# MODELLING SUCCESS

## DESIGNING AN ETS THAT WORKS

THE BUSINESS COUNCIL OF AUSTRALIA

# HOW EMISSIONS TRADING CAN WORK FOR THE ENVIRONMENT AND THE ECONOMY

# ABOUT THIS PAPER

**THIS PAPER SETS OUT HOW AUSTRALIA CAN DESIGN A SUCCESSFUL EMISSIONS TRADING SCHEME.**

It comprises analysis and recommendations by the Business Council of Australia (BCA) on an Australian emissions trading scheme (ETS), together with a report prepared for the BCA by Port Jackson Partners Limited (PJPL) which has shaped the BCA's thinking. The PJPL report includes detailed modelling on the effects of possible ETS features.

The paper provides new approaches to two critical challenges in the design of an Australian ETS. The first is the challenge of emissions-intensive, trade-exposed industries. The second is the challenge of reducing Australia's electricity sector emissions.

The paper points toward solutions which would make Australia a world leader in effective and efficient responses to climate change.

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**BRINGING SPECIFIC COMPANY ECONOMIC PERSPECTIVES TO BEAR ON THE ETS DESIGN**

REPORT TO THE BCA BY PORT JACKSON PARTNERS LIMITED

## THE PATH TO SUCCESS

The introduction of Australia's emissions trading scheme (ETS), the Carbon Pollution Reduction Scheme, is the single most important policy decision the Australian Government will make and implement over the next three years.

The Business Council of Australia (BCA) fully supports the government's plans to introduce the Carbon Pollution Reduction Scheme (CPRS). However, successful implementation of the CPRS poses huge challenges. It must balance often competing yet interdependent demands: changing spending and investment, providing assistance to low–income households, ensuring competitiveness in the absence of a global response, and aligning Australia's strategies with global action, while preserving and fostering Australia's economic growth. It must be effective and efficient.

A successful Australian CPRS will provide an example to many other nations. That example is itself vital. If the world is to address climate change, it will only be because many nations are persuaded to implement effective emissions reduction initiatives.

The BCA believes Australia is on the path to creating a scheme that addresses these challenges through a partnership between government, business and the community.

Business has a key role to play in the success of the CPRS. The CPRS will not itself reduce emissions. Decisions by business and consumers will do that. Under the right policy framework, business will make long-term investments and produce the innovations needed to move to a low-emissions economy. These include:

- restructuring of current business processes and operations;
- greater business deployment of low-emissions technologies than exists now;
- further business development and commercialisation of emerging technologies; and
- discovery of new, breakthrough technologies.

Government can encourage investment and innovation. But businesses, motivated by incentives and price signals, will deliver them. Providing business with the right incentives and signals is therefore a critical component of the CPRS.

Research commissioned by the BCA, as detailed in this paper, provides guidance as to how this can be achieved while minimising adverse impacts on the Australian economy.

### THE BCA VISION FOR AUSTRALIA

Australia should become the best place in the world in which to live, learn, work and do business. To achieve this, we should commit to three key goals:

- A growth rate of between three to four per cent annually.
- Policies that are environmentally and socially sustainable.
- Minimising barriers to trade and global engagement.

## THE EMERGING CONSENSUS

Government, business and substantial sections of the wider Australian community agree on the broad principles that should apply to the CPRS. We agree on the following points:

- Australia should address climate change as an economic challenge, using economic policies and market mechanisms.
- We should design the CPRS to avoid unnecessarily constraining economic growth.
- Our approach must balance the costs of inaction with the costs and benefits of action.
- Arbitrarily limiting growth or specific economic activities will not produce the best outcome.
- Other domestic policies, state and federal, must be consistent with the aims of the scheme.
- All relevant stakeholders, including business, must participate in the discussion on the scheme's design and must be part of the solution.
- Ultimately, only global action will successfully address climate change.

Addressing climate change is not a zero-sum game. There are very real costs, but successful policy will ultimately advantage the entire Australian community and the world beyond our borders.

## THE SUCCESSFUL SCHEME

An effective and efficient CPRS will meet the following goals:

- Provide broad sectoral and emissions coverage that precludes the need for additional regulatory frameworks.
- Send clear signals to business and the community to reduce emissions.
- Compensate low-income households in a manner that provides incentives to reduce emissions.
- Prevent 'carbon leakage', where the source of emissions moves across national borders and total global emissions do not fall.
- Maintain an industry composition in Australia that is similar to that which would exist with a global carbon price.
- Allow for a smooth long-term transition to a low-emissions electricity sector.
- Be capable of alignment with international progress and schemes.
- Maintain economic growth in Australia in the short and the long term.
- Be credible, with the Australian community believing that the scheme can, should and will continue to work over a long period of time.

This scheme must be underpinned by an Australian emissions trajectory that is premised on both Australia's contributions to global emissions and the possible impacts on Australia in the absence of global action. It should be built on an ongoing assessment of the science and technology available as well as the economic, social and environmental impacts.

The BCA has stressed the importance of getting the scheme's design right in both the immediate and longer term. Using a market mechanism which includes a price signal to business and the community will ensure Australians have the incentive to pursue the most cost-effective approach to reducing emissions. This will in large part determine whether the CPRS succeeds.

## THE GREEN PAPER

The Australian Government's Green Paper, published in July 2008, sets out the government's preferred approach.
It proposes:

- Coverage of all sectors and all gases.
- A medium-term national target range for 2020 emissions.
- Short-term annual caps and a 10-year range for future caps, to be regularly reset.
- Assistance for low-income households.
- Emitters covered by the scheme being required to purchase permits at regular auctions.
- Reducing the risk of 'carbon leakage' by providing some free permits to emissions-intensive, trade-exposed (EITE) industries.
- Unlimited banking and limited borrowing of permits.
- No export of permits in the early years of the scheme.
- A price cap in the early years to aid the smooth introduction of the scheme.
- Assistance for the electricity sector during the transition phase.

## FRONTIER CHALLENGES IN GLOBAL EMISSIONS REDUCTION

Both the position of EITE industries and the electricity sector present difficult problems for the design of any emissions trading scheme. These are 'frontier challenges' – policy problems which so far have not been satisfactorily addressed in any similar jurisdiction.

The BCA-commissioned research evaluates the effectiveness and impact of the government's proposed mechanisms for assisting the EITE and electricity sectors. As a result of this research the BCA believes that the government's intended mechanisms for compensation require modification if the Australian economy is not to be unintentionally and unduly damaged.

The BCA research points towards possible solutions to these problems – solutions which would place Australia among the leaders in an effective and efficient response to climate change.

## THE 'TRULY DREADFUL PROBLEM' OF THE EMISSIONS-INTENSIVE, TRADE-EXPOSED INDUSTRIES

Professor Ross Garnaut, in his review of emissions trading, accurately describes what he calls the 'truly dreadful problem' of EITE industries: so-called 'carbon leakage'. If we price emissions fully in Australia, emissions-intensive activity might simply relocate overseas. Rather than eliminating emissions, Australia's regime would move the source of the emissions offshore, most likely to jurisdictions with less stringent environmental standards. Thus a well-intentioned Australian regime could produce the truly perverse effect of actually increasing the level of global emissions.

This problem affects a substantial slice of Australian economic life. The EITE industries contribute 16 per cent of Australian business investment, 51 per cent of exports, 15 per cent of gross value add and employ nearly one in 10 working Australians.

## THE GREEN PAPER'S RESPONSE

The Green Paper acknowledges the dilemma of the EITE industries, and suggests dealing with it through short-term assistance over the next decade:

- The EITE industries would receive assistance, starting at the scheme's commencement in 2010 and phasing out by 2020. This assistance would end if comparable carbon constraints were introduced in competing economies.
- Assistance to these industries would be limited to 30 per cent of the declining pool of permits, 10 per cent of which would be issued to agricultural industries.
- Assistance would be determined according to the amount of carbon dioxide emitted for a given amount of revenue. This assistance would cover:
  - 90 per cent of all emissions for activities exceeding 2,000 tonnes per million dollars of revenue.
  - 60 per cent of all emissions for activities with between 1500 and 2000 tonnes per million dollars revenue.
- Assistance would be reviewed and wound back from 2015.

Such an approach will of itself not be sufficient to ensure there is not substantial impact on business viability and therefore the potential for the export of carbon emissions and reduced economic growth.

## NEW DATA ON EMISSIONS-INTENSIVE, TRADE-EXPOSED INDUSTRIES

As the government has acknowledged, Australia has until now lacked hard evidence on the situation of Australia's emissions-intensive, trade-exposed industries. The new research commissioned by the BCA from Port Jackson Partners Limited (PJPL) provides the first detailed picture of the likely impact of the CPRS under the government's proposed approach to assist the EITE industries.

PJPL examined in detail 14 businesses and facilities in EITE industries across a range of sectors including minerals processing, manufacturing, oil refining, coal mining and sugar milling.

PJPL was given access to detailed financial and operating data not on the public record and never previously studied. The research not only clarifies the impact on these businesses, but shows how business can and will respond. The research suggests a number of significant unintended consequences if the scheme, as outlined in the Green Paper, is implemented.

However, alternative approaches to scheme design are available that will avoid unintended consequences for this very significant sector of the Australian economy.

While the case studies represent detailed analysis of 14 businesses, these are representative of their broader industry sectors and similar impacts and responses can be expected in many other businesses.

## DESTRUCTIVE CONSEQUENCES

The case studies highlight the potential destructive consequences on EITE businesses of the government's proposed CPRS in the absence of a global carbon price.

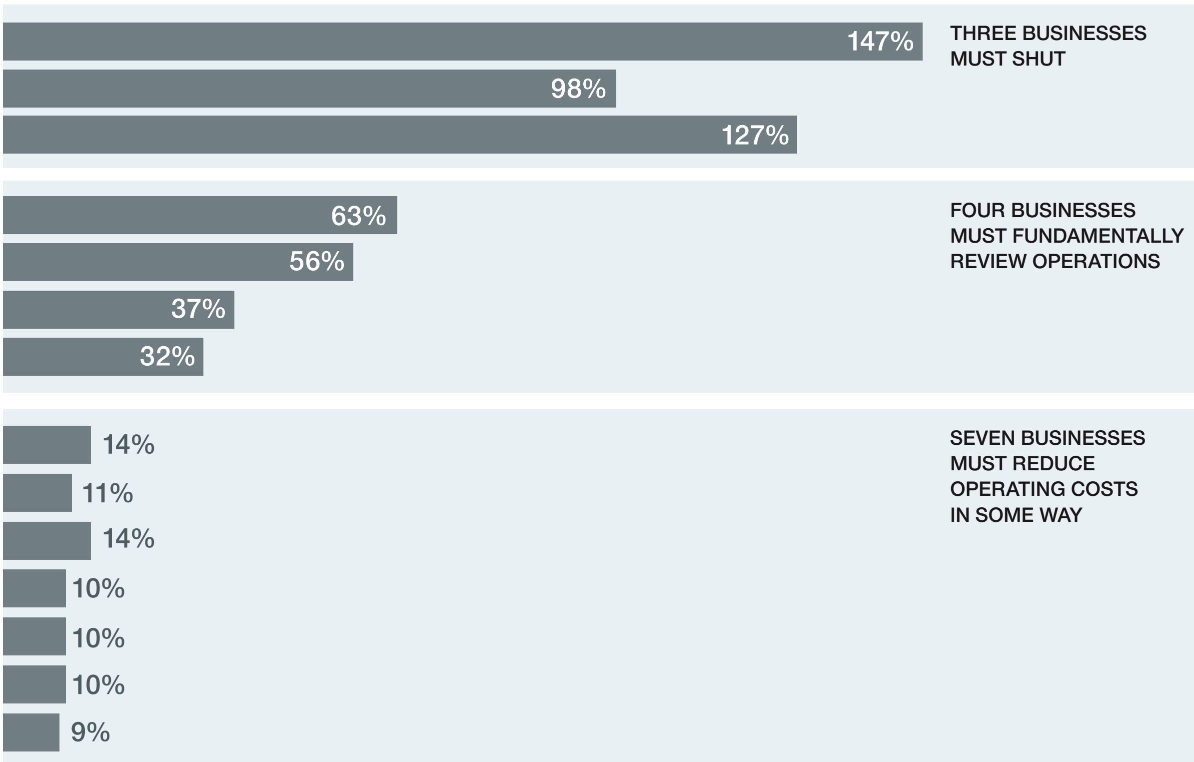
Boards and management of EITE businesses will model the impact of the proposed scheme on projected earnings and make an assessment as to whether they can continue to operate and invest in Australia.

The expected impact on business earnings before interest and tax (EBIT) for EITE businesses is more fully explored in the PJPL report at page 29. Figure 1, however, shows the impact at the year 2020, in simplified form, for the 14 case studies.

### FIGURE 1

HOW THE GOVERNMENT'S EMISSIONS SCHEME COULD FORCE BUSINESSES OUT OF AUSTRALIA

Reductions in EBIT for case studies under the Green Paper compensation scheme, 2020




Source: PJPL case studies, PJPL calculations.

## HOW MANY BUSINESSES CONTINUE AS GOING CONCERNS?

Boards and management of EITE businesses completing this earnings analysis would have to make major decisions as to whether to continue to operate in Australia, restructure their business or move offshore. For the 14 case study businesses, it is expected that:

- **Three businesses will shut:** their reduction in EBIT is near to or more than 100 per cent so they cannot continue in business.
- **Another four businesses must fundamentally review their operations:** they see such substantial reductions in earnings that they must examine whether it is possible to recover the reductions through cost cutting and restructuring. If this is not possible, they must consider closure.
- **The remaining seven businesses must reduce operating costs in some way.**

In addition to the impact on existing EITE businesses, new investments in the sector will be severely curtailed. Many potential investments will not take place unless there is an effective mechanism to compensate EITE industries in the absence of a global price. With no compensation, or with the levels of compensation proposed in the Green Paper, and depending on the price of permits, currently viable investment projects could lose between 25 per cent and 100 per cent of their value. This makes many long-term investments unattractive. An unknown number of these projects will relocate to foreign jurisdictions.

## ANOMALOUS COMPENSATION

The PJPL analysis suggests the government's preferred approach to compensating EITE industries will lead to poor economic and environmental consequences.

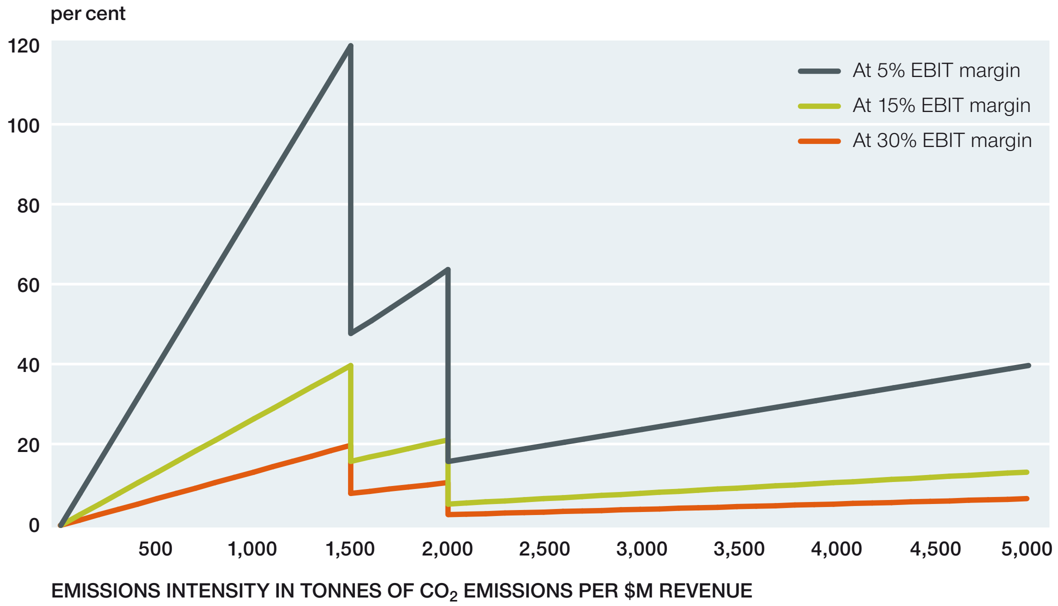
The PJPL analysis points to five key issues that lead to anomalous compensation and therefore require new approaches.

- Discontinuities in the compensation scheme see firms at 1,400 tonnes of $CO_2$ per million dollars of revenue getting no compensation, while firms with 1,500 tonnes of $CO_2$ per million dollars of revenue receive 60 per cent of their permits free.
- Many businesses receive inadequate compensation under the proposal. The effects on EBIT are shown below. EITE businesses with emissions intensities between 500 and 2,000 tonnes and margins of 15 per cent see profits significantly eroded – by up to 40 per cent at a $40 per tonne carbon price. Firms with 5 per cent margins at the same level of emissions see their profits reduced by between 50 per cent and more than 100 per cent.
- As the price of permits rises, the level of compensation to EITE businesses reduces.
- The proposal to assess businesses for EITE compensation using 2006–08 information risks excluding from compensation those EITE businesses that are currently experiencing unusually high prices.
- The scheme design creates high levels of uncertainty, discussed in more detail below.

### FIGURE 2

HOW AN EMISSIONS SCHEME COULD DESTROY BUSINESSES

Percentage EBIT reductions for businesses at different emissions intensities and EBIT margins under the Green Paper compensation scheme




Source: PJPL calculations based on Green Paper, page 27.

## ADDITIONAL UNCERTAINTIES AND ANOMALIES

Any trading scheme is likely to add an element of market uncertainty. The logic of the government's emissions trading scheme is that market risk should fall on businesses. This is an appropriate response.

However, the government's preferred approach adds additional uncertainties which go beyond normal market risk.

The government is yet to determine its 2020 emissions reduction target. However, it has indicated it will limit permits to EITE industries, including agriculture, to 30 per cent of the total permits issued. The government has also indicated that the number of permits will decline over time and the rate of decline will depend on a number of unknown matters. This means that over time, the supply of permits to EITE industries will decline unpredictably.

The criteria and timelines for the phase-out of permits for EITE industries are also unknown.

The government has also indicated it will not provide any mechanism to address growth in these industries, meaning future investment in EITE industries is unlikely. There will be a decline in economic growth as EITE businesses do not proceed with their current investment plans.

This gives a significant competitive advantage to many of Australia's foreign competitors, who are yet to support a global carbon response and have not yet stated clearly when they will do so.

## A SYSTEM THAT WORKS FOR EMISSIONS-INTENSIVE, TRADE-EXPOSED INDUSTRIES

In the absence of a global price on emissions, Australia should ensure its EITE industries share the impact of the introduction of the emissions trading scheme but remain internationally competitive and expand, while also ensuring any growth in EITE industries is accompanied by world's best practice in emissions reduction.

PJPL has explored two ways Australia could progress the development and implementation of the CPRS to achieve these outcomes. While the remainder of this section relates to their first approach, the second approach also includes the features outlined below. The BCA recognises that depending on the results of international negotiations, the second approach will need to be considered.

Working with PJPL, the BCA has identified the following key features required in the scheme:

- Set a modest trajectory which places Australia on a feasible path for emissions reduction in light of its economic structure and recognising the absence of a global scheme.
- Provide full compensation for emissions above an emissions intensity threshold.
- Base this emissions intensity threshold on the financial impact of carbon costs.
- Set the threshold at between three per cent and five per cent of industry value-add (that is, EBITDA, plus labour costs) a measure that can be calculated using company data.
- Provide compensation to all businesses that meet the emissions intensity threshold.
- Accommodate growth in the EITE industries at world's best practice in emissions efficiency, as discussed below.

## ADDRESSING GROWTH IN EMISSIONS-INTENSIVE, TRADE-EXPOSED INDUSTRIES

An effective and efficient scheme must also address the potential growth in EITE industries. The government's preferred approach is to constrain this growth through a declining pool of available permits. This is a severe constraint. Demand for the products of EITE industries will continue to grow in line with growth in population and incomes. To the extent that this increased demand cannot be satisfied by domestic supply, it will be supplied from overseas sources – that is, Australia will experience demand-driven 'carbon leakage'.

The end result is that substantial industry growth will be lost. This is growth which Australia would have experienced in the presence of a global emissions price.

Australia can ensure growth in the EITE industries continues in the absence of a global response, in one of two ways:

- provide permits outside the national cap sufficient to allow growth in EITE industries; or
- set a modest emissions trajectory which maintains the competitiveness of the EITE industries and recognises growth will occur in these industries.

Australia could offset the issue of additional permits through the purchase of overseas permits. Alternatively, it could offset permits issued by making a direct bilateral agreement with another nation that a particular emissions-reducing project in that nation would be treated as offsetting Australia's emissions.

The approach outlined above and discussed in more detail in the attached PJPL report ensures EITE industries contribute to the effectiveness of the scheme, remain internationally competitive but still bear sufficient incremental costs to provide them with the incentive to reduce emissions.

The approach provides a smoother transition path and lowers the risk of business and facilities closure and offshore relocation, with its consequent loss of jobs and economic output.

## THE ELECTRICITY INVESTMENT TASK

PJPL also studied both the essential role the electricity sector must play in emissions reduction, and the impacts of the CPRS on that sector. The report highlights major challenges related to:

- the scale of the sector's required contribution to emissions reduction;
- the efforts that will be required to bring forward low-emission technologies;
- creating an environment where there is investor confidence; and
- the potential impacts of electricity asset impairment.

## SCALE OF EMISSIONS REDUCTION REQUIRED

Given its role in emissions generation the electricity sector will need to play its part in achieving any emissions reduction. There is, however, a physical limit to the maximum rate at which the electricity sector can reduce its emissions.  For example, achieving a 10 per cent reduction in emissions from 2000 levels by 2020 will be extremely challenging for the electricity sector. Such a reduction is, in effect, a reduction in emissions of 34 per cent from business-as-usual levels by 2020.

Modelling and estimates suggest this 10 per cent emission reduction will require a spend of $4 billion per year – a near-doubling of investment in new generation and transmission lines, compared with recent levels. (See page 32 of the PJPL report.)

For this reason, the government may need to consider a more moderate target than the 34 per cent reduction from business-as-usual levels.

## THE CHALLENGES OF BRINGING FORWARD LOW-EMISSIONS TECHNOLOGY

The PJPL report confirms that substantial investments will be required to transition Australia's electricity generation to low-emissions technologies.

The report also highlights that many low-emissions technologies are still under development and will not be available to any substantial degree until after 2020. Australia faces a major risk of electricity supply disruption if the emissions reduction required of the electricity sector is set too high.

