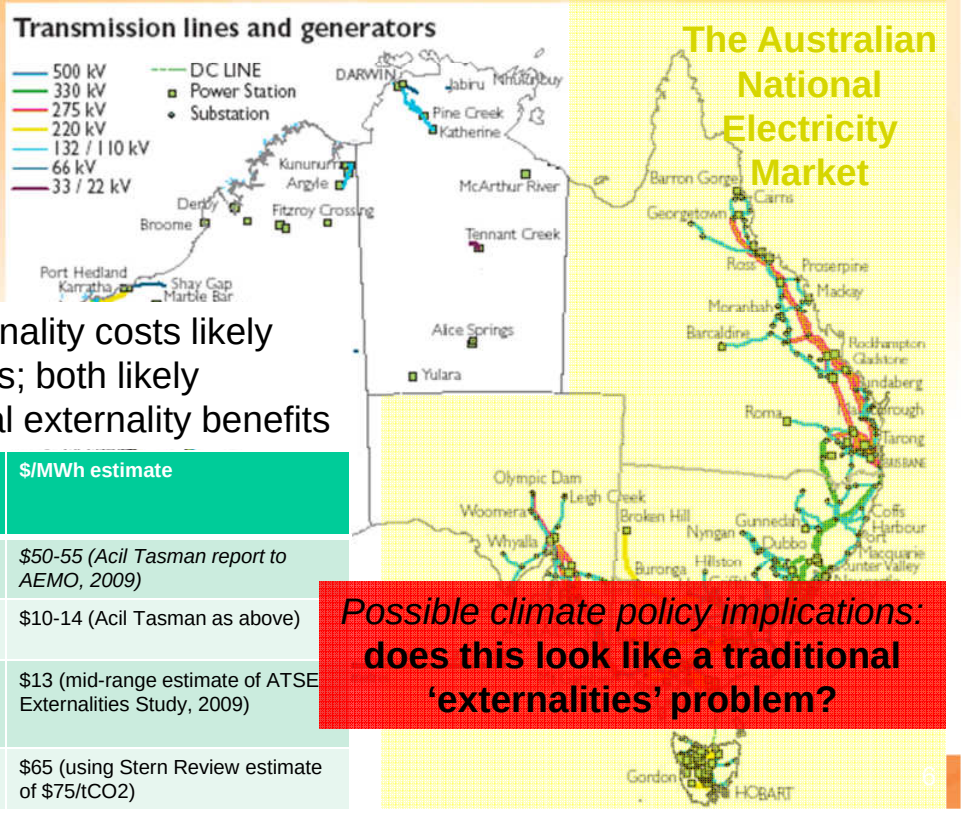
NEM: Aust's largest environmental (externalities) market



Environmental externality costs likely outweigh direct costs; both likely outweighed by social externality benefits

Coal-fired generation in NSW (2009-10) Note: supplying >90% of state electricity	$/MWh estimate
Direct Long Run Marginal Cost (new SC plant)	*$50-55 (Acil Tasman report to AEMO, 2009)*
Direct Short Run Marginal Cost (fuel, variable O&M)	$10-14 (Acil Tasman as above)
External Health damage costs (PM10, SOx, NOx)	$13 (mid-range estimate of ATSE Externalities Study, 2009)
External Climate Change damage cost	$65 (using Stern Review estimate of $75/tCO2)

Possible climate policy implications: **does this look like a traditional 'externalities' problem?**

Overall objective for the NEM (NEL Sec. 7)

*The national electricity market objective is to promote efficient investment in, and efficient use of, electricity **services** for the long term interests of **consumers** of electricity with respect to **price, quality, reliability and security of supply** of electricity and the reliability, safety and security of the national electricity system*

- Are all objectives reflected in market design?
  - One reason there is effective competition in the Victorian Retail Market is "Because the provision of energy is viewed as a homogenous, low engagement service " AEMC, Effectiveness of Competition in Victoria, 2008

