Emissions Trading
The Case for Compensation

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Key Issues

- The cost of carbon
- Cost pass-through to NEM pool customers
  - Winners and losers in the generation sector
- Tax windfall to government
- Use of tax windfall
  - Compensation to affected generators
  - Compensation to energy-intensive, trade-exposed customers
  - Other tax relief
  - Fostering zero and low emission technologies
- Auctioning and administrative allocation of permits
- Allocation of permits as compensation
  - Efficiency and effectiveness

Position of Electricity Generators

- To enhance investor certainty, the National Generators Forum supports:
  - the development of a broad-based emissions trading scheme which incorporates compensation to generators for loss of asset value, and
  - policies that encourage low emission technology development

The Cost of Carbon

- Electricity generation nationally represents one-third of greenhouse gas emissions
  - The rest of the economy covers the remaining two-thirds
  - Electricity generation offers limited low cost reduction opportunities, maybe 3 percent at costs of less than $10/tonne of carbon dioxide, but much in excess of $40/tonne
  - Other sectors offer significant opportunities, so why limit a scheme just to electricity supply?
  - Even at $10/t, funds accumulating to government is some $2 billion per year or some 30 percent of total electricity generation revenue. At $35/t, funds accumulating to government exceed total electricity generation revenue
- Emission caps, targets, pathways and price caps profoundly influence approaches to emissions trading

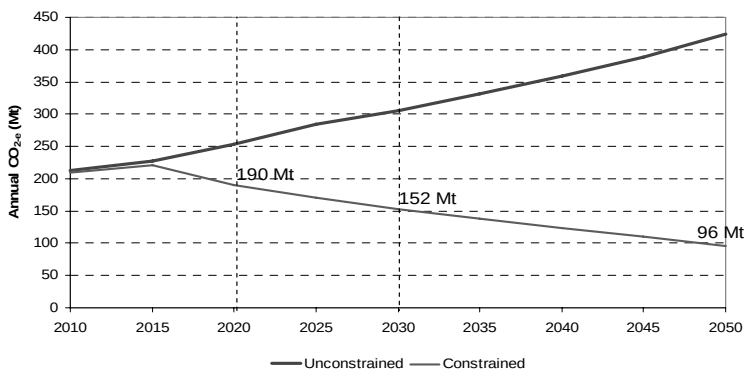
Brief Case Study

- Objective:
  - Reduce 2010 electricity related emissions by about 50% by 2050
  - From 200 Mt to 96 million tonnes

Reduction to 0.2 t/MWh (96Mt per annum in 2050) CO_2 is Challenging

Study emission target over 2020-2050 requires 78% reduction in annual emissions by 2050 or over 300 Mt compared to reference case

- equivalent to displacing approx 300,000 GWh in 2050 (or 55% of reference case coal generation with zero emission generation)

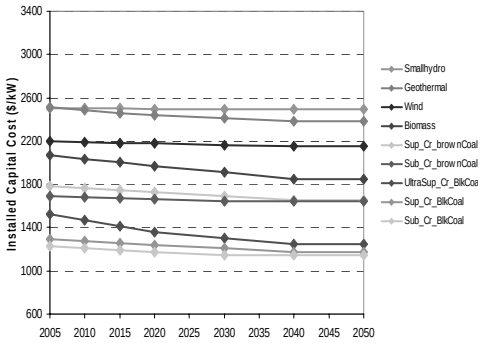


Critical Variables

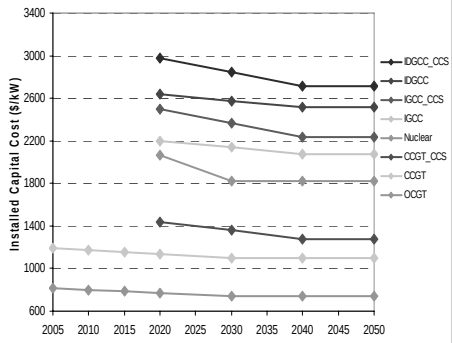
- Critical variables in determining the cost of achieving the objective and the price of carbon are:
  - Capital cost of existing, new and prospective technologies
  - Fixed and variable operating and maintenance costs
    - Including the cost of fuel

Technology Cost Curves Used in the Study

Installed Cost
Coal Technologies and Key Renewables



Installed Cost
Other Technologies including Advanced



• Both the absolute and relative costs of technologies are important in determining least-cost outcomes

• Capital costs for new or prospective technologies are notoriously difficult to quantify