Under the most credible scenarios for capacity growth:

- Gas use for electricity must approximately triple. This will require significant development of undeveloped and, as yet, undefined Bass Strait reserves.
- Installed wind generation capacity must rise approximately sixfold. New wind generation must be built at a rate of 600 megawatts per year.
- At least 1350 megawatts of geothermal energy must be built, although this technology has not yet been demonstrated on a commercial scale.
- More than 500 megawatts of biomass capacity must be built, although biomass generation has failed to grow in recent years.
- More than 1000 megawatts of concentrated solar or carbon capture and storage (CCS) facilities must be built, although neither technology is currently in production and CCS may not become viable by 2020.

The heavy reliance on gas and wind creates major risks to supply:

- Many of the gas fields we assume will contribute to the solution are yet to be fully developed.
- Many potential wind generation sites are yet to secure planning approval and are distant from the grid, creating supply and reliability risks.

## INVESTOR CONFIDENCE

Clearly, success in reducing emissions from electricity will require an environment where investors are confident that they can achieve reasonable returns for the substantial investment that is required.

If these requirements are to be met, Australia will need electricity price signals to be transmitted as clearly as possible. Measures required include:

- Removing all retail electricity price caps so retail electricity prices rise fully to reflect the increased cost of supply.
- Winding up the renewable energy target scheme and allowing the market to determine the most cost-effective sources of incremental supply.

If the investments and other measures outlined above are not successful, Australia risks having insufficient electricity supply to meet total demand – that is, there is a risk of brownouts and blackouts.

## ASSET IMPAIRMENT

It is highly likely that brown and black coal electricity generation facilities will have to be rapidly revalued and written down. Some of the potential impacts of this include:

- Reduced supply reliability as plants close ahead of schedule;
- Reduced plant reliability if plants with shortened asset lives are not maintained; and
- Increased price volatility as asset owners use the spot market rather than contracts.

All these factors in turn will impact on supply reliability. There is a severe risk of increased electricity supply interruptions.

## ADDRESSING THE ELECTRICITY CHALLENGES

Given the importance of the electricity sector and the necessary investment to transition to low-emissions electricity while maintaining supply, the BCA recommends that the emissions trajectory to 2020 is set with appropriate recognition of what can be delivered by the electricity sector. Compensation should be considered for coal generators given their asset values will be significantly impaired. Both wholesale and retail prices will need to rise to fully reflect the impact of the CPRS, and the renewable energy target should be wound up as the CPRS is implemented.

## SUMMARY
## AN OPPORTUNITY FOR GLOBAL LEADERSHIP

If global greenhouse gas emissions are to be reduced effectively over the long term, the world will need examples of how this can be done effectively and with minimal economic disruption. The stakes are high. Creating an ineffective or inefficient scheme is likely to bring a harsh cost. But the rewards of a successful scheme will go beyond a contribution to the global challenge of greenhouse reduction. Our success will have a multiplier effect among other countries whose own intentions will be shaped by our example.

The BCA and the government share more than a broad interest in Australia's national success. They also share a clear interest in an effective and efficient CPRS design.

Until the rest of the world puts a price on carbon emissions, achieving these goals will require Australia's scheme to address EITE enterprises. And it will require minimising the potential uncertainties in the reliable supply of electricity and the transition to low-emissions electricity generation.

The solution proffered in the government's Green Paper makes substantial progress towards the goal of an effective and efficient scheme. With the further adjustment outlined in this paper to address these goals, Australia can indeed have a CPRS that will be global best practice.

# Bringing specific company economic perspectives to bear on the ETS design

Report prepared for the **Business Council of Australia**
by Port Jackson Partners Limited

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Port Jackson Partners Limited (PJPL) is a specialist consulting firm which provides advice to CEOs, boards and senior managers to help them set corporate direction, define business strategies and develop their organisations.

Rod Sims, a Director of PJPL, led the development of this Report, including the formulation of its policy proposals. Edwin O'Young, a Principal of PJPL, led the work on the electricity sector. Grant Mitchell, a Senior Associate of PJPL, led the work on trade exposed, emissions intensive industries. Angela Lopes and Patricia Donovan, Business Analysts at PJPL, compiled much of the research and performed the analyses which underpin this Report. At times they were supported in this by Michelle Hone and Min Guo, who are also Business Analysts at PJPL.

**Acknowledgements**

This Report was made possible by the co-operation of case study companies, both in trade exposed, emissions intensive industries, and in the electricity generation sector. Discussions with these companies assisted us to identify the issues of most importance. In addition, much of the key analyses in this Report is based on data these companies agreed to share with us.

This Report has also greatly benefited from discussions with BCA members and the BCA Secretariat. In particular, we wish to acknowledge the contribution of the BCA Sustainable Growth Task Force, led by its Chairman Rod Pearse.

## CHAPTER 3

## CHAPTER 4

## CHAPTER 5

# OVERVIEW

# OVERVIEW

- This study is the first to use case study data from prominent Australian businesses to test the effects of particular ETS designs
  - Evidence of these effects on specific businesses has, to date, been missing from the debate
  - The case study data sheds most light on the effects of the ETS on trade exposed emission intensive (TEEI) industries and on the electricity sector

**Trade Exposed Emission Intensive industries**

- An ETS will have a profound effect on TEEI industries if no compensation is paid. Across 14 businesses, and using long run commodity prices and the European carbon price of $40/t $CO_2$-e:
  - The median profit reduction is 53%
  - Seven businesses see their returns drop below acceptable levels; five see already poor returns become considerably worse
  - Four businesses became cash flow negative, and another three see their cash flows fall by 40 – 70%
- This will result in considerable ‘carbon leakage’
  - Some TEEI businesses will close, others will wind back; there will be a large reduction in new investment that would otherwise have occurred, and which would have occurred with a world carbon price
  - Australia will lower its emissions in large part by exporting them to other countries i.e. there will be no price signal to use less cement or steel (as under a world scheme); we will simply import our growing needs rather than meet them locally
  - Australian TEEI businesses will be poorly placed to adapt to a low carbon world; indeed, they will receive a signal that they are not wanted in Australia
- Australia will suffer considerable economic pain for no global environmental gain
  - Australia’s economic comparative advantage is to a considerable extent in commodity based emissions intensive industries; shifting them offshore will lower Australia’s (and the world’s) economic welfare
  - Australia’s TEEI industries drive at most 0.6% of world emissions, yet they are often less emissions intensive than their overseas competitors; damaging Australia’s TEEI industries will not help address global warming and will likely make it worse
- The Government’s Green Paper compensation scheme is inadequate and contains significant anomalies

  - Businesses in industries with average margins and emission intensities of 1,000 – 2,000t per $1m revenue generally will face significant profit declines
  - Businesses in low margin industries with emissions over ~500t per $1m revenue will also face significant profit declines
  - Businesses with emissions of 1,490t per $1m revenue receive no compensation while businesses with intensities of 1,500t per $1m revenue receive 900t of free permits per $1m of revenue; the former will seek to boost their emissions, the latter will not reduce theirs

- Even more important, the Government's Green paper approach will strongly limit future TEEI investment
  - By limiting overall TEEI compensation to 30% of permit revenues the level of compensation available to a business will decline over time from its original level
  - Under reasonable assumptions, and with no world emissions reduction scheme, some businesses might anticipate compensation declining to such an extent that it has little material value by 2020
  - Overall compensation will be phased out according to uncertain criteria
  - When considering new investment at world's best emission practice, therefore, TEEI industry boards will need to make conservative assumptions that will often reduce the returns on otherwise attractive investments to unattractive levels

- The proposals in this paper call for:
  - Full compensation, but only for emissions above a threshold of emission costs of 3 – 5% of value add (profits plus labour); this still sees businesses take a significant profit 'hit' consistent with the welfare loss the entire community will suffer with the introduction of an ETS
  - Using long term commodity prices when making this compensation calculation that will apply for many years
  - Having an emissions trajectory that can accommodate investment in new TEEI facilities (companies will still have to assess how their investments will perform when there is a world carbon price)

**The electricity sector**

- An overall abatement target of 10% emission reduction on 2000 levels by 2020 will provide significant challenges for the electricity sector if it is to meet its share of such a reduction
  - This requires a reduction in emissions of 34% from business as usual levels by 2020 from the electricity sector
  - It requires a near doubling of spend over past levels on new generation and transmission lines, or a spend of $4 billion per annum

  - It places a heavy reliance on new gas-fired generation as gas use for electricity must rise from 139PJ today to 375 – 466PJ; this requires significant new gas field development
  - It also places a heavy reliance on wind generation which must increase from the current 1,000 MW to around 6,000 MW by 2020, which is close to the calculated limit of available wind generation in Australia
  - While post, say, 2020 new technology will allow higher levels of abatement from electricity, new technology will likely only play a modest role up until then

- This 10% emission reduction will see significant impairment of coal-fired generation asset values
  - The only way to achieve this 34% abatement below business-as-usual levels is to reduce significantly the use of coal fired generation, which currently relies on running reasonably constantly
  - Impairment will occur as those generators with a lower carbon intensity will set the price at times when reasonable gross margins can be earned, and so the price received by coal-fired generators will not increase sufficiently to cover their carbon costs

- Retail electricity prices should be allowed to rise fully to reflect the impact of an ETS
  - In particular, governments will need to remove the current price caps on electricity sold to households, or make quick adjustments to accommodate the higher wholesale prices
  - A large margin squeeze for electricity retailers, much like occurred in California, will occur otherwise

- The Renewable Energy Target (RET) Scheme should cease with the introduction of an effective ETS
  - The RET distorts how abatement is achieved so it cannot be at lowest cost

**Other issues**

- A range of other issues have arisen from this work
  - Attention needs to be given to the auction system and derivative markets to minimise the working capital burden placed on businesses
  - Petrol should be effectively in the ETS, so that the carbon price impacts are not offset by excise adjustments
  - Some assistance should be given to smaller businesses affected by the ETS
  - The treatment of mining within the NGERS Act needs to be addressed

**Looking forward**

- There seem only two options that are workable for Australia's ETS
- The first option is to set a modest abatement target until the necessary global agreements are in place (and only these global agreements will address the greenhouse problem)
  - A stronger emission reduction trajectory will see Australia meet this higher target largely by exporting our emissions from TEEI industries for no world environmental gain
  - This is because once emission prices begin to exceed, say, \$20/t $CO_2$-e, the 'permit arithmetic' does not work. That is, there is insufficient permit revenue to support low emissions technology, assist low income households and provide sufficient compensation to prevent the export of Australian emissions associated with businesses that would have remained in Australia with a world carbon price
- This first option is workable. There are, however, two potential issues with it
  - Australia may receive a negative international reaction to the modest initial target, and to allowing TEEI investment outside the cap (this could occur despite our willingness to adhere to a more aggressive target as part of a global agreement)
  - With a modest target scheduled to move to a more aggressive target with a global scheme the banking of permits may be difficult, and the scheme could see volatile emission prices sending mixed abatement signals
- The second option takes a different approach. This option would see Australia fix the carbon price in Australia at, say, \$10 – 20/t $CO_2$-e until there is an effective global agreement. This option:
  - Would see Australia with only one target, the one that would apply when there is an effective global agreement; Australia would undertake to meet this target by buying permits internationally as allowed under a global agreement
  - Avoids the issue of TEEI investment needing to be outside the cap until there is a world scheme
  - Addresses the issue of potentially volatile emission prices
- This option essentially resembles an emissions tax. When effective global agreements are in place, however, the infrastructure that is in place will allow a swift move to full emissions trading
- Both of the options provide a sensible way forward. The preferred option should be that which allows Australia to make the most effective contribution towards achieving global emissions abatement

# CHAPTER 1

## INTRODUCTION, EXECUTIVE SUMMARY AND POSSIBLE WAYS FORWARD

# 1. INTRODUCTION, EXECUTIVE SUMMARY AND POSSIBLE WAYS FORWARD

This work takes as its starting point that the world must reduce its greenhouse gas emissions significantly and quickly. In his recent draft report Ross Garnaut has weighed the range of opinion on the greenhouse science and concluded that the wisest course is to act on the basis that the majority of climate scientists are right.[1]

The overall finding of the Garnaut Report is that, without action, Australia's GDP will be around 5% lower by 2100 than it otherwise would have been. More relevant, however, are the specific affects predicted for our coastal areas, water supplies and a range of other specific assets.

The point stressed by both the Garnaut Report and the Commonwealth Government's recent Green Paper, however, is that "Climate Change is a global problem requiring a global solution".[2] That is, Australia acting alone cannot address the challenge of global warming: Australia's main role will be in encouraging others to act.

With the above in mind both the previous and the current Commonwealth Government decided to introduce an emissions trading scheme (ETS). The current Government intends to introduce this scheme by 2010.

It follows from the above that Australia is introducing an ETS to achieve two objectives:

- To facilitate a global agreement on emissions reduction by indicating Australia's willingness to play its appropriate role in a world response, and so to influence others to do the same
- To begin to send the signals that will encourage Australian businesses and households to change their behaviour to suit a low emission world

From these objectives it can be seen that Australia's ETS must be, and be seen to be, successful. Only a successful scheme will influence others to follow, and only a successful scheme will have the acceptance in Australia to influence behaviour.

There are many possible characteristics of a successful ETS. Five critical characteristics are highlighted below:

- It must help Australia achieve appropriate emissions reduction from business-as-usual levels
- The scheme's effects on low income households should be neutralised as much as possible

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[1] Garnaut Climate Change Review, 'Draft Report', June 2008, page 1

[2] Dept of Climate Change, 'Carbon Pollution Reduction Scheme Green Paper', July 2008, page v

- It should avoid 'carbon leakage'; that is, it should not achieve emissions targets in Australia by simply exporting emissions for no or little overall world abatement
- It should facilitate an industry composition similar to the one that would apply with a world carbon price
- It should avoid significant adverse events such as interruptions to Australia's electricity supply.

With all the above in mind the Business Council of Australia approached Port Jackson Partners Limited (PJPL) to discuss how best to contribute to a successful ETS for Australia. It was agreed that the most appropriate step was to analyse the effects of particular ETS design parameters on the economic performance of a number of specific Australian companies. This practical discussion of the implications of an ETS on specific industries and companies has, to date, been missing from the debate. This analysis can make a unique contribution to the introduction of a successful ETS in Australia.

PJPL has worked closely with many prominent Australian businesses covering metals processing (alumina, aluminium, lead, zinc, nickel), manufacturing (cement, steel, paper, glass), electricity generation, oil refining, coal mining and sugar milling. These companies cover most sectors that would be considered emissions intensive, and they alone account for nearly 6% of Australia's emissions. In addition to considering their emissions intensity, PJPL examined their commercial performance in some detail and also examined the commercial outcomes from particular investments under evaluation or recently completed.

A range of other activity has also been undertaken. In particular, the two most respected models of Australia's electricity sector have been examined. This has been crucial to understanding how an ETS will affect this complex sector.

Four recent Government sponsored reports into an ETS have also been examined, including:

1. the report presented to the previous Government by the Prime Minister's Task Group[3];
2. the more detailed work undertaken by State Governments[4];
3. Ross Garnaut's draft report, mentioned above; and
4. the recent Government Green Paper.

The BCA and PJPL have been important contributors to the Australian debate on an appropriate response to the greenhouse challenge.[5]

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[3] Prime Ministerial Task Group on Emissions Trading, 'Report of the Task Group on Emissions Trading', May 2007

[4] Principally the National Emissions Trading Taskforce, 'Possible design for a national greenhouse gas emissions trading scheme', December 2007

Finally, the existing European ETS has been examined to understand its lessons, including how and how not to compensate electricity generators and other industries. It is clear that the ambitions for an Australian ETS in 2010 are more akin to the ambitions of the European ETS in 2020, not as it is currently. That is, the Europeans have opted for a more 'careful' start than Australia currently appears to be aiming for. This approach has allowed 'mistakes' to be made and corrected, and impacts on industry to be successfully managed, while allowing carbon price signals to begin to shape the EU economy.

From all of the above analysis this study has developed some significant proposals that should help shape Australia's ETS. In broad terms the proposals cover the following.

First, the trade exposed, emissions intensive (TEEI) industry compensation method suggested in the Green Paper creates anomalies and is inadequate to address carbon leakage and investment certainty. Given the analysis undertaken for this study a new approach is required. Ten proposals are put forward to make the TEEI compensation scheme effective.

Second, a 10% emissions reduction target on 2000 levels by 2020 is very challenging for the electricity sector, given the physical limits to installing new low-emission and renewable generation plants. It will also have significant effects on the asset values of the coal-fired generators.

Third, there are a number of other important issues to address to make the ETS as practical and effective as possible.

Finally, these findings, when taken together, suggest there are only two options for Australia to introduce an effective ETS and so make a material contribution to achieving global emissions abatement.

Each of these broad findings will now be developed further here and explained in detail in subsequent chapters.

## 1.1 Designing an effective compensation scheme for trade exposed, emissions intensive (TEEI) industries requires a new approach

The treatment of TEEI industries is the most significant issue for Australia's competitiveness and for the bulk of Australian industry. This issue dominated discussions held with a wide cross section of Australian producers of goods.

There is considerable ill informed comment on this issue. Newspapers contain many statements, some from experienced commentators, to the effect that providing compensation to TEEI industries is a "political" compromise that goes against the objectives of an Australian ETS. This is clearly not the case.

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[5] See, for example, Port Jackson Partners Limited, 'Establishing credible targets for greenhouse gas reduction', May 2007

Providing TEEI compensation is the logical thing to do when a country introduces an ETS prior to its competitors. Indeed, not to do so compromises the environmental objectives of the scheme as countries largely meet their emission targets by exporting their emissions to other countries.

This Report's findings on this important issue can be summarised as follows.

- Australia's ETS should include compensation for TEEI industries until there is a global emissions reduction agreement
  - Australia has a high proportion of trade exposed industries, and their competitors are overwhelmingly located in countries without an ETS
  - Moving the production of those industries offshore would not assist global emissions reduction
- Australian TEEI industries should receive ~90% compensation by providing full compensation for emissions above an appropriate threshold
  - A threshold of between 3% and 5% of industry value add is recommended
  - A threshold expressed in terms of tonnes of emission intensity per $1m of revenue (as used in the Green Paper) is biased against lower margin industries, and is inappropriate at higher carbon prices
- A range of other design features are important
  - For example, using long run prices to calculate revenue, to provide fairness and investment certainty
- While the above is in agreement with the Green Paper in some respects, there are important differences
  - There are at least five significant problems with the compensation regime proposed in the Green Paper.

Each of these points is addressed in turn below.

### *1.1.1 Australia's ETS should include compensation for TEEI industries*

The logic underlying this perspective is based on the following facts:

- Australia's traded goods sector overwhelmingly competes with countries without an ETS
  - For example, over 80% of Australia's exports go to countries without an ETS, compared to 40% for, say, the UK
  - And around 75% of our imports come from countries without an ETS compared to 40% for the UK

- 60% of Australia's exports are commodity based or other manufacturing, which is significantly higher than virtually all other developed countries
  - These industries are often emission intensive
- Placing Australia's traded goods sector at risk will bring no environmental gain. Australian industry is, in general and at minimum, no more emissions intensive than alternative locations for production without an ETS

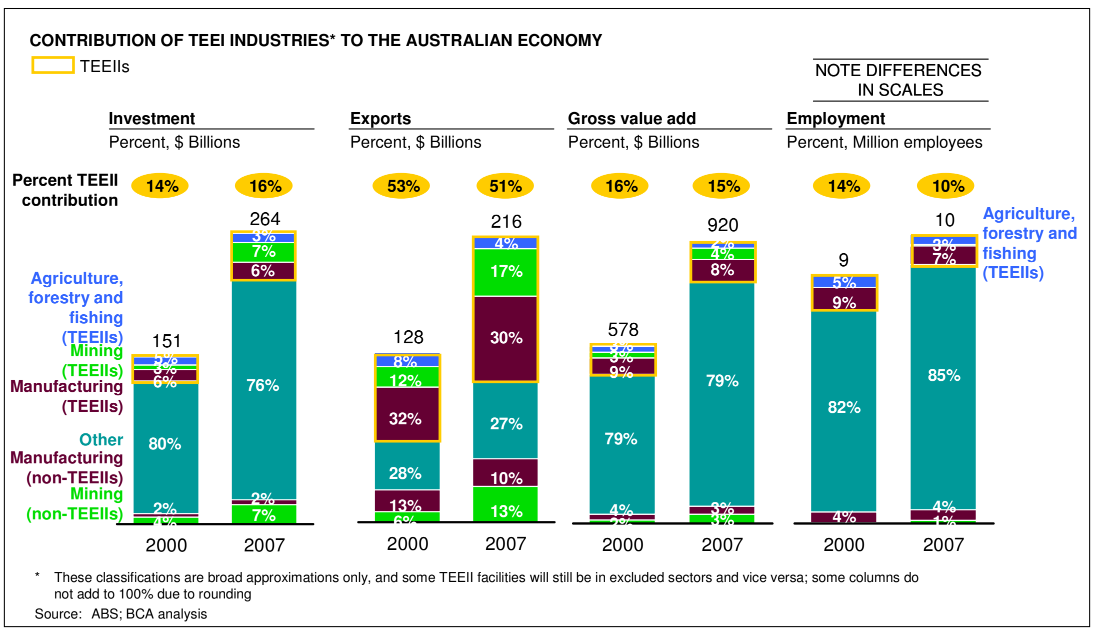
An example makes this logic clear. If Australia makes its cement production uncompetitive, so that we import our cement versus produce over 80% of it in Australia as we do now, Australia's emissions will reduce but the world's emissions will not (indeed, they will rise as Australian cement producers are less emissions intensive). If Australia's cement producers face a carbon cost they must pass it on, so Australia will import its cement from Asia where there is no carbon cost. Australians will not use less cement; they will use imported cement.

This point also applies to meeting Australia's growth in cement demand. If investment in new cement facilities in Australia is discouraged then imported cement from countries without an ETS will meet the country's increasing demand.

Some may point to Europe to say that imports of such products did not occur in Europe. This is because, in general, the European ETS provided many free permits to such producers.

It is also important to highlight that TEEI industries are important to Australia. This can be seen from Exhibit 1.1.

Exhibit 1.1




In 2007 TEEI industries provided around 16% of Australia's investment and over 50% of its exports. They also provided 10% of employment. Australia must take great care when it imposes significant costs on such industries when none apply to the vast majority of their overseas competitors.