Possible policy implications: **Claimed market objective is 'services' – how and where is delivery of these being assessed?**

- Lack of env. and wider sustainability objectives a **design choice**
  - *As government desires that NEM contributes to achieving such objectives must implement 'external' policies to drive changes*

Possible climate policy implications: **not an imposition on participants but an obligation – role of NEM then to faciliate changes**

… many **C** based energy prices

- Energy highly valuable – vital roles, non-substitutable
  - Not just a question of direct costs of extraction + conversion
- Potentially major differences b/n cost and value
- Many of these costs + values are externalities unless addressed by governments
- Key externalities until now include social welfare, resources management, energy security,pollutants

… now climate change

Issue is not whether to price carbon – instead, who will pay how much to whom + when

Chart 23 Components of Australian retail RULP prices in the five largest cities: 2008–09

(ACCC, 2010)

Source: ACCC calculations based on Platts, CBA and Informed Sources data.

Prices, tariffs, fees. taxes…

- NEM wholesale market has prices
- Predetermined retail electricity tariff (schedule of fees) is not a price in 'economic efficiency' sense of term
  - requires locational and temporally varying and uncertain spot and future prices for both energy and network services (Outhred and MacGill, 2006)
  - major reform of interface b/n supply and demand sides of electricity industry and NSPs required before genuine 'price discovery' can occur
  - Little apparent interest or willingness to do this to date by key players
- Electricity industries
  - traditionally 'charge' fees/taxes sufficient to deliver essential current & future access to 'reliable' electricity supply 'service' to all s.t. underlying customer 'class' costs but also wider considerations (eg. equity).
  - In restructured industries, an unresolved question, often only limited moves towards 'economically efficient' pricing wrt earlier arrangements

What can governments do regarding **C**?

- **Tax, Spend and Regulate**
  - We have millennia of experience in this
- … or, over last 2 decades, growing interest in creating **'designer' markets** to achieve environmental objectives
  - Renewable Energy Targets, **Emissions Trading**
- Some insights
  - To spend is to tax - *Milton Friedman*
  - Taxation impacts: revenue, redistribution, repricing + representation
  - Taxation targets: capital, labour, consumption
  - Regulation has a proven track record in environmental challenges … has only recently fallen out of favour

Carbon pricing – from theory to practice

(adapted from Clive Spash, *Brave New World of Carbon Trading*, www.clivespash.org)

- Underlying economic theory on pollution control
  - An aberration on otherwise perfectly functioning markets
  - Known or knowable pollution control costs and benefits
  - Optimal pollution control equates marginal costs of control & benefits
  - Taxes set the price, emissions trading sets the quantity
- … may not adequately address challenges of practical implementation?
  - Oversimplification – range of climate change drivers beyond **C**
  - Existing market failures + other distortions – eg. fossil fuel subsidies
  - Markets, power and vested interests
  - ***What about equity considerations?***

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C pricing around the world to date *(DCCEE, 2011)*

- Developed countries
  - ETS already operating in 27 EU + 4 other countries, New Zealand, 10 US states. Trials in South Korea + Japan.
  - Carbon taxation in UK, Denmark, Finland, Norway, Sweden, Netherlands + Canada
- Developing countries
  - India: coal tax to fund research and development on renewable energy technologies
  - China: value-based tax on coal, oil and gas extraction in largest gas-producing province, plans to extend to all other western provinces
- *Almost all countries*
  - *A range of 'implicit' **C** prices and subsidies*

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EU ETS latest…

a debacle to date in many regards

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Polluters the winners from EU carbon scheme

Gerard Wynn & Nina Chestney

Published 9:06 AM, 24 Jun 2011
Updated 9:41 AM, 24 Jun 2011

Tags
carbon trading scheme, climate change, EUAs, Enviro-Markets, Europe

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LONDON (Reuters) – A European plan to raise funds for clean energy has backfired spectacularly, helping trigger a rout on its carbon trading scheme, and so cutting available green funds and benefiting polluting coal plants.