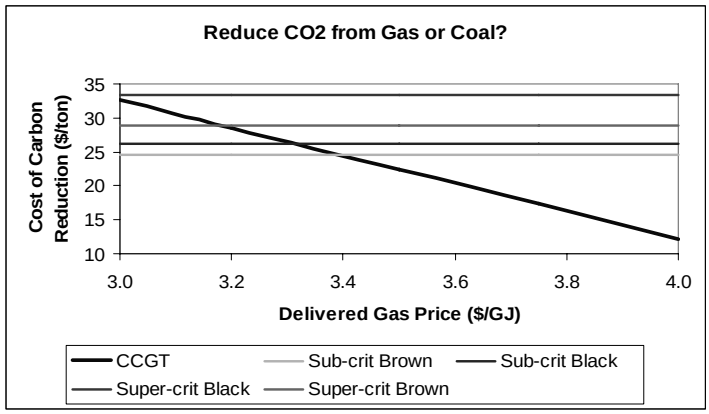
Fuel Costs Will Influence Outcomes

Cost of CO_2 Reduction by Switching to Nuclear

Illustrative example

Gas price may influence which fuel should switch to Nuclear

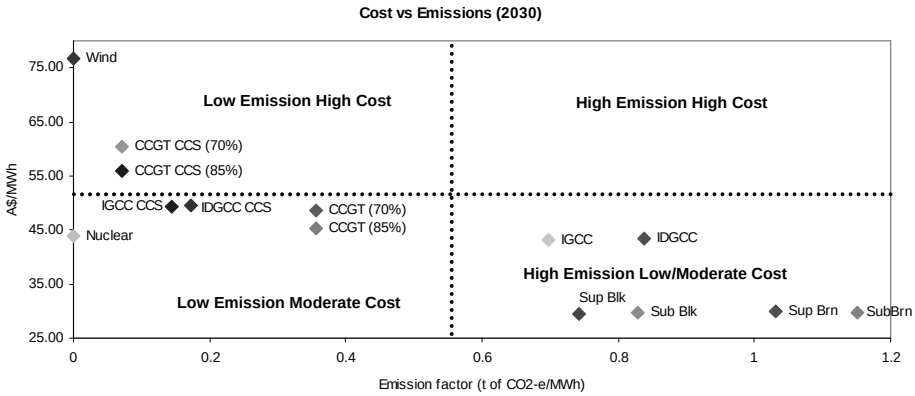
Variable costs such as gas price is an important driver – below $3.4/GJ delivered gas price, it may be cheaper to displace coal



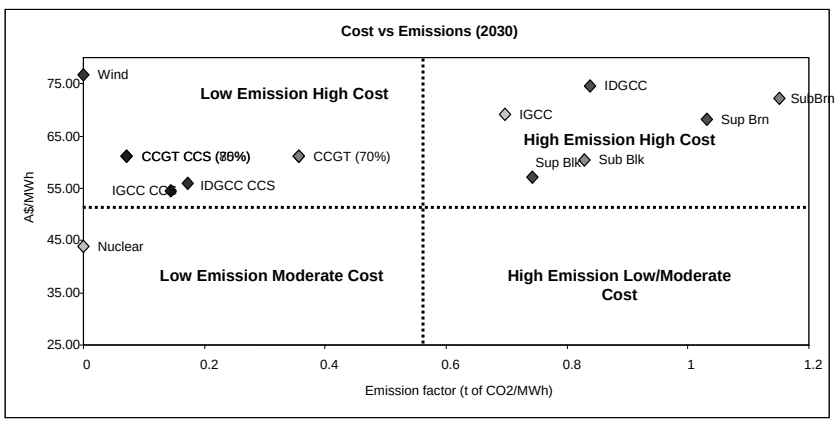
Merit Order Dispatch into the National Electricity Market

- Dispatch of power station units is essentially based short-run marginal costs
  - Mainly fuel and variable operating costs
- Strategic market behaviour is a critical in short-term dispatch
- Modelling of long-term dispatch is essentially based on long-run marginal costs
  - Including the cost of capital
- Longer term modelling is generally least-cost based
  - Not good at incorporating market behaviour
- Introducing a cost of carbon will change both short and long run costs and change market behaviour
- Introducing a price on carbon has a significant impact on electricity pool prices

Snapshot of long-run marginal cost and emission intensity – no limit on emissions