### *1.1.2 Australian TEEI industries should receive ~90% compensation by providing full compensation for emissions above an appropriate threshold*

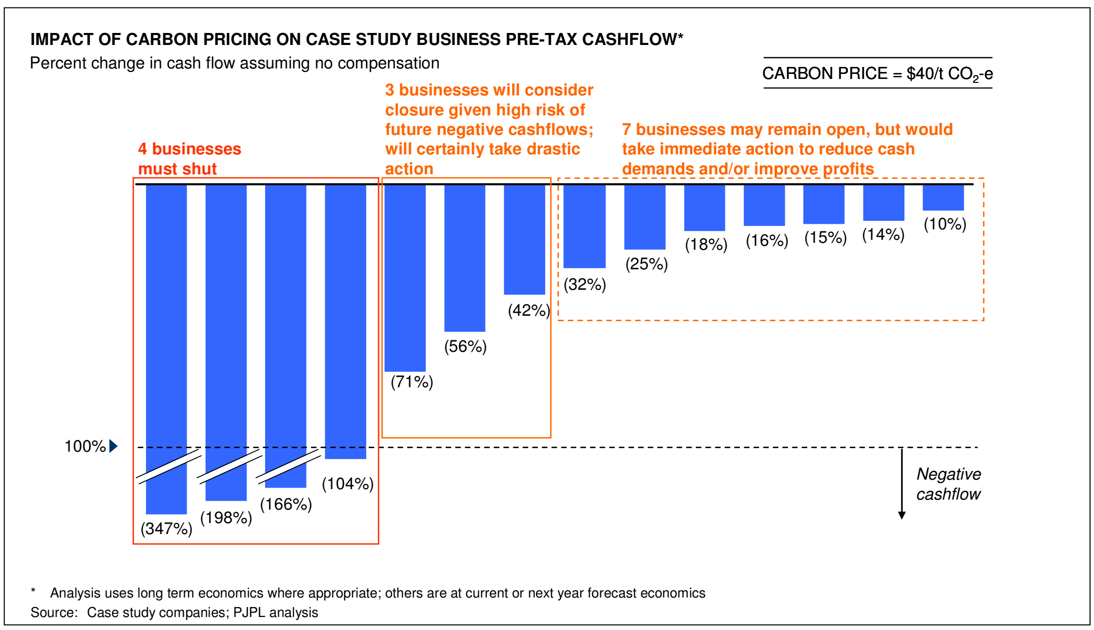
It is straightforward to show that the companies that participated in the case study analysis are trade exposed, and in virtually all cases unable to pass on additional carbon costs. Many are exporters, and many others have the prices they charge their customers set by the price of imported products.

Given access to the economic information made available by the case study businesses, the effects of a lack of compensation on TEEI industries can be estimated. It is acknowledged that policy makers have not previously had the benefit of this type of analysis based on real company data.

- Without compensation, and using the European emissions price of \$40/t $CO_2$-e, the median profit[6] reduction for the 14 case study businesses using long run economics where appropriate is 53%
- Without compensation, seven of the businesses see their returns drop below acceptable levels of ~15% return on assets, while five businesses see already low returns become considerably worse, again based on long run economics where appropriate
- Without compensation cash flows often fall to unsustainable levels

The analysis is described in detail in Chapter 3 of this report. Exhibit 1.2, however, explains the results of the cash flow analysis.

Exhibit 1.2

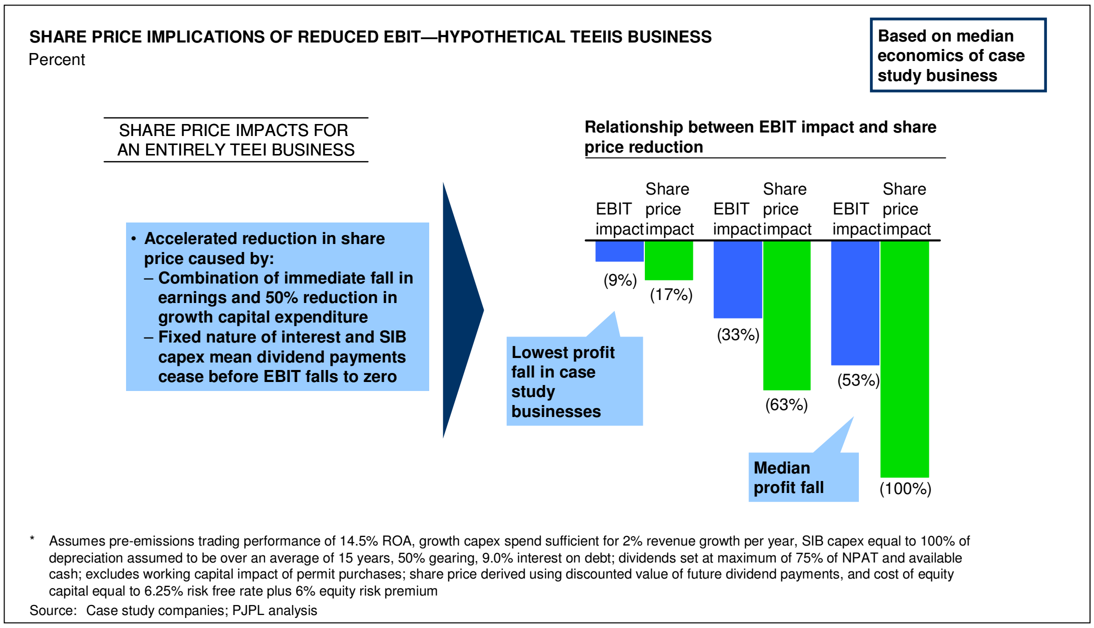



[6] As measured by earnings before interest and tax (EBIT)

It can be seen that without compensation four of the case study businesses would need to shut immediately at a carbon price of \$40/t $CO_2$-e; they are cash flow negative, and significantly so. Another three lose between 40 – 70% of their cash flow, and an additional seven lose between 10 – 32% of their cash flow. Note that the extent of the cash flow losses depends on the carbon price used. The assumption of \$40/t $CO_2$-e reflects the average price of EU ETS 2008 carbon permits over the past twelve months. It is also consistent with a number of other price forecasts.

The case study businesses can be used to create a typical or median case set of economics around which the effects of a fall in profits on a business' share price can be shown. The results of the analysis are shown in Exhibit 1.3, and explained in more detail in Chapter 3.

Exhibit 1.3




The effects on shareholder value from a lack of TEEI compensation are extremely significant. Even the smallest fall in profits from the case study businesses would cause a share price fall of 17% due to the reduction in both earnings from the current business as well as earnings growth as capital expenditure is reduced, and given the need to meet fixed commitments such as interest and stay-in-business capital.

Companies will, of course, react strongly to such impacts.

- Businesses facing reduced earnings and a loss in shareholder value will take measures to recover at least some of what has been lost. They will seek to reduce costs to recover the reduction in returns. These actions could include staff reductions, pressure on their suppliers and also steps to reduce their emissions.

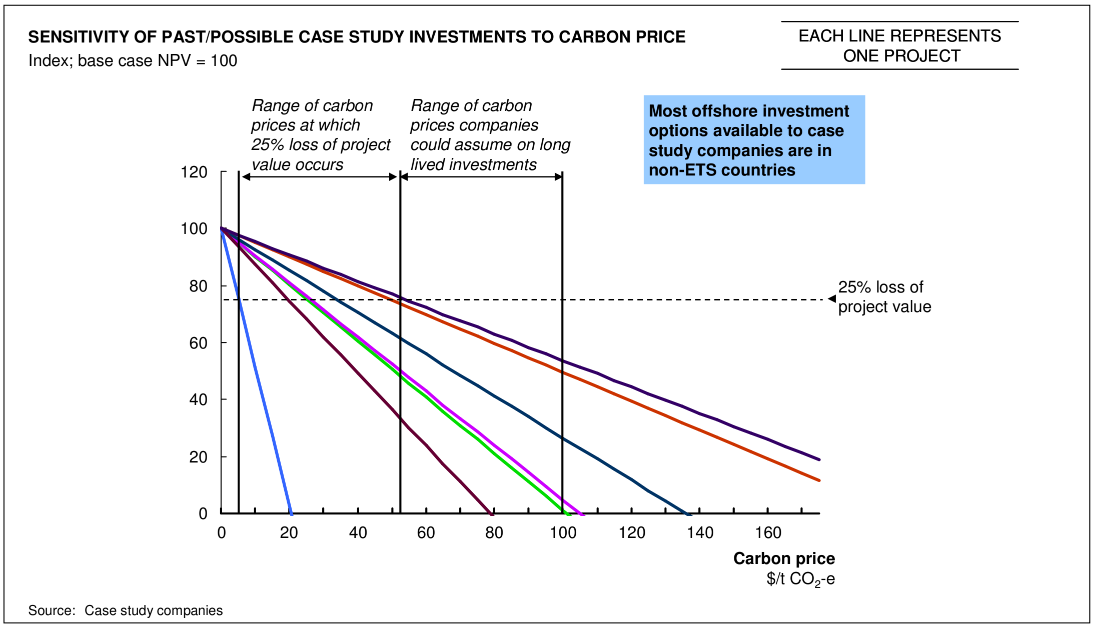
- Those who see their returns fall below acceptable levels will need, in addition, to question the attractiveness of the industry they are in. At a minimum, capital expenditure will be diverted from this now underperforming business.

- Other businesses will, of course, need to close as cash flow is seriously squeezed or, indeed, negative.

Experience across a range of industries suggests that, in general, when profits are permanently reduced by more than, say, 10%, companies will behave in ways that could inappropriately change the shape of Australia's industry structure. This is a subjective judgement based on commercial experience.

In addition to the effect on existing businesses, with no compensation domestic investment will be very difficult to justify. This is shown in Exhibit 1.4.

Exhibit 1.4




At carbon prices of just over \$50/t $CO_2$-e all past or contemplated projects from the case studies lose 25% of their value. All lose 50% of their value at a carbon price of \$100/t $CO_2$-e, a price which will be factored into any assessment of long lived investments.

These circumstances would result in the objectives for the ETS, described earlier, not being met. The business actions described above would almost certainly result in substantial 'carbon leakage'. Many Australian businesses that could survive under a global carbon price would close prematurely, and significant investment would be lost. The broader economic impacts would be profound.

*Paying full compensation, but only for emissions above an appropriate threshold.*

Clearly, if no compensation is paid to TEEI industries the effects will be considerable. Those who have dismissed the need for compensation for TEEI industries have not, of course, had access to particular company economics, as shown above.

Having demonstrated the need for compensation, the question remains at what level. This report's proposals, and the rationale for them, are summarised in Exhibit 1.5.

Exhibit 1.5

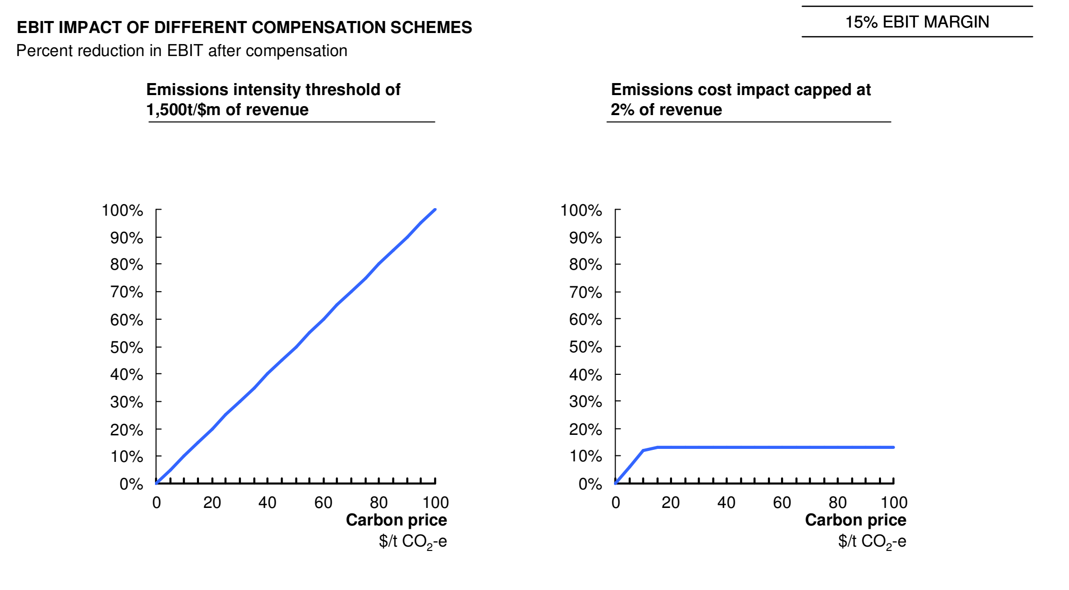
**PROPOSALS FOR COMPENSATION FOR IMPACTS ON TEEI BUSINESSES**

| Proposal | Rationale |
|---|---|
| **1. Provide full compensation but only for emissions above a threshold** | • Avoids providing an incentive to increase emissions to make the threshold<br>• Fair to businesses just under the threshold |
| **2. Use a threshold based on the financial impact of carbon costs** | • Avoids large carbon price risk being placed on TEEI businesses<br>– Prior to international agreements, Government can best manage prices |
| **3. Set a threshold of between 3 and 5% of industry value add** | • Limits EBIT impacts while creating an appropriate abatement incentive<br>• Avoids unfairly punishing highly profitable but low margin industries |
| **4. Compensate all businesses which face material impacts** | • Set compensation based on risk to TEEI industries, not within the artificial 30% limit<br>• At modest carbon prices, however, the compensation proposed here is consistent with proposed limits on TEEIIs compensation |
| **5. Issue permits to new TEEI facilities outside the emissions cap, assuming "world's best" emissions** | • The alternative is to stop investment or place unreasonable demands on other sectors<br>• Maximises chances of investment consistent with a global carbon price |

Providing compensation only for emissions above a particular threshold will avoid 'gaming' and is fairer. That is, it avoids a company at 1,400t $CO_2$-e/$m revenue getting no compensation but a company with 1,500t $CO_2$-e/$m revenue receiving 60% compensation, as under the Green Paper proposals. It also avoids creating an incentive for the first company to increase their emissions in order to change their eligibility for compensation, or the second company not to reduce them.

Using a threshold based on the financial impact of carbon costs, not on tonnes of emissions intensity, is also fairer. At low carbon prices businesses may be sufficiently protected, but this will not apply as carbon prices increase. This is illustrated in Exhibit 1.6.

Exhibit 1.6




Source: Case study companies; PJPL analysis

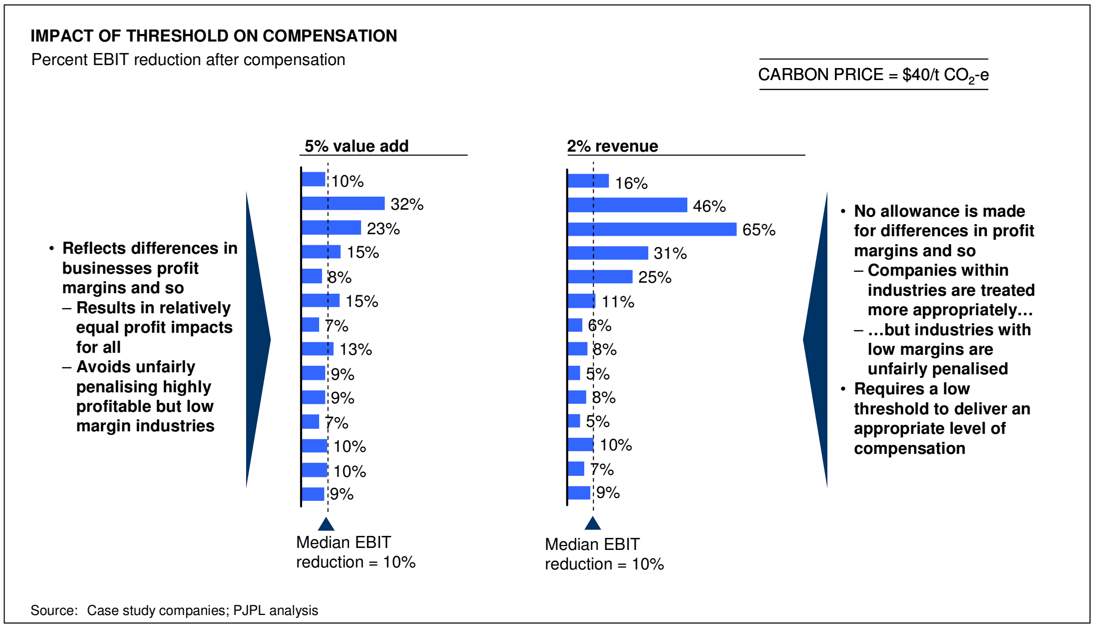
Capping the cost at 2% of revenue caps the percentage impact on profits at around 10%. Using an emissions intensity threshold sees the percentage profit reduction increase dramatically at higher carbon prices, for example at the Green Paper threshold of 1,500t $CO_2$-e for each $1 million of revenue.

This is a key point. Who should bear the impact of high carbon prices when Australia is imposing a price on carbon ahead of its main competitors? The Australian Government is, of course, in control of how fast Australia will seek to reduce emissions prior to a world approach, which will be the key determinant of carbon prices.

This is also an important point for investment certainty. At high carbon prices (say, $50 – $100/t $CO_2$-e) medium intensity companies see their profits fall by 50-100%. When making investments, or indeed when planning the future of their businesses, companies will assume carbon prices at these levels are possible.

The third proposal is to use a threshold of between 3% and 5% of industry value add before full compensation is paid. The comparison with a revenue-based threshold is shown in Exhibit 1.7.

Exhibit 1.7




The problem with a revenue-based threshold is its affect on low or modest margin industries. There are many attractive industries that are structured around modest margins (say, 10 – 15%). A threshold of emission costs equalling 2% of revenue, for example, would see a 10% margin business lose 20% of its profits.

Using value add is more appropriate. It is the sum of profits and employment costs and represents the value a firm adds to the inputs it buys from other firms.

Compensation for TEEI businesses should be high, but not complete. This ensures that the TEEI industries share in the reduction in overall welfare associated with the introduction of the ETS, and that TEEI businesses feel a clear profit signal to begin abatement.

It is important to observe that evidence from the case study businesses suggests that in many cases a compensation threshold higher than 5% of value add would result in profit impacts large enough to defeat the purpose of compensation.

All businesses which face material impacts should be compensated, without an artificial limit on the overall level of compensation. The Green Paper, for example, proposes to cap total TEEI industry compensation at 30% of permit revenue which may sometimes be appropriate (for example, at $20/t $CO_2$-e) and sometimes not. Note, however, that at the carbon prices assumed in the Green Paper, the thresholds proposed in this paper should likely keep the cost below 30% of total scheme revenue, including agriculture. The cost would exceed 30% of total scheme revenue, however, at a carbon price of $40/t $CO_2$-e.

It is also worth explaining the proposal to exclude new TEEI industry investments from the emissions cap (proposal 5), which is fundamental. This can be done by way of an example. If it is assumed that TEEI industries were to grow 3½% per annum then non TEEI sectors will need to abate around 150% more than they otherwise would.

### *1.1.3 A range of other design features are important*

To get the ETS design right there are a range of other design features which are important. These are summarised in Exhibit 1.8 and listed as proposals 6-10.

Exhibit 1.8

**OTHER PROPOSALS FOR ETS DESIGN**

| Proposal | Rationale |
|---|---|
| **6. Determine TEEI facility eligibility and compensation over long time intervals (e.g. every 5 years)** | • To provide a continuing incentive for firms to abate |
| **7. Calculate eligibility based on long run economics** | • Essential for fairness<br>• Also fair to businesses who may receive less compensation when prices are volatile |
| **8. Compensate for Scope 1 and 2 emissions** | • Given the potential impacts of Scope 2 emissions, there is no logic to compensating for only Scope 1 |
| **9. Compensate using a combination of permits and cash** | • Scope 1 emissions will cost permits, Scope 2 will cost cash<br>• It is appropriate to match the type of cost with the type of compensation – for example, to eliminate mispricing risk |
| **10. Continue compensation until key competitors all face a like carbon cost** | • Consider allowing significant new TEEIs investments, with world's best emissions practice, to sign a contract with Government – Creates a legally enforceable 'property right' to provide sufficient certainty over policy changes, which would cease with a world scheme |

Many of the above points are obvious from the rationale given in the Exhibit. All proposals are fully explained in Chapter 3.

The logic of the proposal to calculate eligibility at long run economics (proposal 7) may require more explanation. It revolves around fairness and certainty. The main point is that, with single point in time assessments of compensation eligibility, as suggested in the Green Paper, it would be unfair if the assessment occurred at the higher point of the commodity price cycle.

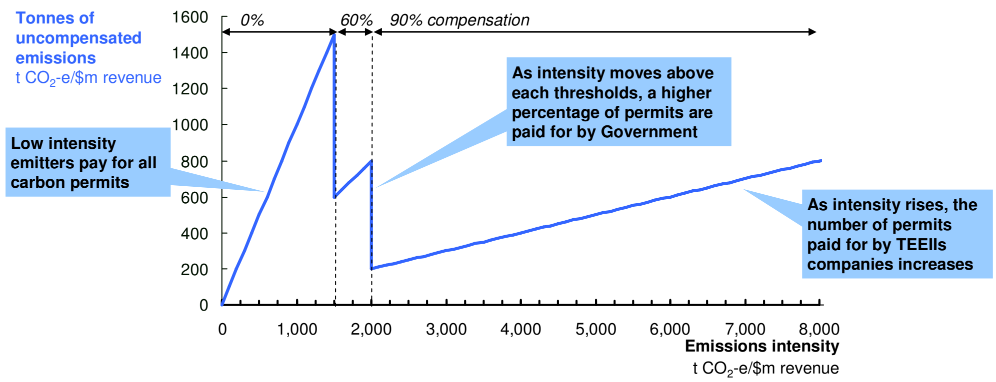
### *1.1.4 There are at least five significant problems with the compensation regime proposed in the Green Paper*

There are five significant problems worth highlighting with the Green Paper proposals. These arise because the Green Paper only picks up essentially one of the 10 proposals (number 8 – to compensate for both Scope 1 and Scope 2 emissions).

The first problem is that the Green Paper scheme involves discontinuities, which cause serious anomalies. This is explained in Exhibit 1.9.