Additional causes for the latest sell-off included eurozone woes over Greece, and an EU efficiency directive announced this week which could send carbon emissions lower.

The EU's emissions trading scheme has endured a slew of damaging scandals from its launch in 2005, including VAT fraud, the re-sale of used credits, phishing scams and cyber-theft.

Most importantly, the scheme which is supposed to cap the carbon emissions of about 11,000 factories and power plants has seen a permanent surplus of permits called EU allowances (EUAs) since its launch in 2005.

That glut, partly a result of a financial crisis which cut economic output and pollution, is just about to get worse thanks to a European Commission plan to sell an extra 300 million permits on the market to raise funds for green energy projects.

Carbon prices have been cut a quarter lower in the past three weeks, largely because of the plan, traders say.

That drop in carbon costs has sent the profit margins of polluting British coal plants up more than a tenth.

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EU carbon: a zero-sum game?

Giles Parkinson

Published 7:06 AM, 27 Jun 2011
Updated 7:04 AM, 28 Jun 2011

Tags
Australia, carbon price, emissions reduction target, energy efficiency, EU carbon trading scheme, EU ETS, EUAs, Enviro-Markets, Europe

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Just as the federal government prepares to announce details of its carbon pricing regime in the next week or two, the European emissions trading scheme is lurching through another crisis. Or should that be crises?

The European carbon price has plunged dramatically in the past month, with an 11 per cent slump on Friday to €12, extending a 30 per cent slump in previous sessions. It is now at its lowest levels in more than two years.

It's been caused by a confusion of seemingly separate but ultimately interrelated factors: The Greek debt crisis and the threat of another European-wide recession; the failure to agree on more ambitious emissions reductions targets; a massive overhang of free permits; a major spat between Europe, China and the US over the inclusion of non-EU airlines in the European ETS; and the proposed introduction of new energy efficiency targets.

Views differ on the import of the various factors, but there is no doubt that without corrective action they could combine to create a massive overhang of pollution permits by 2020 and a carbon price that ultimately falls to zero. The European Commission has canvassed this very scenario in a recent assessment.

It is one of the conundrums of emissions trading schemes that – as nearly any economist will tell you – while they are effective at finding the least cost of abatement, when low-cost abatement is combined with modest targets, or over-generous compensation, the carbon price can slump dramatically, unhinging the business plans of those relying on it going up. The EU experience in the past six years has been akin to a dog chasing its tail.

In Europe, there are fears of another recession. This means that abatement targets will be likely met through a reduction in production rather than any serious abatement measures or technology switches, adding to the considerable overhang of permits caused by overly-generous handouts to industries such as the steel and cement sectors.

According to the European Commission, the GFC and other energy-saving incentives have already reduced the business-as-usual projections out to 2020 by around 14 per cent. It fears that new energy efficiency obligations, which require energy utilities to achieve annual savings equivalent to 1.5 per cent of their sales, and other measures, could ultimately push emissions some 30 per cent below 1990 levels by 2020.

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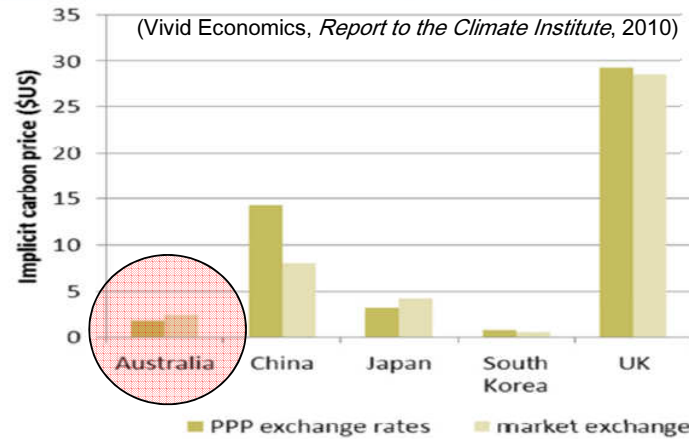
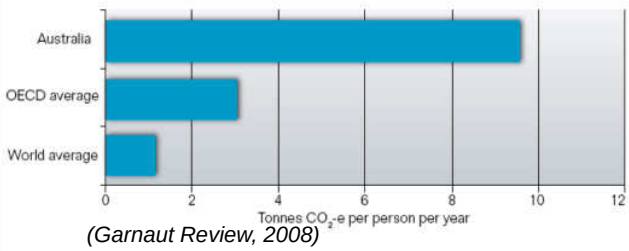
C pricing & electricity