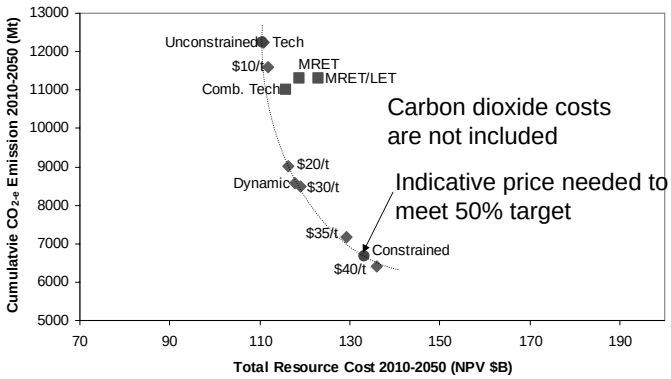


Snapshot of long-run marginal cost and emission intensity – limit on emissions as per constrained scenario, including a $37/t tax on Emissions



The Efficient Frontier

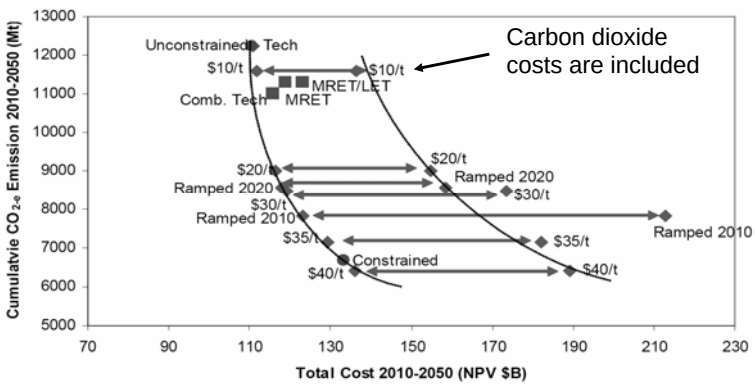
- Based on a consistent suite of capital and operating costs for existing, new and prospective plant, a least-cost curve of this kind can be drawn. The curve represents the least-cost means of achieving abatement at nominated carbon dioxide prices.
- Policy measures that do not fall on the curve are less cost-effective (governments are poor at picking least-cost winners)



Incorporating the Cost of Carbon Dioxide

•Adding the carbon cost moves the efficient frontier to the right, making mandated measures look good

•Difference between curves are the funds accumulating to government, which could be used for compensation and new technology deployment



The Emissions Trading Dilemma

- Set a low carbon price cap, say up to $15/t, there is very little change in generation dispatch, meaning the $3 billion collected annually is just a tax without much abatement impact
- Set a high carbon price, say around $35/t, there is a dramatic change in dispatch, wiping out most existing coal plant, with significant abatement impact
  - Providing new large-scale zero and low emission technologies are commercially available

Cost Pass-through to NEM Pool Customers

- A price on emissions is akin to an additional cost on fuel, and to the extent allowed by competition, it will be passed through to pool customers, and ultimately all consumers
- Predicting the extent of pool pass-through is challenging as it depends on many factors, including pool behaviour, position in the load curve, and contractual obligations
- Within the electricity sector, there will be clear winners and clear losers
  - Pool customers will see the **net** impact of this
  - But power station losers will see large **gross** losses and some power station winners will see large **gross** gains

Use of Funds Accumulating to Government

- Abolish less efficient taxes
  - Generally backed by economic theory, but never assessed in terms of massive technology change required
- Compensate the affected losers
  - Minimise future sovereign risk for investment initially made in good faith
  - Maintain NEM stability and security of supply
- Compensate affected pool customers or needy consumers
  - Counter-productive in desired outcome terms
- Fund development and deployment of zero and low emission technologies
- Balance all of the above

Provide ‘Free’ Permits to Affected Generators

- In equity terms, affected existing investors will require compensation for loss of asset value (cumulative loss of net revenue)
- Allocation of free permits as compensation is generally more efficient than other forms of compensation
- Compensation is difficult to compute due to pool cost pass-through and business complexity
- However, both sophisticated modelling and some simple allocation rules can result in fair compensation to affected businesses
  - Upfront, once-and-for-all, long-term allocation is essential for long-lived assets such as power stations

What About Energy-intensive, Trade-exposed Sectors

- What are the sectors?
  - This is not a simple sector, such as aluminium exports
  - It includes both export and import competing industries, but boundaries will be hard to define
- Why provide compensation?
  - To maintain international competitiveness for very significant export earning industries
  - Annual ex post compensation based on export production appears to be the most workable