Exhibit 1.9

TEEIIS COMPENSATION SCHEME ENVISAGED IN THE GREEN PAPER



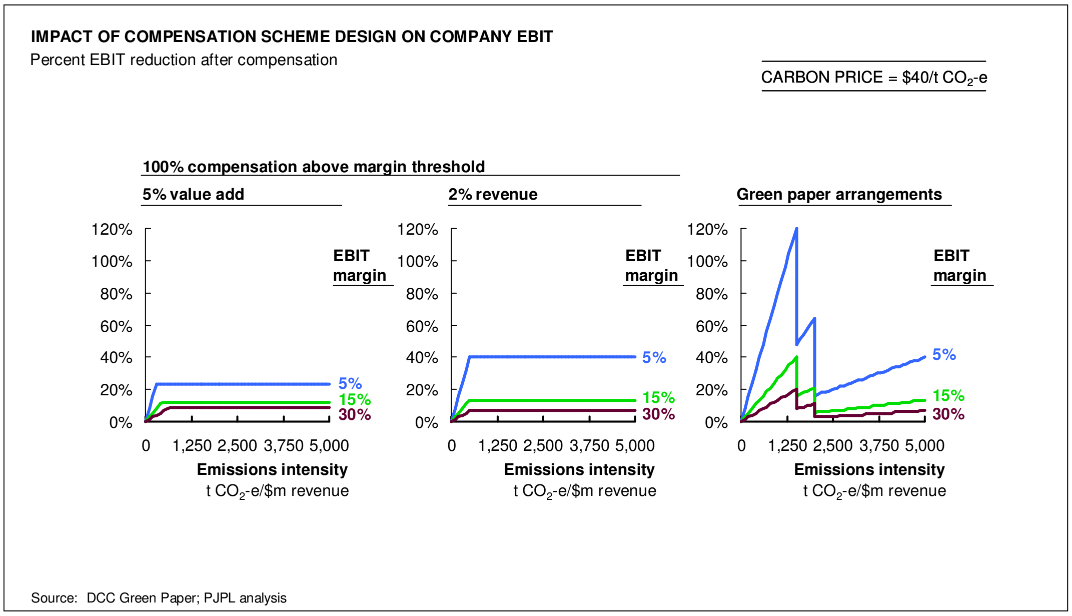

* Excludes sectors with emissions intensity less than 300t $CO_2$-e/$m revenue
Source: DCC Green Paper, Section 9.4.3; PJPL analysis

The discontinuities mean, for example, that a firm with 1,400t $CO_2$-e emissions for each million dollars of revenue receives no compensation, while a firm with 1,500t $CO_2$-e/$m of revenue receives permits to emit 900t for every million dollars of revenue. A firm with emissions of 2,000t $CO_2$-e /$m revenue receives 1,800t of free permits for every million dollars of revenue, while a firm with emissions of 1,900t $CO_2$-e/$m of revenue receives only 1,140t.

The Government Green Paper creates these discontinuities because it is using a threshold based on tonnes of emission intensity, not one based on the percentage financial impact as advocated in this paper. As shown in Exhibit 1.6, a tonnage based emission intensity threshold reduces profits by too large an amount at high carbon prices. The Green Paper is therefore forced to compensate for a proportion of all emissions once a company meets the threshold, not just those above the threshold. The Green Paper's use of a threshold based on tonnes of emission intensity is, quite simply, the wrong starting point.

The second problem is the inadequate compensation provided to many businesses under the Green Paper proposals. This is shown in Exhibit 1.10, which summarises possibly the key analysis in this paper.

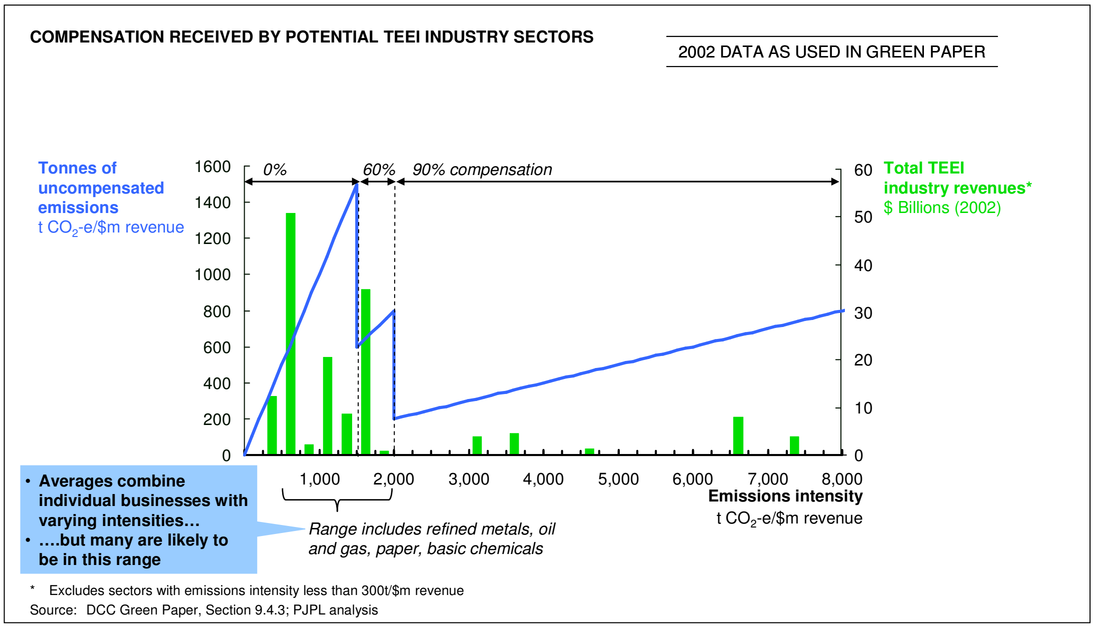
Exhibit 1.10




Australian TEEI companies, with emissions intensities of 500 – 2,000t $CO_2$-e/\$m revenue and margins of around 15%, see their profits significantly affected at, say, a permit price of \$40/t $CO_2$-e. Profits decline by between 20 – 40% for such firms. Businesses in industries with low margins see profit impacts of well over 50%, in some cases over 100%. This is inappropriate and counter productive.

The available data suggest many Australian businesses will find themselves receiving inadequate compensation. This is shown in Exhibit 1.11, which uses data presented in the Green Paper to show the relative size and emissions intensities of Australian industries. The data is compared with the Green Paper compensation arrangements presented in Exhibit 1.9.

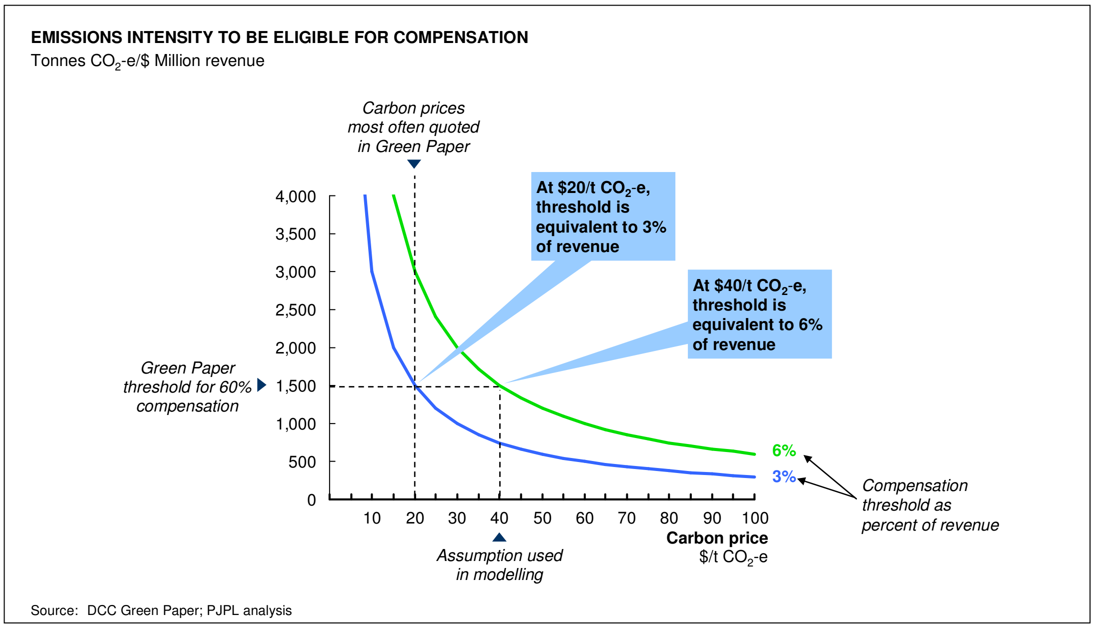
Exhibit 1.11



This data suggests many businesses will receive very little compensation. Though the industry averages shown combine businesses of varying intensities, many businesses will be in the region less than 2,000t $CO_2$-e/$m revenue, and so will receive inadequate or no compensation.

The third problem is that TEEI industries are taking on an unacceptable carbon price risk. This is shown in Exhibit 1.12.

Exhibit 1.12




The Exhibit shows that at the Green Paper's assumed carbon price of $20/t $CO_2$-e, a 1,500 tonne threshold amounts to 3% of revenue. At a price of $40/t $CO_2$-e, however, to provide compensation to firms who are losing 3% of revenue requires a threshold of around 750t $CO_2$-e/$m revenue. Alternatively, retaining the same 1,500 tonne threshold implies that compensation will be paid only to firms who lose 6% of revenue. At $40/t $CO_2$-e the Green Paper thresholds are clearly inadequate. This carbon price risk sits with TEEI industries under the Green Paper proposals.

The fourth problem is that the Green Paper proposes to make "once and for all" assessments for eligibility on the basis of current (2006 to 2008) economics. This risks unfairly denying compensation to TEEI businesses currently experiencing unusually high prices. Many commodity businesses are in this category. Assessments with long term impacts must be based on long term industry economics.

The fifth, and possibly the most critical problem, is that the Green Paper creates too much uncertainty for TEEI industries, both for their current businesses and for future investment. This is explained in Exhibit 1.13.

Exhibit 1.13

**CAUSES OF UNCERTAINTY IMPLICIT IN THE GREEN PAPER COMPENSATION SCHEME DESIGN**

| Green paper position | Problems | Practical implications for business decision makers |
|---|---|---|
| • **Rates of TEEI industry compensation will be adjusted to target a fixed 30% of permit revenue** | • Actual levels of compensation paid to a TEEI business will be related to many factors, such as:<br>– emissions cap size<br>– rate of TEEI industry growth<br>– emissions abatement achieved by TEEI businesses | • Estimating the future economics of new or existing businesses will be made difficult<br>• Reasonable assumptions will see TEEI business' earnings decline dramatically by 2020 |
| • **TEEI industry compensation will be phased out according to broad criteria** | • Suggested criteria are too broad to be useful…<br>• … especially after 2020, where compensation could end under a range of scenarios | • It will be difficult to determine in advance the timing and economic impacts of reductions in compensation<br>• As there will be no recourse if policies change, Boards must make very conservative assumptions when considering investment |

These arrangements create uncertainty in two ways.

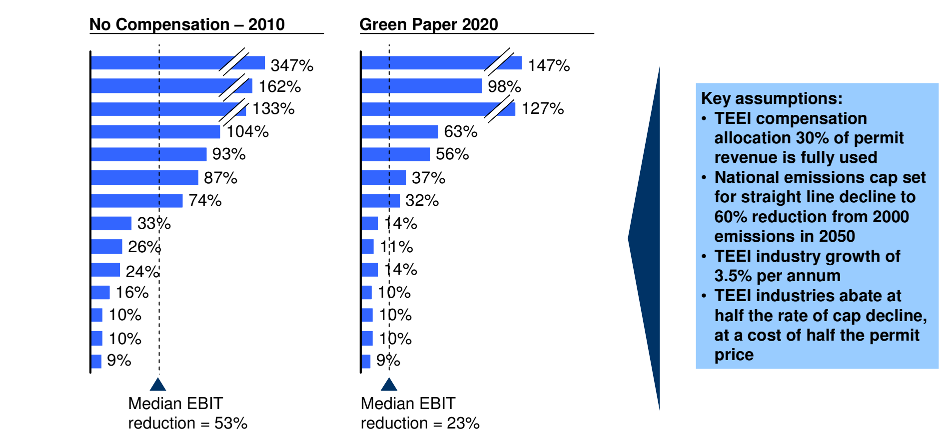
First, by fixing the rate of total TEEI industry compensation to 30% of permit revenue, rather than linking it to what is appropriate, companies cannot predict their future compensation, particularly as the emission trajectory declines. Under reasonable assumptions, TEEI businesses may judge that any benefit of the compensation scheme will quickly be eroded. Exhibit 1.14 illustrates this.

Exhibit 1.14

**IMPACT OF GREEN PAPER COMPENSATION SCHEME - 2020**

Percent EBIT reduction after compensation

CARBON PRICE = \$40/t $CO_2$-e




**Median EBIT reductions at \$20/t $CO_2$-e** 27% 12%

Source: Case study companies; DCC Green Paper; PJPL analysis

The Exhibit compares the EBIT impact for the case study companies with no compensation, and a forecast EBIT impact after the compensation envisaged in the Green Paper, for 2020. The latter estimates are based on the assumptions shown in the blue shaded box. All are reasonable given the Green Paper's proposals, forecast sector growth rates and possible emissions cap policies. Many case study businesses repeating this analysis would conclude the proposed compensation arrangements have little lasting value.

Second, the criteria set to determine when compensation will be phased out are too broad. The Green Paper's description of these criteria, and the likely reaction of TEEI businesses' Boards, are shown in Exhibit 1.15.

Exhibit 1.15

**POSSIBLE BOARD VIEW OF GREEN PAPER CRITERIA TO PHASE OUT OF TEEI INDUSTRY COMPENSATION**

**Green Paper criteria**

**Between 2010 and 2020:**
- Assistance would be provided to emissions-intensive trade exposed industries as proposed unless broadly comparable carbon constraints are introduced in key competitor economies, in which case assistance would be withdrawn

**Beyond 2020:**
- Assistance would be withdrawn if broadly comparable carbon constraints are introduced in key competitor economies or
- Assistance would be phased out over a five-year period in the event of acceptable international action that places obligations on an industry's major competitors or
- Assistance would be continued as proposed in the absence of broadly comparable carbon constraints or acceptable international action

**Possible Board perspective**

- There is a real risk assistance could be unwound before a level playing field was achieved
  – This risk increases after 2020
- Changes to these criteria could quickly make a previously attractive investment uneconomic
- In any event, compensation will be reducing with the overall trajectory

**Affect on investment economics**

- For hypothetical investments that would have earned 15% post-tax IRR
  – If compensation stops after 10 years and the carbon price is then \$100/t $CO_2$-e the returns drop to 4%

Source: DCC Green Paper

Boards are likely to find little assurance in these criteria. In particular, after 2020 the extent of compensation is sufficiently uncertain that most Boards would have to anticipate a global scheme to invest – an assumption that today could not be relied upon.

Unless these problems are addressed there will be considerable uncertainty for business that will limit stay-in-business investment and is judged to be sufficient to cripple new investment. This crippling of new investment will result in significant carbon leakage.

Many changes to the Green Paper arrangements should be made to provide sufficient certainty. These changes were anticipated in the proposals in Exhibits 1.5 and 1.8 above.

## 1.2 Given the nature and complexity of Australia's electricity sector great care is required to ensure an appropriate transition

The electricity sector must, at a minimum, meet its share of any Australian emission reduction target. The electricity sector accounts for around 35% of Australian emissions, and emissions from electricity are increasing faster than from other sectors. In addition, there are both available and possible technologies that can replace coal in electricity generation to reduce emissions. It is not as obvious how emissions can be reduced in many other sectors in the near term (for example, in steel making).

Wholesale electricity prices will need to rise by between 40 – 80%, and retail prices will need to rise by between 25 – 40% over the status quo to achieve a 10% reduction in emissions from 2000 levels by 2020 in the electricity sector. A 10% abatement target by 2020 is close to a straight line trajectory from expected 2010 emissions to a 60% reduction from 2000 levels by 2050. Such price increases are expected under an ETS and they will provide useful signals to reduce consumption.

The conclusions in this report have been based on a deep understanding of the two main models of the electricity sector used in Australia (ACIL Tasman and CRA) and on a detailed examination of the economics of specific power stations. PJPL also has extensive knowledge of this complex sector.

Based on this analysis, the following recommendations are made with regard to the electricity sector:

- The Government needs to set the cap trajectory to 2020 with a clear eye to what can be delivered by the electricity sector.
  - Based on the available modelling a 10% emission reduction target on 2000 levels by 2020 in the electricity sector will be very challenging (this represents a 34% reduction below business-as-usual levels)
  - An overall target that is more moderate than a 10% reduction in overall emissions by 2020 may be necessary. Sectors other than electricity may find it even more challenging to meet their levels of emissions reductions required to meet this target, given they have relatively less abatement options. A 10% reduction in overall emissions by 2020 requires a 21% reduction below business-as-usual levels for these sectors.
  - Mechanisms should be investigated to ensure pre 2020 supply reliability is maintained given the risks involved.
  - Post ~2020 there should be more technologies available to reach more aggressive reduction targets in the electricity and other sectors.
- Some form of compensation should be considered, as many coal-fired electricity generators will see their asset values significantly impaired
  - This is in large part an issue of equity, although there are other concerns.
- The permit auction process needs to cater for the large and specific working capital needs of the electricity sector.
  - Steps need also to be considered to ensure the derivative markets can meet industry needs.
- Both wholesale and retail prices should be allowed to rise fully to reflect the impact of an ETS
  - Suggestions to weaken the effect on wholesale electricity prices should not be adopted.
  - Retail price caps will need to be removed.

- The Renewable Energy Target (RET) scheme should cease with the introduction of an effective ETS.
  – This will ensure emissions reduction is achieved at the lowest cost.
- While the Government's Green Paper addresses many concerns, some remain.

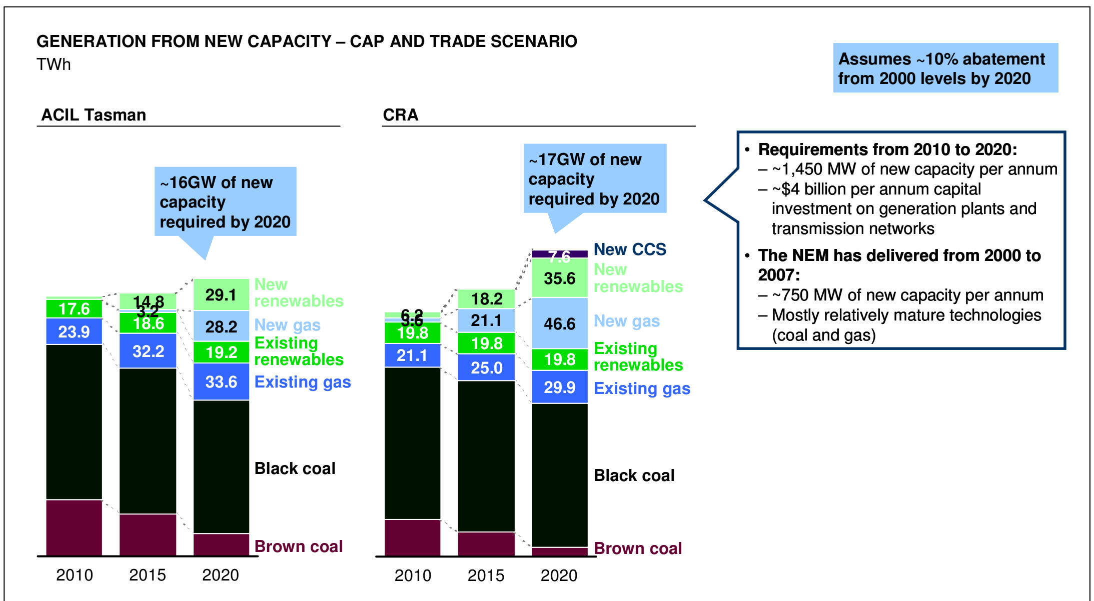
### *1.2.1 The Government needs to set the cap trajectory to 2020 with a clear eye to what can be delivered by the electricity sector*

The two electricity models examined reached broadly similar results on the sources of new capacity to meet a 10% abatement level in the electricity sector from 2000 levels by 2020. The conclusion from the analysis of these results is that a 10% emission reduction target by 2020 in the electricity sector is very challenging.

This conclusion for the electricity sector has important implications for the overall emission reduction target. While the electricity sector is likely to find a 10% reduction target by 2020 very challenging, other sectors are likely to find such a target overall even more challenging given they have relatively fewer abatement options. This may mean that a more moderate target overall is necessary until 2020.

Exhibit 1.16 shows the requirements that have been modelled to meet a 10% reduction in emissions from 2000 levels by 2020 from the electricity sector.

Exhibit 1.16



Source: CRA International, ACIL Tasman

This Exhibit shows that low emission generation sources not only need to meet increased demand (although ACIL Tasman assumes a very high degree of energy demand reduction), they also need to displace brown and black coal-fired generation to achieve the abatement reduction. This requires close to double the annual growth in new capacity added to the system in the future than has occurred in the recent past.

It also requires $4 billion in capital investment on generation plant and transmission each year between 2010 and 2020. This is a considerable amount of new investment that will be required from the industry.

Achieving the level of low emission generation required to achieve a 10% reduction in emissions from 2000 levels by 2020 in the electricity sector will be very challenging based on the modelled outcomes. This is shown in Exhibit 1.17, which outlines the types of additional capacity that both ACIL Tasman and CRA determine will be needed to meet this level of abatement.

Exhibit 1.17

**REQUIREMENTS TO MEET A 10% REDUCTION ON 2000 LEVELS BY 2020**

| New generation required | Additional capacity required by 2020 to meet 10% reduction on 2000 levels | | Comments |
|---|---|---|---|
| | ACIL Tasman | CRA | |
| 1. Gas plants | 6,690 MW | 8,157 MW | • Gas use for electricity must rise from 139PJ pa today to 375-466PJ pa which requires:<br>– Significant development of undeveloped and yet to be defined reserves in Bass Strait<br>– Continued expansion of production and reserves base in Qld CSG<br>– Successful exploration and establishment of production capability in NSW CSG |
| 2. Wind generation | 5,896 MW | 6,313 MW | • Approaching maximum levels of wind generation of 7,500 MW estimated by NGF:<br>– Must build at rate of ~600 MW/yr (currently only ~1,000 MW installed wind capacity)<br>– Assumes no transmission constraints, even though transmission spend may be difficult to justify |
| 3. Geothermal | 1,500 MW | 1,350 MW | • Likely a large challenge:<br>– Technology not yet demonstrated on a commercial scale<br>– Assumes no transmission constraints despite issues similar to wind |
| 4. Concentrated solar | 1,110 MW | None | • No concentrated solar generation currently in production |
| 5. Biomass | 540 MW | 1,287 MW | • Biomass has failed to grow under MRET in recent years |
| 6. Carbon capture and storage | None | 1,129 MW | • Technology currently unproven and may not become commercially viable within this timeframe |

While gas-fired generation is readily available and relatively quick to install the projections require a threefold increase in the gas currently used in electricity generation by 2020. While the gas is likely to be available, many different sources need to be rapidly developed.

The increase in wind generation is very large, requiring an increase from ~1,000 MW today to ~6,000 MW by 2020.

The assumed use of geothermal, solar and biomass are somewhat speculative given the current states of these generation technologies. While new sources of generation technology will become available, it is unlikely that a significant amount will be installed or operating by 2020. Nuclear generation is also not assumed to be available within this timeframe.

The electricity industry is unusually complex given that electricity cannot be easily stored. An instantaneous shortage of power results in immediate and costly load shedding (i.e. brownouts). In addition, the market sets prices based on five minute bids by generators and these prices are extremely volatile. While the FY08 average wholesale pool price was $53.6/MWh, prices can reach $10,000/MWh.

This complexity, plus other factors, add another level of supply uncertainty to the issue of whether sufficient new low emission sources of generation will be available by 2020. Some of these are illustrated in Exhibit 1.18.