- One of the world's most emissions intensive electricity industries
- Current policies including eRET represent modest 'implicit' **C** price
- Explicit (eg. EU ETS) and implicit **C** prices of many other countries likely exceed current Australian efforts



(Vivid Economics, *Report to the Climate Institute*, 2010)

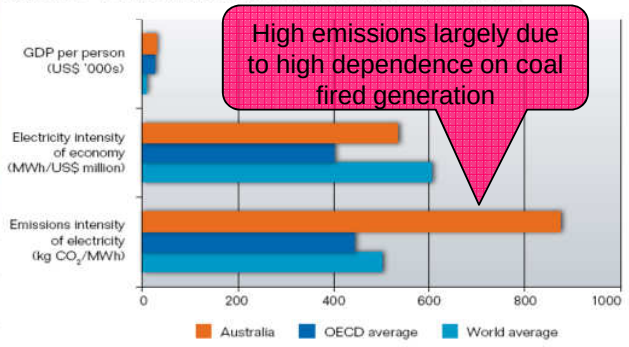
Figure 7.9 Per capita emissions due to electricity, 2005



(Garnaut Review, 2008)

Sources: IEA (2007a); DCC (2008b).

Figure 7.10 Factors underlying per capita electricity emissions, 2005



Source: IEA (2007a).

Scheme	Stated objectives	Productivity Commission estimate of economic subsidy ($(2010)/tCO2)	Alternate estimates of economic subsidy ($/tCO2)	Estimate of energy consumer subsidy ($/tCO2)
NSW GGAS	Reduce emissions associated with NSW electricity consumption	$4.57 PC uses 2009 NGAC spot price (note that the scheme future was in significant doubt in 2009 and the price has been above $10 for most of the scheme's life)	$10-14 Key question is the LRMC of abatement projects rather than spot price towards the end of scheme's expected life. However, difficult to estimate when such a wide range of projects are eligible to claim abatement. Spot prices earlier in the scheme life likely to be a better guide than 2009 price.	$30-100 Key issue is that of additionality as electricity customers required to pay for all NGACs, yet only some of these represent actual additional abatement. Estimates of additionality difficult to make however PC reports DCCEE estimate that only 0.7Mt of over 15M NGACs in 2009 represented additional abatement. Even at $5 NGAC that represents real price of $100/tCO2 for the energy consumer. Grattan Institute estimates $15-$40.
Qld Gas Scheme	Increase gas supply infrastructure in Queensland, and reduce emissions from its electricity industry	$18 PC uses 2009 GEC (Gas Electricity Certificate) price of $6.49 (note that effective future of the scheme was in significant doubt in 2009 given the CPRS proposals and the GEC price was between $10-16 for first four years of the scheme.	$20-40 (Grattan Institute) Can estimate directly from LRMC of gas-fired generation vs. coal in Queensland. Otherwise, early GEC prices likely to be best guide to actual project hurdles that had to be overcome by the scheme.	Not estimated. As the PC notes, significant questions about the additionality of the scheme given that gas-fired generation investments occurring in other States with low-cost coal. As an example, if additionality was only 50% then customer subsidy would be of order of $40-$80.
Large-scale eRET	Increase renewable generation and reduce emissions	37-111 High range value assumes LRMC cost for wind (i.e. REC price of $60 required to drive investment) and low abatement (offsetting gas generation rather than coal+gas mix). Note that LRMC estimates not used for GGAS and Queensland Gas Scheme, nor GGAS electricity reductions offsetting gas generation rather than coal+gas mix. If PC used same methodology as used for GGAS and Queensland Scheme then approx. $40.	$30-70 (Grattan Institute)	$30-70 Some early additionality problems in the original MRET with old hydro and solar hot water. The large-scale eRET should, however, be largely additional because renewable generation generally has higher direct costs than conventional supply.