Exhibit 1.18

**POTENTIAL UNCERTAINTIES IN SUPPLY RELIABILITY**

| Potential uncertainties | Elaboration |
|---|---|
| 1. **Complex investment signals for new generation** | • Uncertainty in the frequency of high price events creates considerable uncertainty for investment decisions<br>• Carbon prices and development of new low emission generation technologies create additional uncertainties for any new plant's long-term competitiveness |
| 2. **Increased intermittent generation** | • Increased wind generation requires more reserve capacity given their intermittent nature |
| 3. **Ability to meet system ramp** | • With increased quantities of gas-fired generation acting as base-load and increased levels of intermittent generation, the system may experience times when it has insufficient ability to meet ramp-ups |
| 4. **Potential for brown coal plants to exit early** | • Brown coal plants may shut before the modelling assumes they do because:<br>– They become financially unviable under current capital structures and re-financing may not necessarily occur<br>– They may not be able to physically operate at load factors below a certain point |
| 5. **Reduced plant reliability** | • Plants whose asset values have been impaired may be maintained less, leading to increased forced outage rates |

While a 10% emissions reduction target by 2020 may not necessarily create supply reliability issues, it is difficult to rule such difficulties out given the nature of the required spend on low emission technology, given the heavy reliance on a few known technologies, and the complexity of the electricity market.

Under an ETS, carbon prices rise, by definition, to justify sufficient new low emission sources of generation to achieve the emission reduction target. The concern with supply reliability is that this can make it difficult to dispatch certain high emission plant when there is no guarantee that the low emission plant will be available precisely when it is required.

To insure against reliability problems there is merit in reviewing whether the current energy market framework needs any amendment to accommodate an ETS. The Ministerial Council on Energy (MCE) recently directed the Australian Energy Market Commission (AEMC) to conduct such a review. This illustrates that some concern over supply reliability under an ETS is shared by the MCE.

Some existing and new mechanisms could be considered. Chapter 4 outlines some existing market operator (NEMMCO, soon to be AEMO, the Australian Energy Market Operator) mechanisms, such as its Reserve Trader mechanism and its Powers of Direction, both of which can require plants to operate if there is a need.

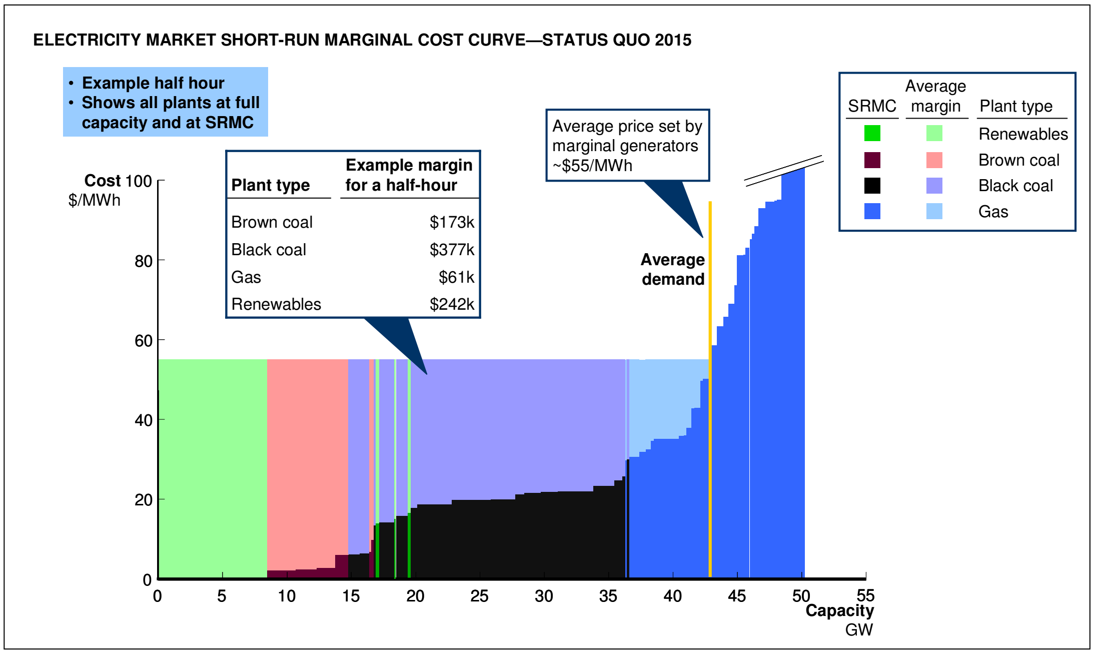
These mechanisms currently have limits which should be the subject of the MCE review. Supply reliability must be the dominant objective.

### *1.2.2 Many coal-fired electricity generators will see their asset values significantly impaired, so some form of compensation should be considered*

Both the ACIL Tasman and the CRA models examined the issue of asset impairment. They found that the value of existing sub-critical black coal plants could fall by at least 30% on average and the value of sub-critical brown coal plants would generally fall by around 80% on average.

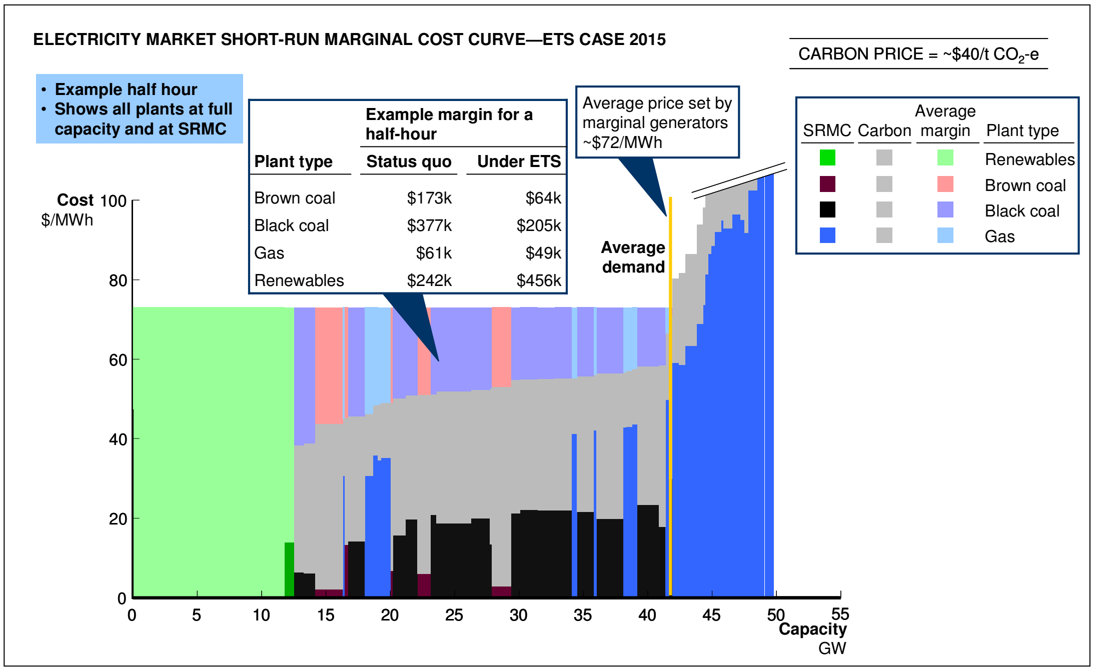
Without a carbon price coal plants earn gross margins by acting as a price taker during price peaks, as they benefit from the higher bids placed by generators (usually gas-fired) with higher short run marginal costs (SRMC). This is shown in Exhibit 1.19.

Exhibit 1.19




Under a cap and trade scheme pool prices are expected to rise by less than the cost of carbon for coal based plants. This is shown in Exhibit 1.20.

Exhibit 1.20



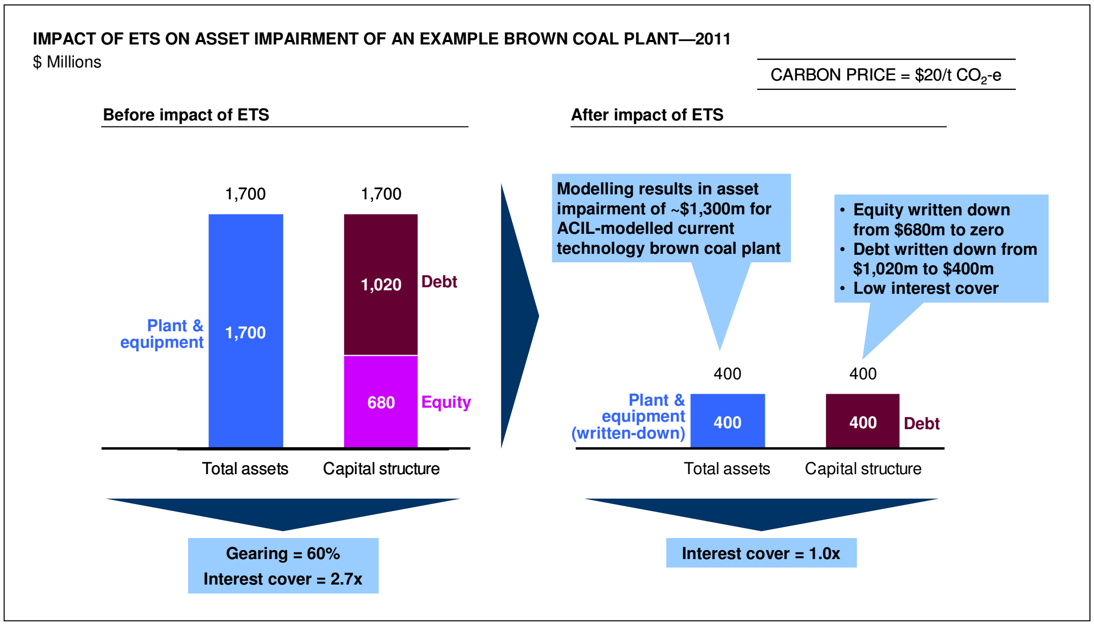

Since gas plants have around half the emission intensities of coal plants, they will increase the pool price by much less than the carbon cost of coal-fired generation. In addition, coal-fired plants cannot switch on and off quickly to operate only at times of very high prices. They must run for longer periods and accept the full range of resulting prices.

These factors will result in a significant decline in coal plant operating margins, particularly for brown coal plants.

These results already assume significant increases in gas and black coal prices as supply contracts are renegotiated and prices move closer to export parity levels. While these increases may lessen the impact on coal-fired generators, there is still likely to be significant asset impairment for these generators.

One example of the impact of a decline in coal plant operating margins is shown in Exhibit 1.21.

Exhibit 1.21




The value of the plant is written down from $1.7bn to $400 million. Equity value goes to zero, debt is written down and interest cover falls to unacceptable levels.

This impairment can create concerns for the electricity market. In the example above an operator would be forced to sell the plant at a large loss but in theory a new owner would purchase the plant at a low price and be able to operate it profitably. There are, however, a number of reasons why this may not happen:

- The existing owners may prefer to remove the plant from the system to improve the economics of their remaining plant.
- A new owner would require a very short payback period given uncertainties in the carbon price trajectory, and they would face some reputational risk in purchasing a high emission plant.
- A new entrant would need significant prudential capital to back multi year hedge contracts.

### *1.2.3 The permits auction process needs to cater for the large and specific working capital needs of the electricity sector*

Most electricity is sold under 2-3 year forward contracts. To enter into such contracts under an ETS, generators will need to fix the price of their emission permits over the same 2-3 year period. The permit auction system will need to include advance auctions of permits over, say, three years to allow sufficient forward price discovery.

Advance purchases of physical permits would impose significant working capital requirements on generators. Their working capital needs would increase from around 3% of their current plant asset values or ~$50m to around $425m or 25% of asset values.

Derivative markets will need to form quickly to allow companies to purchase the required future permits without large working capital requirements. The Government should work closely with potential derivative market makers and operators to improve the chances of this happening.

### *1.2.4 Both wholesale and retail prices should be allowed to rise fully to reflect the impact of an ETS*

An output-based allocation of permits to generators would have the affect of lowering the entire electricity supply curve. It would moderate wholesale price increases but still provide the same price signals for low emission generation.

While this has some attraction, an output-based permit allocation is not favoured. Wholesale electricity prices should be allowed to rise fully to dampen demand for electricity.

It follows that Governments will need to remove the current caps on retail electricity prices or make quick adjustments to allow the price caps to rise to accommodate the higher wholesale prices. Otherwise a large margin squeeze on electricity retailers will occur, as was the experience in California.

### *1.2.5 The Renewable Energy Target (RET) Scheme should cease with the effective introduction of an ETS*

A given level of abatement, as determined by the level of the cap of an ETS, will be achieved at a lower cost without the RET Scheme. The RET distorts how the abatement will be achieved; it cannot be through the lowest cost means.

The ACIL Tasman modelling provides a simple example of this. Substituting gas-fired generation for brown coal to achieve abatement costs ~$10/t $CO_2$-e, while using wind and solar to achieve the same end costs $45 and $128 – 162/t $CO_2$-e respectively.

A RET Scheme had a role when there was no ETS. It is not needed with an effective ETS.

### *1.2.6 While the Government's Green Paper addresses many concerns some remain*

The Green Paper seems well aware of the above issues. It says, for example, that the emissions target and trajectory will affect energy security as it must avoid sudden and large scale replacement of capacity before sufficient new capacity can be installed.

The Green Paper also proposes some transitional assistance to coal-fired generators on the grounds of fairness and based on concerns over the environment for investment. There are important issues to be settled such as whether this assistance is based on name plate capacity, as suggested in the Green Paper, or on other criteria which may less favour large, old and rarely used plant.

### 1.3 There are a number of lesser but nonetheless important issues to address in relation to the ETS design

These issues include the following:

- Ensuring working capital needs are manageable
- Considering assistance for smaller companies significantly affected by the Scheme, and
- Making sure that mine owners are deemed to be in operational control of mines for the purposes of the NGERS Act

These issues are outlined in detail in Chapter 5.

It is also important that petrol be effectively in the ETS. Petrol prices will fluctuate and it will be too difficult for Governments to decide on when to have emission permit costs reflected in petrol prices and when not to. The ETS will be most effective if the incentives provided by emission permit costs are allowed to flow freely into petrol prices.

### 1.4 There are two possible ways forward with an Australian ETS which achieves its objectives

Trying to achieve aggressive abatement in Australia prior to a world scheme will not allow a manageable emissions trading scheme. This is because conflicting priorities must be satisfied:

- If TEEI industry emissions are not curbed, other sectors must cut their emissions to a potentially unworkable level to meet an aggressive national emissions cap
- If compensation for TEEI industries increases with higher permit prices, as it will need to, the emissions permit revenue available for other purposes reduces
- Growth by TEEI industries accentuates these problems
- As shown in Section 1.1 above, however, without appropriate compensation carbon leakage will occur and TEEI industries will be damaged for no environmental gain; that is, the aggressive target will largely be met by Australia exporting its emissions

In addition, meeting an aggressive abatement target will place strain on the electricity sector, given the pace of investment required, and the likely ability to adopt low emissions technologies in the time available.

An unsuccessful Australian scheme will not encourage other countries to also implement an ETS, nor will it send the appropriate signals to Australians in ways that people can embrace and not reject. Australia’s objectives for introducing an ETS will not be met.

Clearly, a different approach is required. This report’s findings suggest two workable ways forward, which are summarised in Exhibit 1.22.

Exhibit 1.22

**POSSIBLE WAYS FORWARD**

**Option 1**

**Perspective**

- If we seek to cut emissions significantly before there is a world carbon price this will conflict with appropriately compensating TEEI industries, and strain the electricity sector
  – The “30% limit” reduces compensation too quickly
  – No room for TEEI growth

**A way forward**

- Adopt a modest emission reduction trajectory **until** there is a world carbon price
- Ensure it can accommodate TEEI growth, or have TEEI growth outside the cap

**Option 2**

**Perspective**

- Australia’s best greenhouse contribution will come from strong international diplomacy, led by the PM
- BUT adopting a modest emission trajectory now may compromise our ability to play this active international role
- AND having two targets may cause uncertainty

**A way forward**

- Agree a 2020 target that works internationally during the coming negotiations and put all Australia’s focus on securing binding international agreements, both general and sectoral
- Until we have these agreements fix the permit price at a modest level (e.g. $10-20 – TEEI industry compensation still required but enough will be left over for other purposes)
- When the international agreements are in place, activate the full ETS and buy overseas permits as required to meet our targets (e.g. for 2020)

One option is to set a modest abatement target until the necessary global agreements are in place. Only a global agreement will address the greenhouse problem. Under this option Australia would accept more aggressive emission reduction targets once there is a world carbon price. The logic is as follows.

- With a modest emission reduction trajectory the “permit arithmetic” can work because the emission price should remain around, say, $20/t $CO_2$-e. With such a price there will be sufficient permit revenue to support low emissions technology, assist low income households and provide sufficient compensation to prevent the export of Australian emissions associated with businesses that would have remained in Australia with a world carbon price.

- Emissions from significant TEEI investment could be in addition to this more modest target, or the target could also be set to allow for the anticipated growth in TEEI industries. It is worth remembering that any Australian company that undertakes long life investments will now need to consider whether these investments will remain economic when there is a world carbon price.

This option is workable. There are, however, two potential concerns with it.

One concern is that this first option may limit Australia’s ability to push for an effective world scheme. This is because the abatement trajectory set under this option may not be seen as credible by other countries even though there will be an undertaking to increase the abatement trajectory once there is a world scheme.

Australia is well placed to contribute to the achievement of effective global action to address the greenhouse challenge. While a developed country it has many links with developing countries, and the Prime Minister in particular seems well placed to assist with the brokering of an international agreement.

Ross Garnaut's June draft report highlighted how effective global action could be achieved[7] (Exhibit 1.23). It requires binding commitments by all the world's major emitters, although they would have different levels of commitment. For example, China would not be expected to take on the same level of commitments as developed countries. With these commitments in place and an international permit market, a world carbon price can be established. This should allow investments to occur in the most appropriate places factoring in the full cost of carbon.

Exhibit 1.23

**ELEMENTS TO ACHIEVING INTERNATIONAL COLLABORATION ON CLIMATE CHANGE MITIGATION**

**Appropriate national commitments**

- Initially tailor commitments to economic circumstances:
  - High-income countries have an emissions reduction target
  - Medium-income countries have one-sided emissions targets below their business as usual emissions:
    - Allows excess credits to be sold but no obligation to purchase permits
  - No target for low-income countries, but need to participate in sectoral agreements through carbon taxes on TEEI industries
- Set a binding target for China as a special case, albeit with a more lenient cap
- Set ultimate targets to equalise per capita emissions
  - Provide 'headroom' to ease transition for countries with rapid economic growth

**Binding agreements involving the principal emitters will create a global price**

**International market for trading carbon permits**

- Develop mechanisms to allow direct trading through private firms, and also to allow countries which exceed their cap to purchase permits from countries which abate below their cap
  - Helps reduce the global cost of abatement
  - Results in similar carbon prices across countries, to provide a level playing field for TEEI industries
- Provide financial incentives for low and middle income countries by allowing them to participate:
  - Countries with one-sided targets could sell excess permits
  - Other countries could sell offset credits, created through an extension of the current CDM

**Providing incentives for developing nations to contribute will lower the overall cost of abatement**

**Committed funds for abatement technologies and adaptation**

- Require high-income countries to create a fund to develop low-emission technologies
  - Target a large portion to efforts in developing countries
- Expand current adaptation support mechanisms:
  - Provide funds to developing nations to help them adapt to impacts of climate change
  - Needs to be additional to existing aid programs
  - Support with policies to encourage free trade to help with adaptation efforts (e.g., food, unskilled labour)
- Link access to these funds to participation in the global scheme

**Participating in the global scheme will assist developing nations to mitigate and adapt to impacts of climate change**

Source: Garnaut Climate Change Review, Draft Report, June 2008

Sectoral agreements can also play a role in levelling the carbon playing field. They can allow particular industries to ensure that all relevant competitors are playing by the same rules.

There are number of inducements potentially available to achieve a world agreement on an emission reduction strategy. These range from an ultimate per capita allocation of permits, through to the benefits from accessing funds for new technology and adaption, and potentially including penalties on exports from countries that are not part of the world scheme.

Another concern is that, with a modest target scheduled to move to a more aggressive target when there is a global scheme, it may be difficult to allow the banking of permits. This, plus a potential discontinuity in the abatement trajectory as the international negotiations unfold, could see volatile emissions prices that would send mixed abatement signals.

It is, of course, difficult to tell how significant these concerns could be.

The second option takes a different approach. This option would see Australia fix the carbon price in Australia at, say, \$10 – 20/t $CO_2$-e, until there is an effective

[7] Garnaut Climate Change Review, 'Draft Report', June 2008, Chapters 12-13

global scheme. This option builds on Ross Garnaut's proposed "transitional arrangements". This option has a number of advantages:

- It would see Australia with only one target, say in 2020, as agreed with the international community
- Any gap between this target and the trajectory Australia would otherwise be on would be met by buying permits internationally as allowed under an effective global agreement
- This option avoids the issue of TEEI investment needing to be outside the cap until there is a world scheme
- This option also avoids any volatility in emission prices
- This price level would provide permit revenue that would allow support for new technology, appropriate assistance to low income households and TEEI industries, and also new TEEI investment, on a continuing basis
- When effective global agreements are in place the established infrastructure will allow the swift removal of the fixed emissions price and full emissions trading

The disadvantage of this option is that initially it will resemble an emissions tax rather than emissions trading. It will therefore set the price of emissions, but not cap the annual level of emissions. This is appropriate, however, as a transitional measure. Since only a global agreement will provide an effective response to the greenhouse challenge it is appropriate that these transitional arrangements stay in place until there is this global agreement.

Australia should have time to buy the necessary permits internationally to reach any international commitment for, say, a 2020 target. Ross Garnaut has indicated that an effective response to the greenhouse challenge requires an early global agreement on emissions reduction. If there is no world agreement as we approach 2020 then it can be judged that the cost of an ETS with an aggressive abatement target was greater than the benefit of Australia largely acting ahead of its competitors.

Both of these approaches can achieve the objectives described at the beginning of this Chapter. The preferred option should be that which allows Australia to make the most effective contribution towards achieving global emissions abatement.

* * *

It is appropriate for Australia to act now to indicate the country's willingness to play its role in emission reduction and to begin sending the signals to Australian businesses and households to change their behaviour to suit a low emission world.

It is also important that an Australian ETS be seen as successful in terms of the environment, the economy and community acceptance. Australia can help demonstrate that such market mechanisms can work effectively.

The recommendations in this paper are aimed at achieving this.

*21 August 2008*

# SUMMARY RECOMMENDATIONS

**Trade exposed, emissions intensive industries**

- Provide full compensation above a modest threshold
  - Compensate only for emissions above the threshold
  - Use a threshold based on the financial impact of carbon costs
  - Set a threshold at between 3% and 5% of industry average value add
  - Place no artificial limits on compensation
- Issue permits to new TEEI facilities outside the cap, assuming world's best emissions intensity
- Determine compensation eligibility at, say, five yearly intervals
- Calculate eligibility based on long run economics
- Compensate for Scope 1 and Scope 2 emissions
- Compensate using a combination of permits and cash
- Continue compensation until key competitors face a like carbon cost
  - Support with a 'property right' to underpin investment

**Electricity sector**

- Set the emissions cap trajectory to 2020 with a clear eye to what can be delivered by the electricity sector
  - A 10% emissions reduction target on 2000 levels by 2020 will be very challenging, based on industry modelling
  - The overall target may need to be more moderate
  - Mechanisms should be investigated to ensure pre-2020 supply reliability
  - Post about 2020, technology should enable more aggressive reduction targets to be achieved
- Consider compensation for coal generators given their asset values will be significantly impaired
- Cater for the large working capital needs of the sector in the auction process and facilitate effective derivative markets
- Allow both wholesale and retail prices to rise fully to reflect the impact of an ETS; remove retail price caps

- Cease the Renewable Energy Target (RET) scheme when there is an effective ETS to ensure lowest cost abatement

**Other recommendations**

- Use frequent auctions to minimise working capital impacts
- Establish a compensation scheme to address ‘flow through’ inflation
- Include fuel in the ETS, without adjusting the excise
- For mining operations, by default place management of the ETS with the mine owner, unless agreed otherwise by mine owners and contractors

**Way forward**

- Decide between the two available options for Australia prior to agreement on a world scheme
  - Set a modest emission reduction trajectory, or
  - Fix the carbon price at, say, \$10 – 20/t $CO_2$-e

# CHAPTER 2

## PERSPECTIVES ON THE EU ETS

# 2. PERSPECTIVES ON THE EU ETS

As the largest and most diverse emissions trading scheme currently operating, the European Union's ETS has been closely examined. There are a small number of key points that are relevant to this study.

Scrutiny of the EU ETS often results in mixed reviews. The 'mistakes' made in design and implementation are now well known. Among them are the 'windfall profits' secured by the electricity sector through the grandfathering of free permits, the over and under allocation of permits between and within industries, and the price volatility created through artificial restrictions on the timing of permit use.

There is no doubt mistakes have been made, as would be expected in this first attempt at an ETS. The benefits from the EU's approach to the introduction of their ETS are, however, also becoming clearer. These include the following:

- Steady progress is being made to a comprehensive scheme, while learning from their 'mistakes'
- Impacts on business appear controlled, even in sensitive sectors
- Carbon price signals are being successfully incorporated into business decision making

This section briefly describes each of these points in turn.

## 2.1 Steady progress, while learning from their 'mistakes'

The EU's phased approach to introducing its ETS might be seen as slow. An equally valid view is that the pacing has been appropriate, given the lessons that had to be learnt, and that the EU's ETS was much larger and more comprehensive than any previous scheme.

Exhibit 2.1 gives a summary of the progress and lessons of the EU ETS to date, and the planned progress during Phase III. The detail shown in Exhibit 2.1 is a reflection of the effort that has been required to design and implement the scheme.

Exhibit 2.1

**THE EVOLUTION OF THE EU EMISSIONS TRADING SCHEME**

**Phase I – 2005 to 2007**

**Features**

- Flat cap for 05 to 07
- 27 national caps and allocation plans, determined through projection of emissions
- Majority of allowances (>90%) allocated free – only four member states used auctioning
- Only $CO_2$ emissions included
- Coverage limited to combustion installations (e.g., power stations), oil refineries, coke ovens, iron and steel plants and factories making cement, glass, lime, bricks, ceramics, pulp, paper and board

**Major Lessons**

- Over-allocation of allowances as verified emissions data was unavailable – emissions were less than cap, causing a fall in the permit price
- Inharmonious National Allocation Plans (NAPs) created distortions threatening fair competition between EU nations
- Certain sectors (mostly power generators) passing on the 'opportunity cost' of allowances to customers made windfall profits

**Phase II – 2008 to 2012**

**Features**

- 27 national caps and allocation plans, determined through "benchmarking" emissions and in line with Kyoto targets – approved by independent Commission
- EU-wide cap of 2,083Mt (~5% reduction on Phase I emissions)
- Majority of allowances (>90%) allocated free – ten member states plan to do some auctioning
- Additional sectors include domestic aviation (to be introduced in 2011) and international aviation (2012)
- Limits to banking from Phase I to Phase II – for each Phase I allowance banked, the number of Phase II allowances decreases

**Major Lessons**

- Further need to centralise cap-setting and allocation planning
- High transaction costs impact the cost-effectiveness of small emitters
- Rules for "new entrant reserves" currently favour high-emitters

**Phase III – 2013 to 2020**

**Proposed features**

- One EU-wide emissions cap and allocation plan (no more NAPs)
- Cap reducing linearly from 2012 levels to ~1,743 Mt by 2020 (average 42.5Mt reduction per annum)
- 100% auctioning for power generators from 2013
- Phased reduction in number of free allowances to other sectors - From 60% of all allowances auctioned in 2013 to 100% by 2020
- Sectors at risk of 'carbon leakage' to continue receiving free permits – also, potential to apply tariffs to imports
- Rights to auction allowances will be redistributed to Member states with lower per capita income to increase capacity to invest in technologies
- Additional gases include $N_2O$ and PFCs
- Additional sectors include petrochemical, ammonia and aluminium producers, as well as the carbon capture and storage industry
- Increased emission threshold on small installations – ~ 4,200 installations will be opted out of scheme
- Unlimited banking from Phase II to Phase III

Source: EU directives and memoranda

There are three points to be made.

The first is that pre-announcing multiple phases has allowed mistakes to be made but adjustments could be introduced in a controlled fashion. The mistakes made were quickly recognised and, where possible, fixed in later phases.

The second is that the EU has planned a less ambitious pace of scheme development than Australia. Full auctioning will not commence until 2020. Some sectors will only enter the scheme in the next Phase. Trajectories in initial phases were relatively conservative – stabilisation of emissions in Phase I, and a 5% reduction across Phase II.

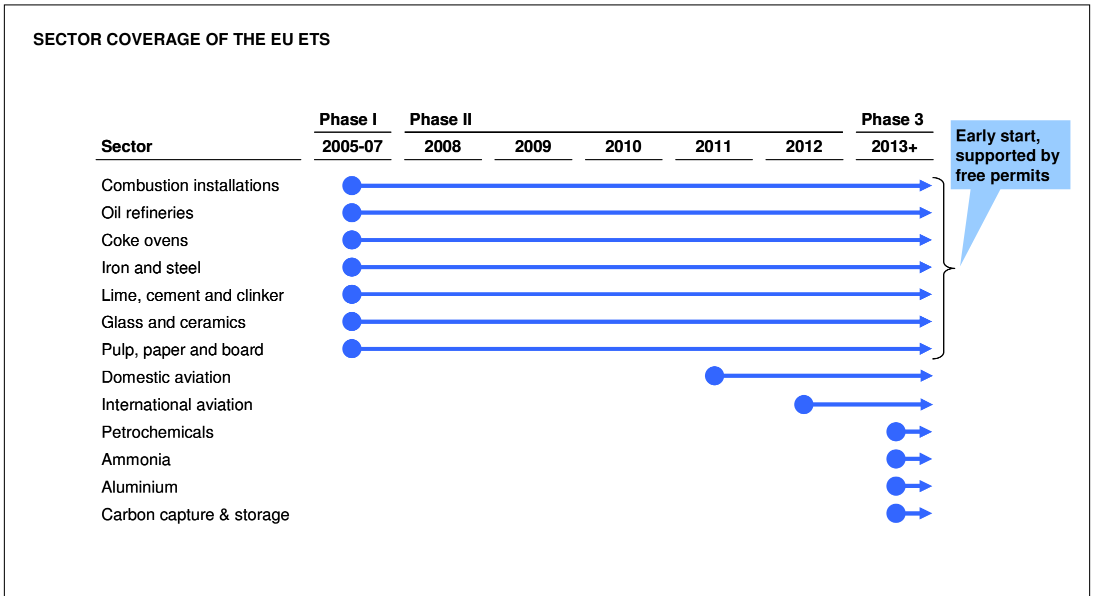
The third is that the EU experience suggests that a well functioning, broad based emissions trading scheme is an achievable goal.

## 2.2 Controlled impacts on business, even in sensitive sectors

A feature of the European emissions trading experience is the comprehensive studies available of its potential effects on sensitive industries.

Managing these effects was clearly seen as critical to the success of the EU ETS. In response, the initial stages of the scheme featured a high proportion of free permits, as well as a phased expansion of coverage, as shown in Exhibit 2.2.

Exhibit 2.2



Source: EU directives and memoranda

As a result, many European industry sectors with high emissions intensities have operated with a carbon price signal for almost 3 years - with the benefits of a strong abatement incentive but little or no impact on international competitiveness.

In the next phase of the scheme, the pace at which these sectors will be exposed fully to the EU carbon price is likely to be carefully controlled. The proportion of auctioned permits across the scheme will increase from 60% in 2013 towards a target of 100% in 2020. Individual sectors, however, will move to full auctions at a pace tailored to their specific characteristics. Even in 2020, at the end of Phase 3, sectors where carbon leakage is expected to occur will still receive free permits.

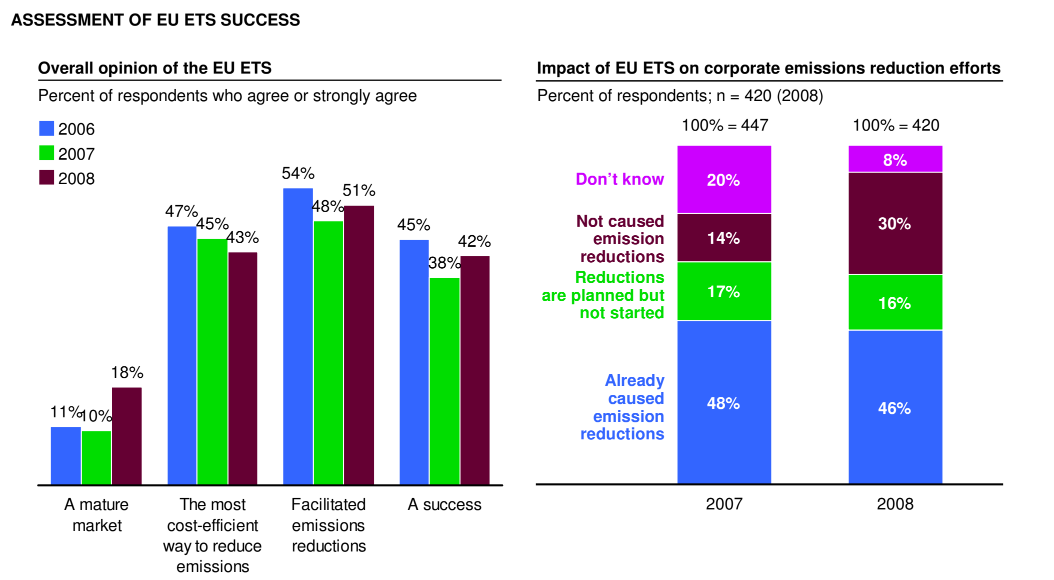
## 2.3 Successful incorporation of carbon price signals

Despite its gradual start, the EU ETS has been successful in establishing the credibility of emissions trading, and in encouraging businesses to address current and future carbon prices in their decisions.

Recent survey data, shown in Exhibits 2.3 and 2.4, support these findings. Two points can be made from the data shown:

First, though the EU ETS was in its early days, almost two thirds suggested the ETS had already caused emissions reductions to be made or planned at their companies (Exhibit 2.3).

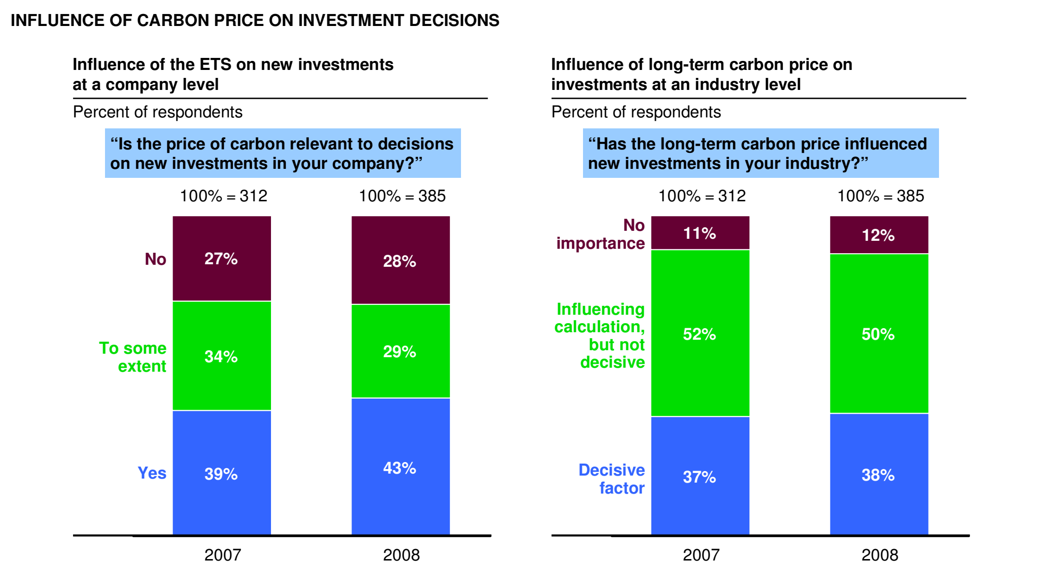
Exhibit 2.3




Source: Point Carbon

Second, only around 10% of respondents were of the view that long term carbon prices were not influencing investment decisions made in their industry (Exhibit 2.4).

Exhibit 2.4




Source: Point Carbon

These results suggest that a cautious start has still allowed carbon price signals to begin to reshape the EU economy.

# CHAPTER 3

## APPLYING AN ETS TO TRADE EXPOSED, EMISSIONS INTENSIVE INDUSTRIES

# 3. APPLYING AN ETS TO TRADE EXPOSED, EMISSIONS INTENSIVE (TEEI) INDUSTRIES

This issue dominated the discussions held with a wide cross section of Australian companies during the course of this study. While the issue of compensation for TEEI industries has received prominent coverage in previous studies of potential ETS designs, there is little consensus around either the high level issue or the preferred details of the particular compensation scheme.

This lack of clarity is understandable, given the shortage of transparent analysis of the impacts of emissions trading on TEEI industries to date. Indeed, this shortage of analysis was the key driver for undertaking this study.

This chapter argues that the impact of Australia's ETS on TEEI industries can be successfully managed. It does this under three headings as follows:

- An Australian ETS that is introduced prior to a similar scheme in competitor countries must include a compensation scheme for TEEI industries
- The scheme should provide full compensation for TEEI industries, but only for emissions above an appropriate threshold
- The scheme should incorporate a series of other design features to ensure its effectiveness and to avoid unintended consequences

This chapter addresses each of these issues in turn. Actual company case study data is drawn on heavily to illustrate key issues and support conclusions.

This chapter concludes with a comparison of the proposals outlined here and those in the Green Paper, and a brief comment on the link between TEEI industry compensation and the concept of 'overshooting' that was introduced in the Garnaut Review June Draft Report.

## 3.1 An Australian ETS that is introduced prior to a similar scheme in competitor countries must include a compensation scheme for TEEI industries

The case for compensation for Australia's TEEI industries rests on three principal points:

- Many Australian businesses will be placed at risk through the introduction of an emissions trading scheme before their competitors face a similar cost for carbon
- There is little benefit to be gained by placing these businesses at risk
- A compensation scheme is an appropriate and practical response to these concerns

This section discusses each of these points briefly.

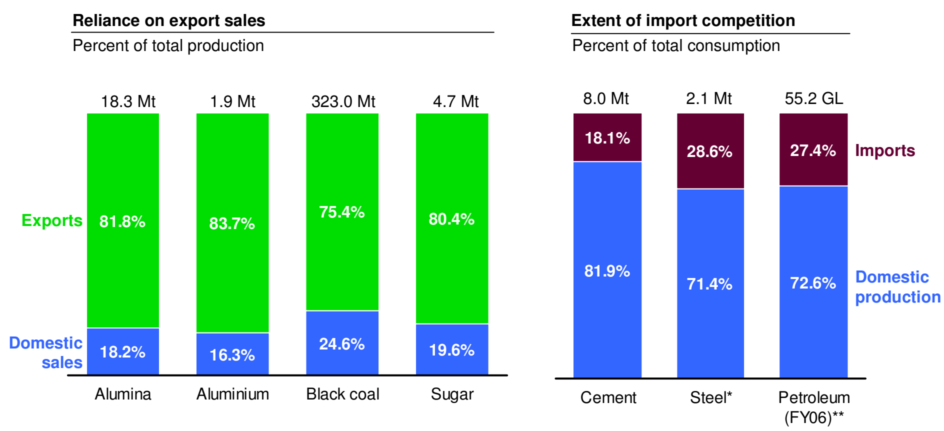
### *3.1.1 Many Australian businesses will be placed at risk through the introduction of an emissions trading scheme before their competitors face a similar cost of carbon*

The introduction of Australia's emissions trading system has the potential to change fundamentally the competitive position of those 'trade exposed' Australian businesses which rely on export sales, or compete with imports in domestic markets.

Australia's exposure to global trade is broadly understood. Nevertheless it is worth showing the extent to which the Australian economy relies on export sales and import trade flows. Exhibit 3.1 illustrates this for selected industries.

Exhibit 3.1

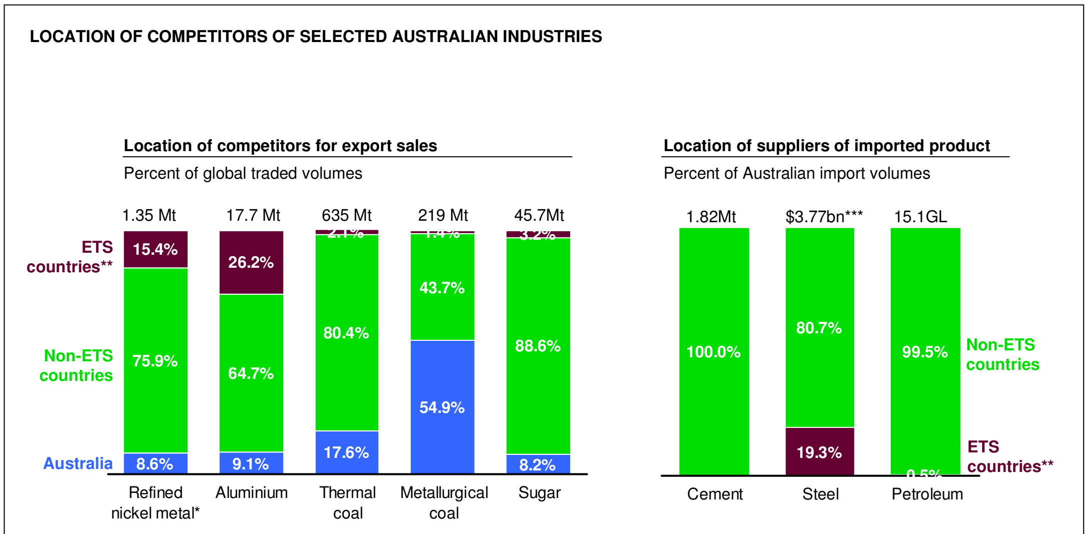
RELIANCE ON EXPORT SALES IN SELECTED AUSTRALIAN INDUSTRIES—CY2006




* Combination of structural, merchant bar, reinforcing bar and rod for mesh, total volume ~65% of long product manufactured
** Total petroleum products
Source: ABARE; CIF; ABS; PJPL analysis

Australia's competitors in these global markets are predominantly located in countries which do not currently have a national emissions trading scheme. This is shown in Exhibit 3.2, which shows the location of producers for selected exports and imports important to Australian industry. For example, non-ETS countries produce around 65% of globally traded aluminium. In other words, Australian aluminium exporters compete overwhelmingly with producers who do not currently face a carbon price.

Exhibit 3.2

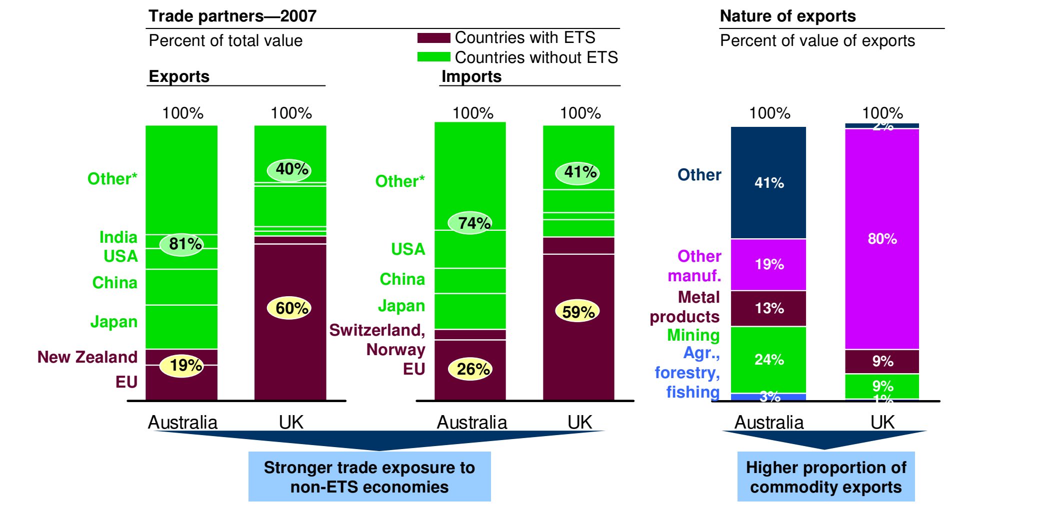



* Production including volumes consumed in country of origin
** EU members, Norway, Switzerland and New Zealand
*** Value of merchandise imports in 2007
Source: ABARE; CIF; PJPL analysis

This means that many businesses that are ‘trade exposed’ are unable to pass on the additional carbon costs that will result from an Australian ETS. If these businesses are also ‘emissions intensive’, these costs will be large, and their profitability will decline.

It is important to understand that, compared with other countries which have introduced emissions trading schemes, this potential risk is unusually high for Australia. Exhibit 3.3 contrasts Australia’s competitive position to that of the UK by comparing export markets, sources of imports and the types of goods being traded by each country. The high volume of trade flows within the EU means that the UK has less exposure to non-ETS competitors. While 81% of Australia’s exports go to non-ETS countries, the comparable figure for the UK is only 40%. The picture is similar for imports: 74% of Australia’s imports are sourced from non-ETS countries versus 41% for the UK. In addition, the UK economy relies less on globally traded commodity products, for which prices are set by worldwide markets, for its export earnings.