(APVA, Response to Productivity Commission Report on Climate Policies, 2011)

Estimating economic subsidies associated with climate policies is challenging and requires numerous assumptions and questions of judgement – some work in the Australian context highly problematic such as that of the Productivity Commission (2011)

Scheme	Stated objectives	Productivity Commission estimate of economic subsidy ($(2010)/tCO2)	Alternate estimates of economic subsidy ($/tCO2)	Estimate of energy consumer subsidy ($/tCO2)
Small-scale PV rebates, eRET and feed-in tariffs	Original PV rebate objectives to promote the uptake of renewable energy, reduce greenhouse gas emissions, help in the development of the Australian PV industry and increase public awareness and acceptance of renewable energy. Feed-in tariffs were not [illegible] and job creation	$432-1043 PC applies a surprising methodology. Rather than use LRMC estimates of the cost difference between PV and conventional supply as with large-scale eRET, instead estimates total fiscal subsidy without any attempt to separate economic subsidy from transfers (unlike other PC scheme assessments such as that undertaken for GGAS). For eRET subsidy, only considers 15 years of abatement although assuming an economic life of 20 years, hence 5 years of uncounted abatement. Also apply a low abatement scenario as per large-scale eRET without justification (if it is to be included, then it should also be applied to NSW GGAS). For most State feed-in tariffs, assume all generation [illegible]	McKintosh et al (2010[1]) estimate social abatement cost from PVRP (broadly comparable to economic subsidy) of $229-274 for 2009. This estimate, however, underestimates total abatement by about 0.5Mt (14%)[2]. Also, they assume effective future climate policy that reduces electricity industry emissions intensity over 50% by 2040 (which isn't included in the PC assessments and represents action that hasn't yet been taken). More importantly system costs fell 2006 to 2008 from 2009 levels suggesting that this estimate is far too high. Prices have fallen by 30% from 2008 to 2011.	Not estimated. Methodological problems with PC study as noted previously mean that their estimates don't appear credible. Furthermore, their report explicitly states that they are attempting to assess increased costs to the economy, rather than transfers such as those involved to determine electricity customer subsidies. Note that some early additionality problems with original PVRP. Current support should, however, be largely additional because of the high costs of PV at present.

(APVA, Response to Productivity Commission Report on Climate Policies, 2011)

Current Australian '**C** Pricing' Framework

Multi-Party Climate Change Committee

- Could commence with fixed price (within ETS framework) as early as mid 2012
- Convert to ETS within 3-5 years subject to Australian and international factors
  - Including International **C** markets, progress on negotiations
- Likely ETS design (starting point the former CPRS)
  - Broad coverage (but not land-use?)
  - International linkages (potentially limited)
  - Assistance to households and businesses still to be determined
- Complementary policies still required (but limited scope?)