Exhibit 3.3




* Other includes the Republic of Korea, Singapore, Taiwan, Thailand, Malaysia, Indonesia, Vietnam, UAE, Hong Kong, PNG, South Africa, Canada Saudi Arabia, the Philippines and other countries with export value <$1m

Source: UK Trade Info; ABS; Department Foreign Affairs and Trade

### *3.1.2 There is little benefit to be gained by placing these businesses at risk*

Neither global emissions reduction goals, nor the Australian economy, would be well served through placing Australia's TEEI industries at risk.

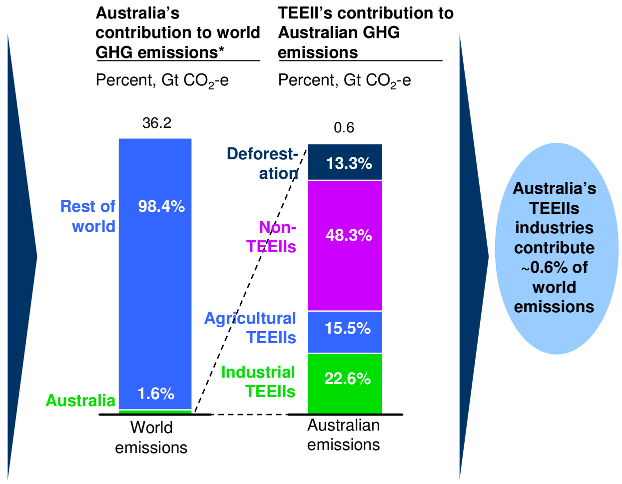
Based on a broad categorisation, Australia's TEEI industries contribute a small fraction of global emissions (0.6% - see Exhibit 3.4). Importantly, they do so at emissions intensities which are, by and large, comparable to their offshore competitors. A sample of comparative industry emissions data is shown in Exhibit 3.5. This data suggests that where Australia competes on a like for like basis at comparable scale, it does so at emissions intensities which are comparable to the world's best. This means that transferring production offshore is unlikely to create a net reduction in world emissions, and may even cause a net increase.

Exhibit 3.4

**CONTRIBUTION OF AUSTRALIA'S TEEIS SECTORS TO GLOBAL EMISSIONS – 2002**

**Inclusion of key potential TEEI industries**

| Sector** | Included in TEEIIs? |
|---|---|
| **Agriculture** | |
| • Beef and dairy cattle | Yes |
| • Sheep | Yes |
| • Pigs | Yes |
| • Sugar cane | Yes |
| • Other agriculture | No |
| **Mining** | |
| • Black coal mining | Yes |
| • Oil and gas extraction | Yes |
| • Ferrous metal ores | Yes |
| • Non-ferrous metal ores | No |
| **Manufacturing** | |
| • Aluminium | Yes |
| • Cement and Lime | Yes |
| • Alumina | Yes |
| • Iron and steel | Yes |
| • Basic chemicals | Yes |
| • Other non-metallic mineral products | Yes |
| • Pulp, paper and paperboard | Yes |
| • Other manufacturing | No |
| **Other sectors** | No |




* Estimate of World emissions from CAIT (excluding land use and forestry), for 2002, plus land use and forestry for 2000; 2002 $CO_2$-e estimate for Australia from AGO

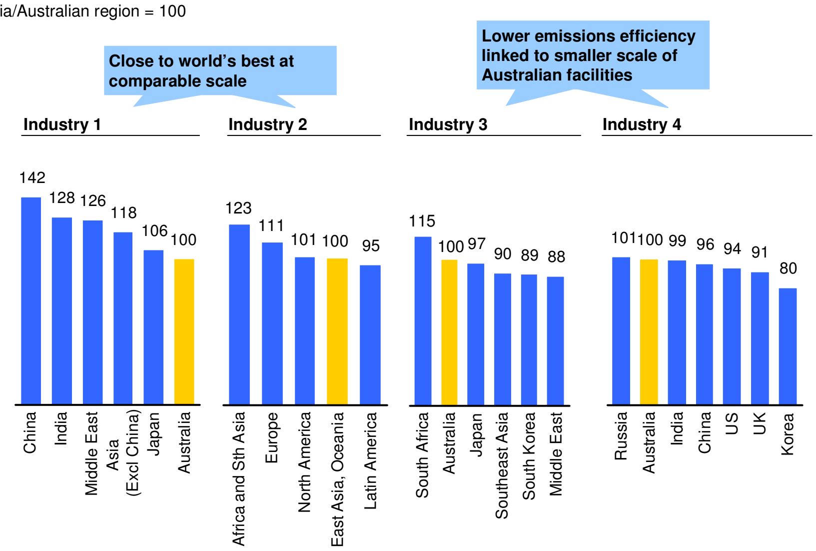
** These classifications are based on Appendix D of the Green Paper, assuming industries are TEEI if cost of carbon permits exceeds 2% of revenue at a carbon price of \$20/t $CO_2$-e.

Source: CAIT; Australian Greenhouse Office; DCC Green Paper

Exhibit 3.5

**RELATIVE EMISSIONS OF SELECTED AUSTRALIAN TEEI INDUSTRIES**

Index; Australia/Australian region = 100




Source: Submissions to Garnaut Review; other international industry organisations

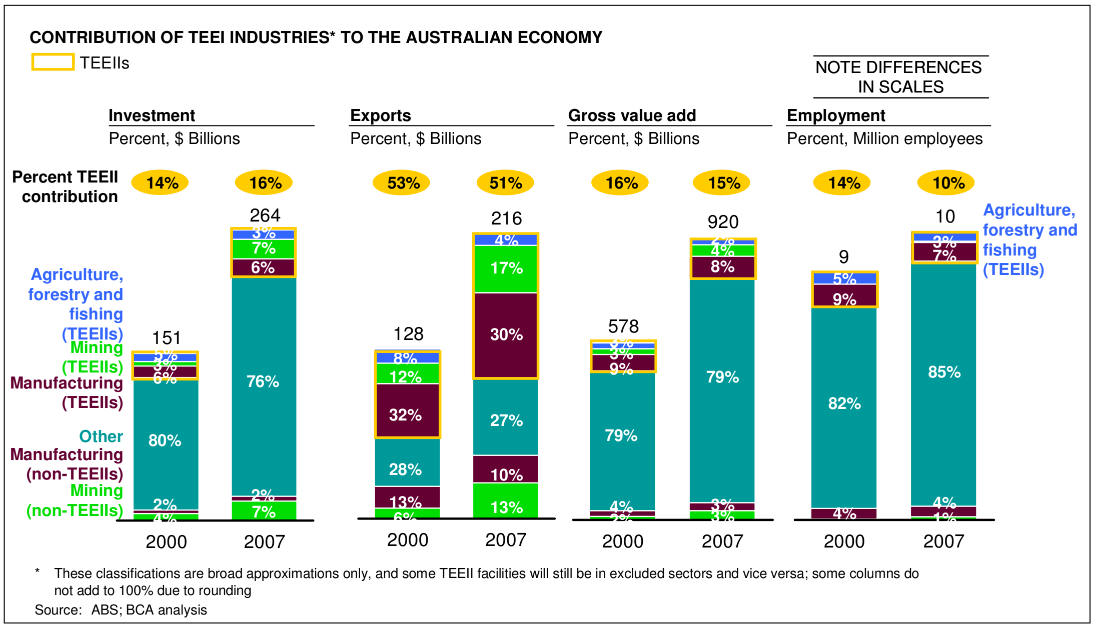
This is not to say that controlling the emissions of Australia's TEEI industries is of no importance. Ultimately, all sectors of the Australian economy will have to achieve reductions in emissions if global targets are to be achieved. The point is that imposing a price on carbon on Australian businesses prior to their competitors will see emissions simply transferred to other locations. Australia may see reduced emissions but the world will not.

In addition, placing Australian TEEI industries in an ETS will have no impact on demand for these emissions intensive products, since product prices will not change until global agreements are in place. It will not, for example, affect Australian demand for such items as cement and steel.

While placing TEEI industries at risk would have substantial implications for Australia's economy, the impact on global emissions is likely to be at best neutral.

The current contribution of TEEI industries to the Australian economy can be understood based on a broad assessment of industry sectors in the national accounts. As shown in Exhibit 3.6, TEEI industries contribute around 16% of new business investment, as well as substantial portions of exports, gross value add and employment.

Exhibit 3.6

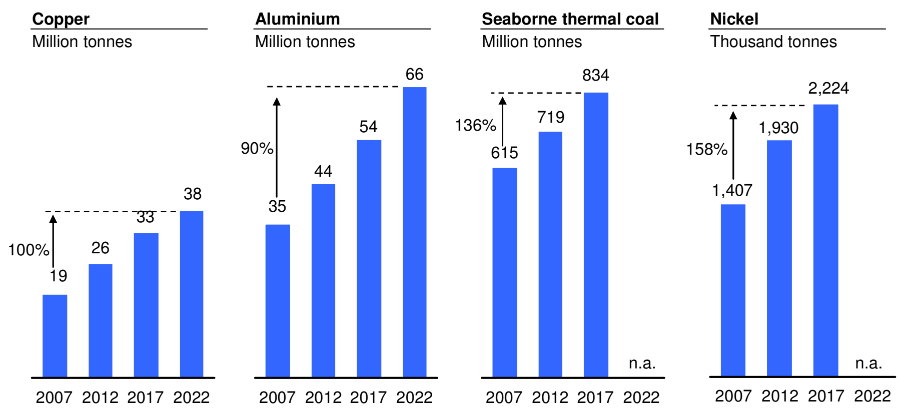



Risks to TEEI industries are also risks to future economic growth. There are two aspects to this.

The first is that, without an ETS, TEEI industries would have contributed strongly to economic growth in the near term. This can be seen in the forecasts for global demand for typical TEEI industries' products. Exhibit 3.7 illustrates this for a variety of refined metals. Rapid investment is required if Australia is simply to maintain its share in these markets. Delayed or cancelled investment by TEEI businesses represents a lost opportunity for the Australian economy that others will take up.

Exhibit 3.7

FORECAST WORLD DEMAND GROWTH IN SELECTED AUSTRALIAN TEEI INDUSTRIES




Source: Rio Tinto investor presentations; Brook Hunt

The second is that placing TEEI industries at risk today would make it very difficult for Australia ever to develop sustainable, low carbon operations in these industries. All TEEI businesses will still have markets to serve in a carbon constrained world. Many of their products currently have few obvious substitutes. For example, there will still be demand for structural elements in high-rise construction, currently served by cement and steel manufacturers. In a carbon constrained world, this demand will be served either by new substitute products or through new manufacturing processes with reduced carbon intensities. If Australia's TEEI industries are forced offshore through the introduction of an ETS, it is doubtful they will ever return.

The threat posed by competitors with new products and processes is already facing Australia's TEEI industries. They should be given the chance to meet this challenge on a playing field which sees them on the same terms with their principal competitors.

### *3.1.3 A compensation scheme is an appropriate and practical response to these concerns*

Accepting the arguments described above, concerns with providing TEEI industries with compensation can remain. However, these concerns are largely misplaced.

One concern is that only international agreements, comprehensive or sectoral, will allow TEEI industries to face price signals and competitive forces consistent with a carbon constrained world. A compensation scheme for TEEI industries can be seen as a poor solution, with the potential to distract countries from the development of international agreements, or place the integrity of the broader emissions trading scheme at risk.

It is preferable that effective global agreements are reached before the introduction of Australia's ETS. Given the current slow pace towards these agreements, however, a pragmatic approach is to introduce an ETS but with a TEEI industries compensation scheme. There is no inconsistency between providing this compensation, and the pursuit of permanent international agreements. In addition, the impact of the compensation scheme on the integrity of the broader scheme can be managed by the ETS's administrators. Important aspects of this issue will be addressed in Section 3.2 of this chapter.

Another concern is that it would be impractical to manage such a compensation scheme. This concern is overstated, however. For example:

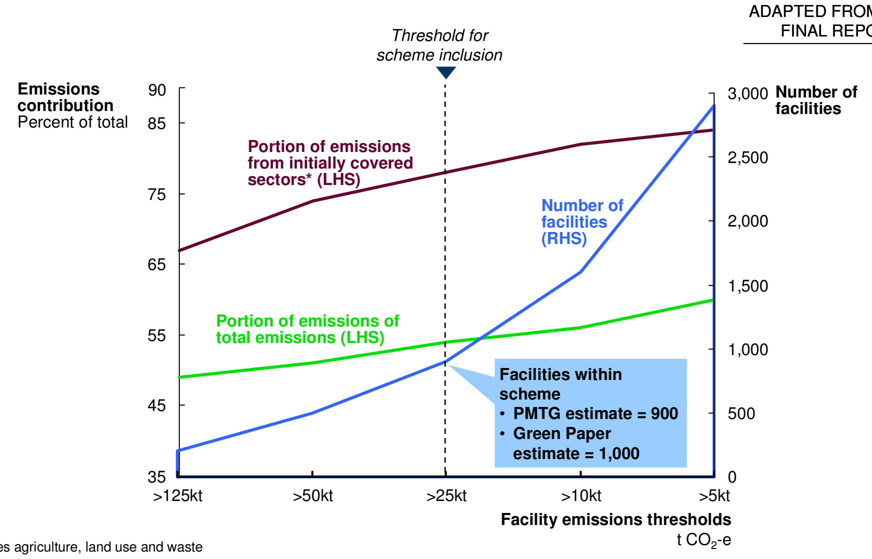
- The scale of effort required to assess and monitor potential TEEI industries facilities appears manageable. Only around 1,000 individual facilities will be required to acquit permits under the ETS (Exhibit 3.8). Given any reasonable tests for trade exposure and emissions intensity, only a minority of these will qualify for TEEI industries status, and therefore need to be assessed for compensation.

- The information required to assess eligibility and the level of compensation is similar, if not identical, to that already available to government agencies. To give two examples:
  - One possible assessment of trade exposure could be to identify a clear link between domestic and world prices. Similar exercises are routinely done by the ACCC – and assessments could frequently be made on a 'whole of industry' basis to reduce the work involved
  - Assessments of emissions intensity could use data similar to that already collected by organisations such as the Australian Greenhouse Office, and reported under the NGERS Act, and the high level information required on firm cost structures is considerably less than that required by the Australian Tax Office

Exhibit 3.8

COVERAGE BASED ON PERMIT LIABILITY AT POINT OF EMISSIONS

ADAPTED FROM PMTG FINAL REPORT




* Excludes agriculture, land use and waste

Source: Prime Ministerial Task Group on Emissions Trading Report; DCC Green Paper

The importance of TEEI industries to Australia is such that the ETS regulator should be provided with sufficient resources to manage this task.

## 3.2 Businesses in affected industries should be fully compensated, above an appropriate threshold

This review has analysed the economics of a number of case study businesses, covering most generally discussed TEEI industry sectors (see Exhibit 3.9). Fourteen existing businesses have provided details of their fundamental economics, including data on cost structures, returns on capital and cash flows. Details of seven investment projects, either recently completed or currently under consideration, have also been made available. In each case, estimates of greenhouse gas emissions, both direct and indirect, have also been provided.

Exhibit 3.9

**SUMMARY OF CASE STUDY DATA USED IN THE REVIEW**

**Summary of case study companies**

| | |
|---|---|
| **Number of case study businesses** | 14 |
| **Number of new investments disclosed** | 7 |
| **Range of case study business revenues** | $92m to >$3b |
| **Potential TEEIIs sectors included** | 5 of 8 possible sectors* |
| **Total GHG emissions** | 34.1 Mt (6% of Australia's 2006 emissions) |

**Data provided by case study companies**

- Scope 1 and Scope 2 emissions estimates
- Current and (where appropriate) long term estimates of business economics, by facility where possible
  - – P&L detail
  - – estimated "stay in business" capital expenditure
  - – capital employed
- Estimated economics of new investments, either as full NPV models or selected modelling results

**Sectors included:**
- **Alumina refining**
- **Aluminium smelting**
- **Cement manufacture**
- **Lead smelting**
- **Paper manufacture**
- **Glass manufacture**
- **Petroleum refining**
- **Steel manufacture**
- **Sugar milling**
- **Thermal coal**
- **Zinc smelting**
- **Nickel**

* 8 possible sectors identified for analysis in Exhibit 4

Source: Case study companies

It is appropriate here to comment on the arrangements used to protect the case study businesses' confidentiality. The information described above is clearly of great commercial sensitivity. It is for this reason that the Exhibits used in this report do not identify by name the case study businesses, nor the industry sectors to which they belong. For the same reasons, the Exhibits avoid the use of actual dollar values, and instead report percentage changes or use indices to express quantities. Neither the BCA nor any of the individual case study companies have been shown undisguised versions of these Exhibits.

While this approach is a necessary consequence of the nature of the information provided, it has had no impact on the substance of this report. None of the recommendations made in this report are specific to individual companies or sectors. Instead, an analysis of the case studies as a group is used to suggest important ETS design features.

Specifically, analysis of these case studies suggests:

- Even at modest carbon prices, the impact on TEEI industries of introducing an ETS before competitors is substantial
- Faced with these impacts, businesses would take actions with important and immediate consequences to the economy and Australian employees
- If these consequences are to be avoided, TEEI industries should receive ~90% compensation by providing full compensation above a carbon cost threshold of between 3% and 5% of industry value add

Each of these findings will now be considered in detail.

### *3.2.1 Even at modest carbon prices, the impact on TEEI industries of introducing an ETS before competitors is substantial*

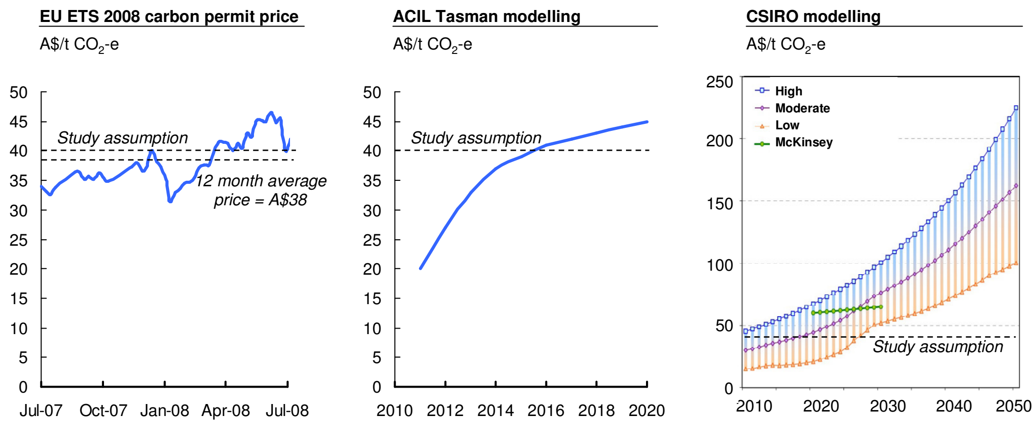
The case study data provided above has enabled an assessment of the impacts of carbon pricing on existing TEEI industries. This assessment was made by adjusting the basic economic data provided by adding costs associated with purchasing and acquittal of carbon permits. For existing operations, this analysis was based on economics judged as being representative of a company's fundamental economics – typically last financial year actuals, or next year forecasts. The impacts on new investments were estimated using the case study businesses' own financial models of each investment. In all cases, the analysis assumes the businesses concerned are unable to pass through any of the carbon cost impact – in other words that the businesses are entirely trade exposed. Given the facts of each company's situation this was an appropriate assumption in nearly all cases.

A carbon price of $40 per tonne of $CO_2$-e was chosen as the base case assumption for these assessments. In the absence of an Australian carbon market with a well developed forward curve, a reliable market-based price assumption is not available. As Exhibit 3.10 shows, however, that $40 per tonne is close to a number of appropriate benchmarks, including:

- The past 12 month average price for 2008 EU ETS permits, in Australian dollar terms
- The 2015 forecast of a respected electricity industry model. This price is especially relevant as it is the electricity sector that is likely to achieve most of the early abatement, and so will strongly influence permit prices
- The CSIRO's mid-range "moderate outlook" forecast for 2020. It is, however, lower than the recent assumptions made by McKinsey & Company

Exhibit 3.10

**RECENT ESTIMATES OF THE RANGE OF CARBON PRICES**




Source: CSIRO Report to the Climate Institute: Energy Affordability, Living Standards and Emissions Trading; Bloomberg; ACIL Tasman

In the Exhibits that follow, price sensitivities have been shown explicitly where appropriate, especially where business boards and management will be factoring in a broad range of possible price outcomes to their decision making. In most cases the conversion of the data shown to a different carbon price is a simple linear one.