Factors driving Carbon Pass Through (CPR)

Change in electricity price / carbon price *(AGL, Working Paper #23 – Carbon Pass-through, 2010)*

- Emissions intensity of existing capital stock.
- Demand elasticity
  - Theory: greater inelasticity of demand means greater incidence of taxation experienced by consumers, rather than producers.
- Economics of existing substitutes
  - If lower emissions substitutes operating with excess capacity, then rate of pass-through may be lowered as higher emitting products substituted
- Availability of offsets or international credits.
- Market competition
  - Perfect competition will have significant existing differences to a market characterised by oligpolistic or monopolistic structures. (AGL , 2010)

Note significant uncertainties and dynamics

2005	WWF-AGL-Frontier Economics	LP model of the NEM based on least cost dispatch – named WHIRLYGIG	90%	Electricity sector specific study
2006	MMA Report for the National Emissions Trading Taskforce	Multi-area probabilistic dispatch algorithm – named STRATEGIST	17%	Electricity sector specific study (although MMRF – a CGE model – was also used and considered by the Taskforce)
2008	ACIL Tasman Modelling for ESAA	LP model called PowerMark (simulation model of the NEM) integrated with GasMark (gas market simulation model) and Tasman Global (General Equilibrium model)	41%	Comprehensive modelling across multiple markets
2008	Garnaut Report	Multi-area probabilistic dispatch algorithm – named STRATEGIST	128%	Electricity sector specific study (although CGE modelling was also used and considered by the Garnuat Review)
2008	ROAM Consulting Submission to CPRS Green Paper	LP model known as 2-4-C	105%	Electricity sector specific modelling
2008	ACIL Tasman Modelling for Commonwealth Treasury	LP model called PowerMark (simulation model of the NEM)	60%	Electricity sector specific modelling
2008	ROAM Modelling for Commonwealth Treasury	LP model known as 2-4-C	51%	Electricity sector specific
2008	MMA Modelling for Commonwealth Treasury	Multi-area probabilistic dispatch algorithm – named STRATEGIST used with demand and supply convergence achieved through use of MMRF (CGE)	107%	The second year has been adopted as the first year appeared to be an anomaly at 38%
2009	Wounded Bull (Simshauser and Doan)	NEMESYS – dynamic half-hourly equilibria determined using strategic exit bidding assumptions and scenarios	78% (Stable bidding behavior) 102%-393% (Exit scenarios)	First Australian study to examine strategic exit bidding behavior and the potential impacts on carbon pass-through
2010	Frontier Economics (IPART Price Review)	LP model of the NEM based on least cost dispatch – named WHIRLYGIG; and similar model incorporating game theory generator bidding (SPARK)	LRMC – 76-80% Market – 96-111%	Study contrasts the differences in modeled outcomes between 'LRMC' and 'market' approaches

Widely varying estimates of CPR (17% – 400%)

(AGL, Working Paper #23 – Carbon Pass-through, 2010)

Managing security + reliability

Maintaining NEM security has priority over commercial arrangements – widespread industry failure is not an option.

- Carefully designed interface between market and centralised security regimes
  - Price can range from -$1000 to $12,500 / MWh (for brief periods)
- If system security or reliability of supply threatened, AEMO has authority to use
  - Security and Reliability Directions
  - Load Shedding
  - Reserve Trading

Possible policy implications: **Robustness is critical: where are the security regimes to ensure we can achieve desired climate and energy equity objectives even if particular favored policies fail? Might this require policy 'portfolios' to manage risk?**

NEM Governance

- Very high transparency in market operation
  - all participant physical and market behaviour is public (ex-post), market event reports, projections over weeks to decade timeframes
- Formal separation of powers and interfaces between policy making, rule making, operation and enforcement
  - MCE, AEMC, AEMO, AER and ACCC
- Rules for changing the rules
  - Any party can propose a rule change at any time; triggers a formal process with high transparency and consultation

Possible climate policy implications: **Serious governance the key to successful market-based policy approaches like LRET, ETS**

- **High transparency with significant disclosure obligations**
- **Robust against the rent-seekers (often incumbents)**
- **Fixable: "market and investor' certainty should never over-ride necessary repairs and improvements**

NEM governance appears more robust than that for some other key environmental markets to date including MRET/eRET, NSW GGAS…

but is it sufficient for transformation of the electricity sector?

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Thank you… and *questions*

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