The impact of a carbon price of \$40/t $CO_2$-e on the existing operations of the case study businesses is substantial. The following Exhibits summarise this impact; each case study business is shown separately. In summary:

- Profits, measured by earnings before interest and tax (EBIT), would reduce by between 9% and 347%, with a median reduction of 53%
- In turn, in almost all cases, returns on capital (EBIT divided by capital employed) would fall below typically acceptable levels. This is shown in Exhibit 3.12
- Cash flows, after deducting forecast 'stay in business' capital expenditure, would reduce by between 10% and 347%, as shown in Exhibit 3.13. Four of the case study businesses would become cashflow negative, and a further four would see cashflows fall to an extent that operations could be threatened

Exhibit 3.11

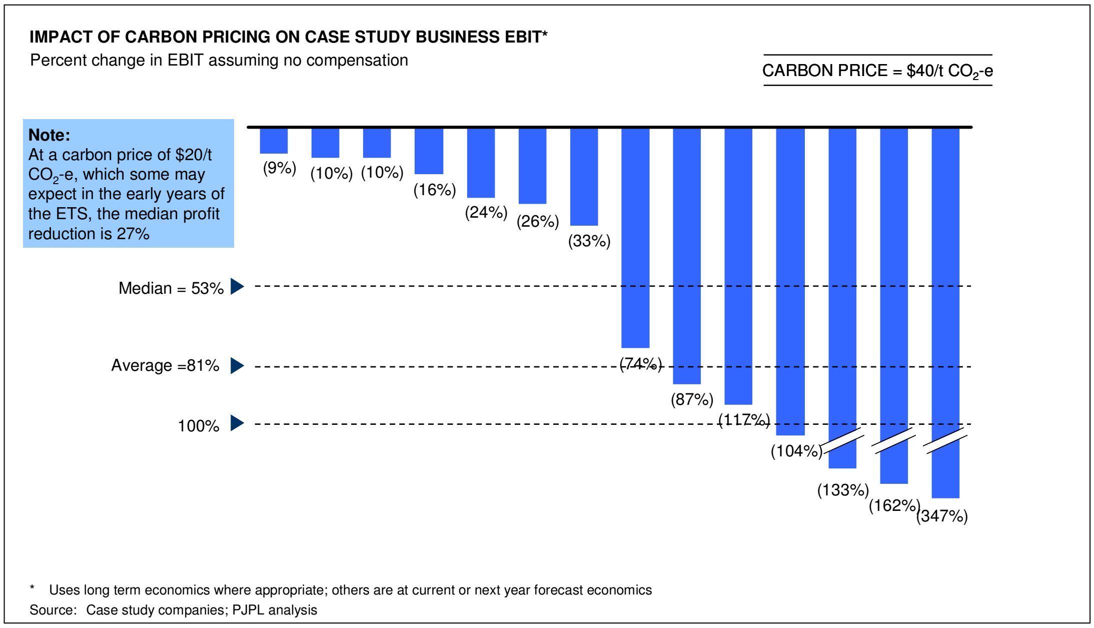



Exhibit 3.12

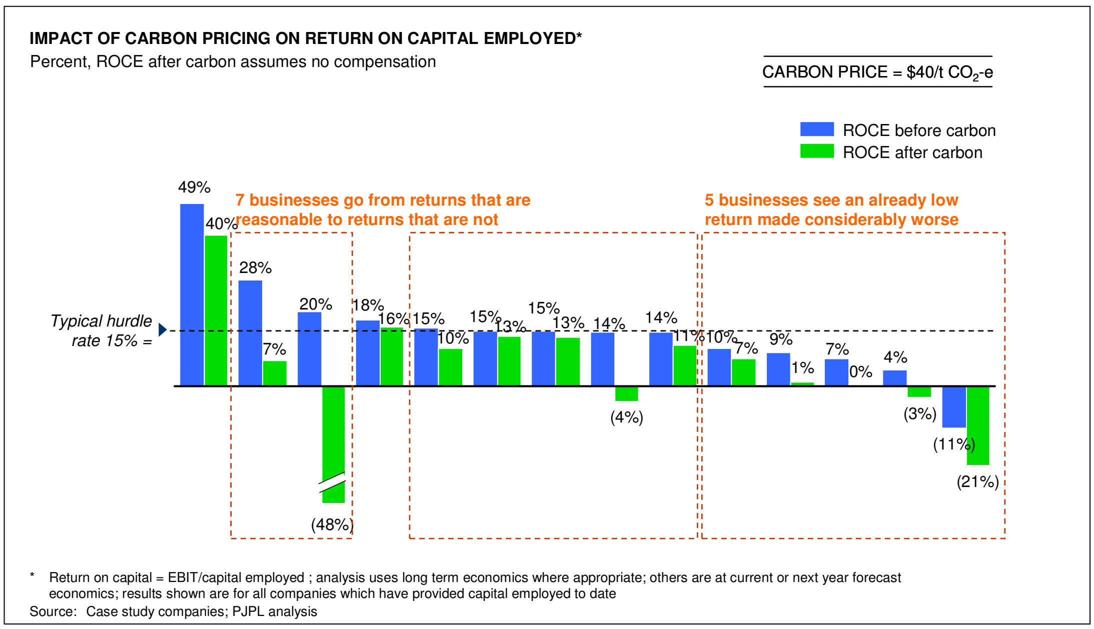
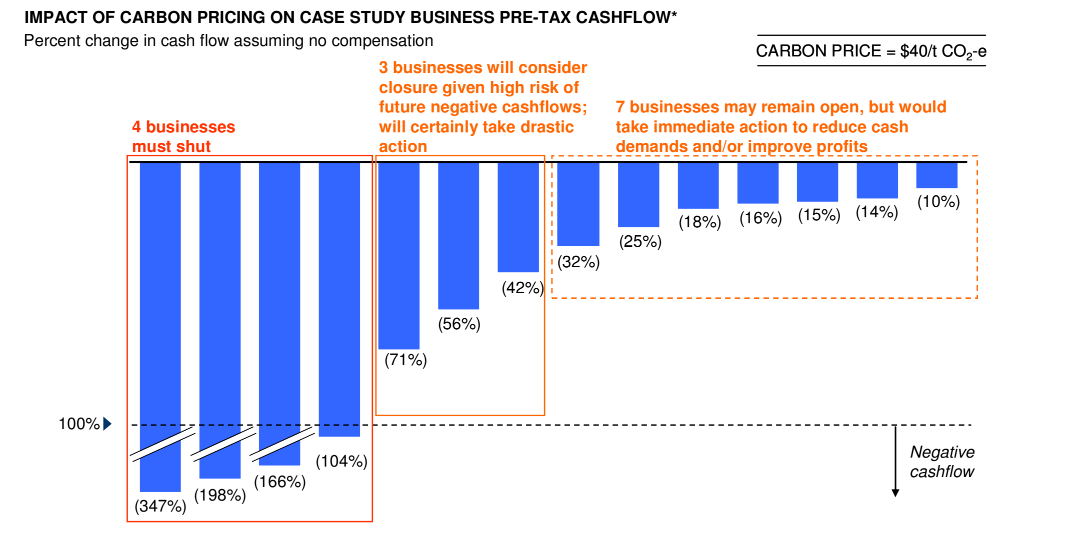


Exhibit 3.13




* Analysis uses long term economics where appropriate; others are at current or next year forecast economics
Source: Case study companies; PJPL analysis

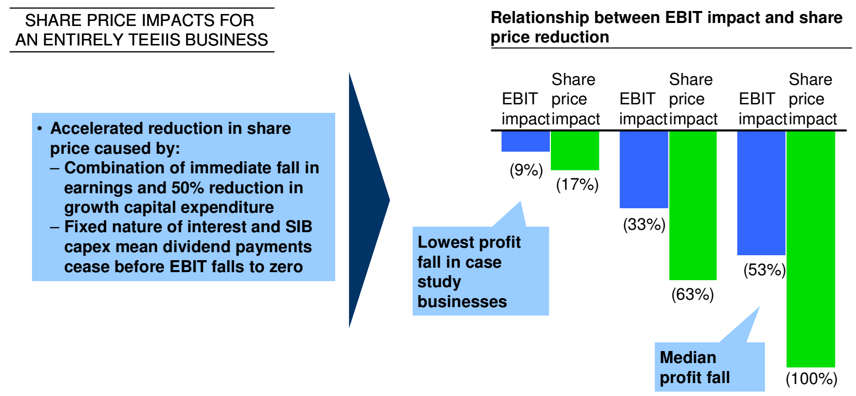
These impacts would have broader implications. Two are worth highlighting here.

The first implication is that, without compensation, reductions in EBIT would rapidly translate into reductions in equity valuations and so into the value of investment portfolios. Exhibit 3.14 shows the impact on the share price of a hypothetical TEEI industry business – one whose fundamental economics are based on the median margins and returns of the case study sample. The analysis values this business' equity on the basis of future dividend flows. This methodology is similar to that commonly used by equity market traders, analysts and investors. In interpreting these results, it is important to note that the impacts shown are for a company which is 'TEEI industries only'. In many cases, TEEI businesses will be part of larger corporate structures and so the impacts shown will be diluted.

Exhibit 3.14

**SHARE PRICE IMPLICATIONS OF REDUCED EBIT—HYPOTHETICAL TEEIIS BUSINESS**
Percent

**Based on median economics of case study business**




* Assumes pre-emissions trading performance of 14.5% ROA, growth capex spend sufficient for 2% revenue growth per year, SIB capex equal to 100% of depreciation assumed to be over an average of 15 years, 50% gearing, 9.0% interest on debt; dividends set at maximum of 75% of NPAT and available cash; excludes working capital impact of permit purchases; share price derived using discounted value of future dividend payments, and cost of equity capital equal to 6.25% risk free rate plus 6% equity risk premium

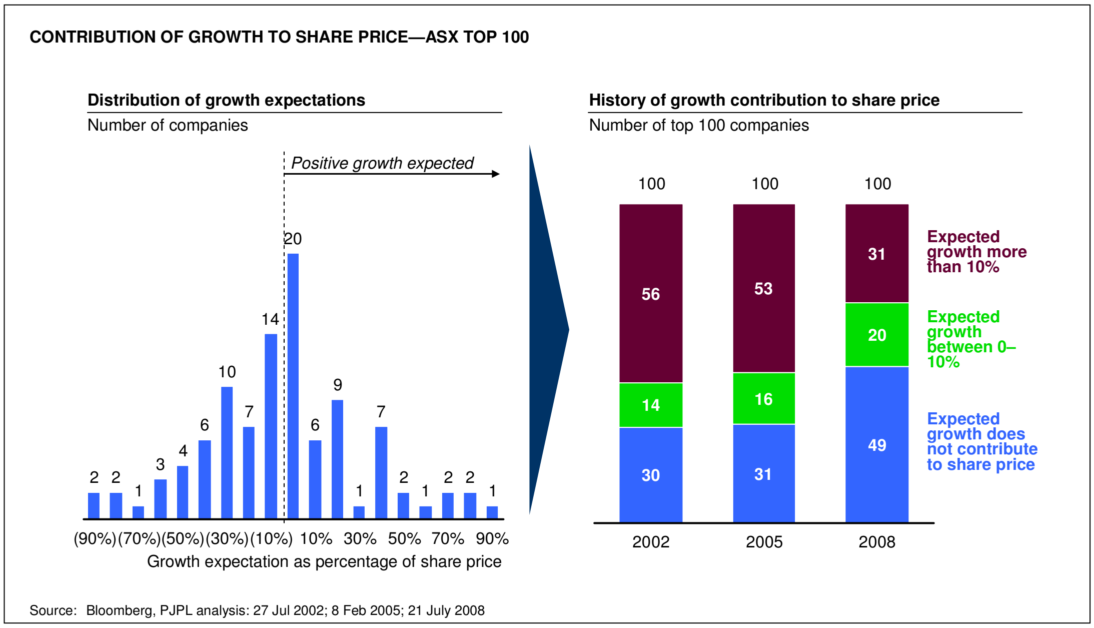
Source: Case study companies; PJPL analysis

In general, the effects on share price valuation from a lack of TEEI industry compensation are extremely significant. The minimum 9% fall in profits across the case study group would cause a share price fall of 17%. The median profit fall could erase all shareholder value.

The impact on share price is more than simply the percentage reduction in earnings. There are two reasons for this.

First is the reduction in growth capital expenditure assumed given the need to conserve cash, and due to the reduced growth opportunities available with an ETS. The close link between growth and share prices is not an artefact of the modelling used. Indeed, expectations of future growth are a key driver of equity market valuations. This is demonstrated in Exhibit 3.15, which shows the relative contribution of current earnings and growth for Australia's top 100 companies. Thirty one of the top 100 companies rely on future growth expectations for more than 10% of their share price. In some cases, their shares are overwhelmingly valued on the promise of future growth. As prospects for future growth are damaged, share prices would quickly fall. Note that share market valuations are less sensitive to growth today than has been usual over the last six years.

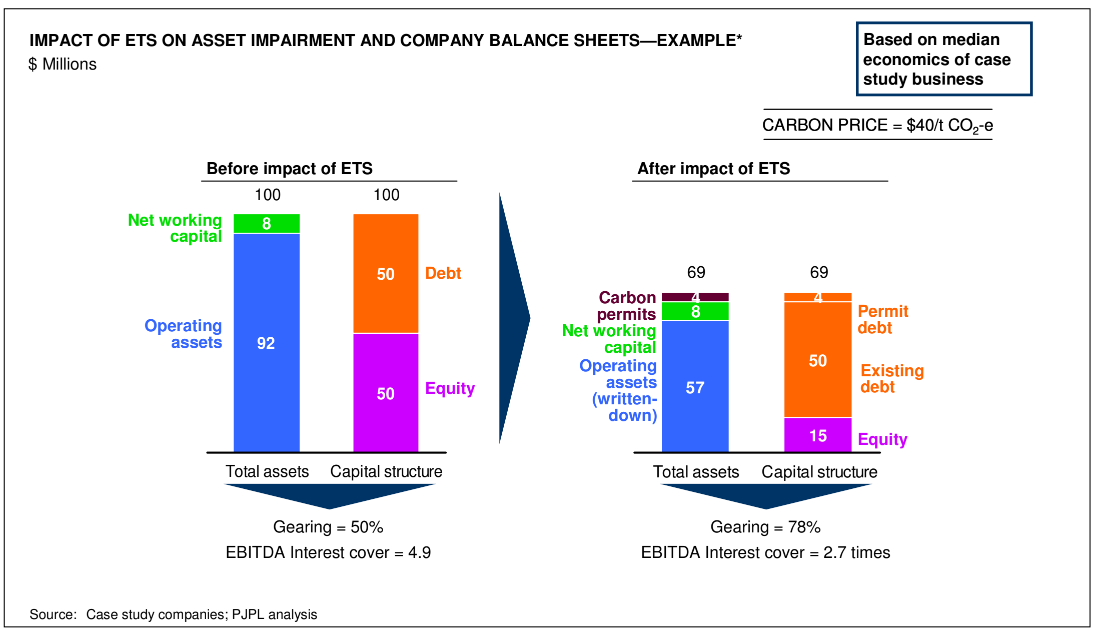
Exhibit 3.15




Second, profit after tax (PAT), out of which dividends must be paid, reduces more quickly than EBIT due to the relatively fixed nature of interest costs.

The second implication of the earnings reductions described is that without compensation, balance sheet impacts can quickly place businesses at risk of default or insolvency. Again based on a hypothetical median TEEI industries business, Exhibit 3.16 illustrates the implications of asset writedowns that might occur as a result of the earnings reductions above.

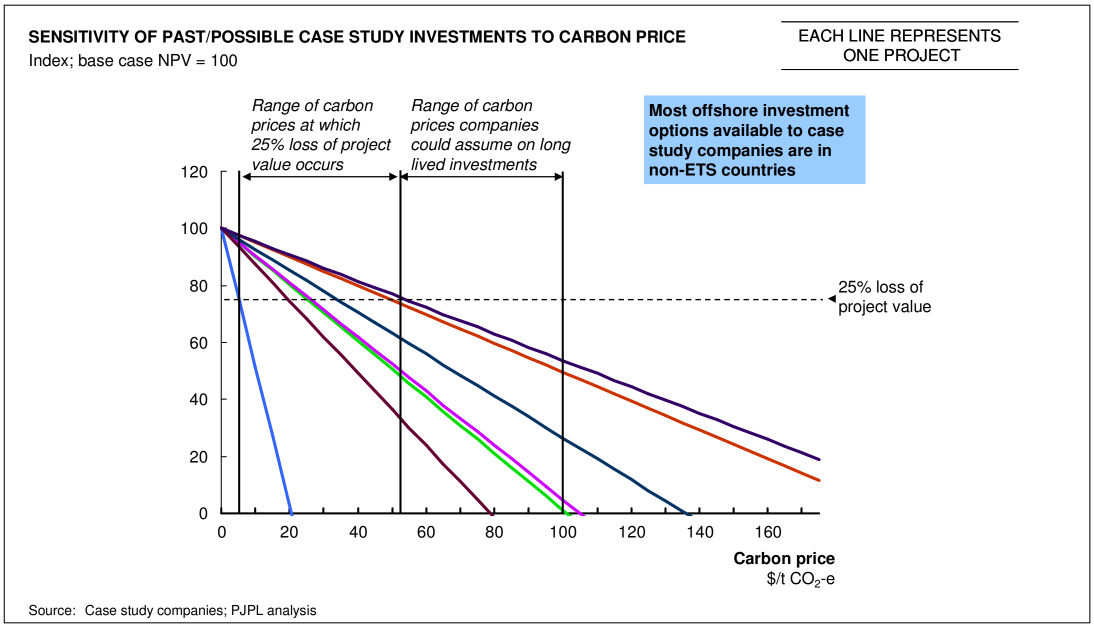
Exhibit 3.16




In this scenario, the balance sheet values of the business' operating assets are reduced by a conservative 75% of the net present value of lost future cashflows, based on the median earnings reduction shown above. As a result, almost all shareholders' equity is lost, and gearing, measured as the proportion of debt to total capital invested, increases from 50% to 78%. In addition, reduced earnings mean the business' ability to repay interest, measured by EBITDA interest coverage, falls from 4.9 times to 2.7 times. Under these circumstances, banks, and individual directors, would have to look closely at the business' ability to meet its continuing commitments. Again, these results are for a 'TEEI industries only' company.

Apart from the impacts on existing businesses, reductions in project valuations would make investment in new domestic capacity difficult. Exhibit 3.17 illustrates the impact on values of the recent or potential new investments provided by the case study companies. Each line on this chart represents a separate investment. Each investment's values are expressed as an index, with each base case valuation (i.e. before a carbon price) set to equal 100.

Exhibit 3.17




It can be seen that substantial reductions in investment valuations occur even at low carbon prices. Over the range of permit prices investment committees or boards may judge necessary to consider, up to perhaps \$100/t $CO_2$-e, the potential impact on project values is very large.

### *3.2.2 Faced with these impacts, businesses would take actions with important and immediate consequences*

The management and boards of the case study companies would have to respond to the reductions in business performance described above. Immediate action would be required to improve the performance of existing businesses.

Exhibit 3.18 illustrates some typical actions available, given a particular degree of business 'illness'. At relatively modest levels of earnings reductions, companies would undertake cost reduction programs and changes to product specifications, designs or production mix. The reaction of Qantas to current fuel price increases is typical.

Exhibit 3.18

**TYPICAL 'REMEDIES' FOR REDUCED BUSINESS PERFORMANCE**

| Diagnosis | Symptoms | Prognosis | Remedies |
|---|---|---|---|
| **"Sick"** | • Reduced earnings…<br>• … though still a satisfactory rate of return | • Loss of shareholder value through share price decline<br>• Increased difficulty paying dividends<br>• Increase in perceived business risk leading to increased cost of new capital | • Immediate actions to increase price…<br>– restructure product mix<br>– raise product prices, balancing potential market share losses<br>• …and reduce costs<br>– reduce levels of staff, initially in "overhead", but ultimately in operations as well<br>– negotiate cheaper rates with suppliers |
| **"Hospitalised"** | • Returns fall below levels required by investors | • As above, plus:<br>– changed perception of industry attractiveness<br>– owners consider exiting the business | • Actions as above, but with more urgency and higher targets<br>• Reduce working capital by renegotiating terms with suppliers and customers<br>• Limit capital expenditure, including all but the most necessary stay in business investment |
| **"Intensive care"** | • Cash flow falls to extremely low levels<br>• In worst cases, businesses become cash flow negative | • Likely quick exit | • As above…<br>• …but directors/owners must quickly evaluate position with respect to solvency<br>• After assessing the risks, closure may be the most suitable option |

Source: Industry interviews

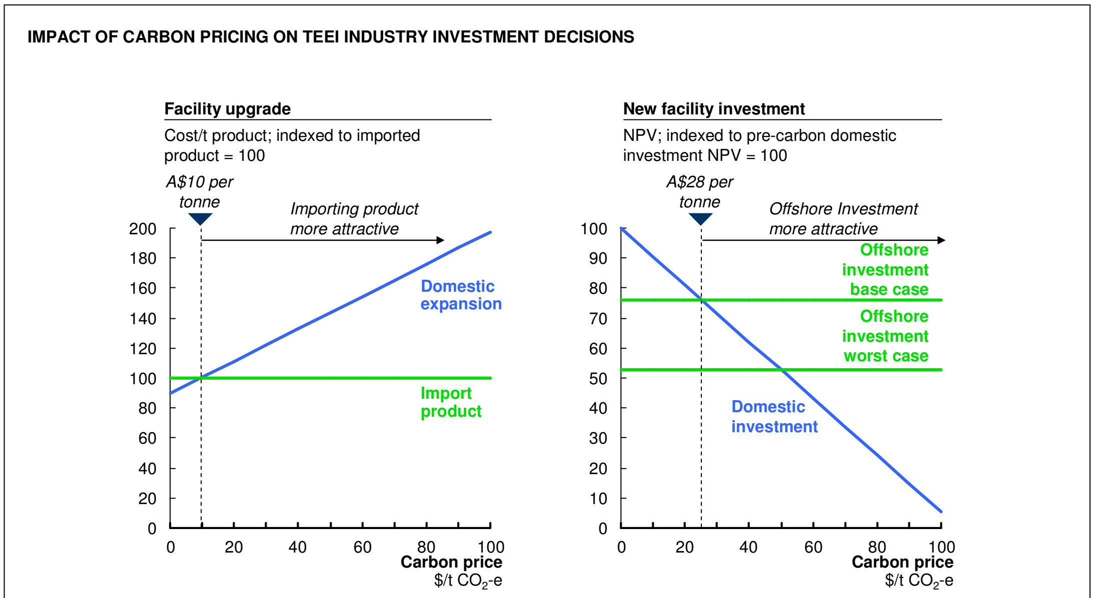
As earnings fall further, so that returns to capital fall below acceptable levels, actions to reduce capital employed would be added, including renegotiating terms with customers and suppliers, and restricting new investment to minimum levels. Finally, as businesses approach the point where cash flow is sufficiently restricted, issues of solvency and facility closure must be considered.

These actions are likely to be more rapid and taken with more fervour than those unfamiliar with business might expect. For example, some have been surprised at the recent steps taken by Qantas. Businesses have, however, any or all of the options described in Exhibit 3.18 available at any time. Every day, Australian managers strive to increase cost efficiency, or sell businesses to new owners, or evaluate whether a particular business can survive. The difference in this case is that, for most case study companies, the earnings reductions described above are of a size outside the usual experience of many in the Australian business community.

Even with these increased efforts, many affected businesses may not see sufficient improvement. As Exhibit 3.18 shows, without a successful 'cure', or even with a partial one, the outlook for nearly all the businesses in the case studies is poor.

For new investments, the impacts described above will see most investment moved offshore. In almost all cases, the investments described in Exhibit 3.17 above have offshore alternatives. Exhibit 3.19 shows in detail the relative attractiveness of two such investments and their alternatives. In one case, the comparison is of cost to manufacture product in a new domestic facility versus that of investing overseas and importing the product. In the other, the comparison is of project values themselves. In both cases, a low carbon price is sufficient to make offshore alternatives more attractive.

Exhibit 3.19




Source: Case study companies; PJPL analysis

### *3.2.3 If these consequences are to be avoided, full compensation of between 3% and 5% of industry value add will be required*

The threshold at which businesses are declared eligible for compensation, and the level of compensation provided above that threshold, are the pivotal design parameters for any TEEI industries compensation scheme. Perhaps more than any other design decision, they govern the effectiveness of the scheme in avoiding the consequences described above.

Analysis of the case study businesses suggests the following conclusions:

- Pay full compensation for emissions above an emissions intensity threshold
- The threshold should be based on the financial impact of carbon costs, not on tonnes of emissions intensity
- The threshold should be set at a carbon cost of between 3% and 5% of industry value add
- Rather than conform to an artificial limit (such as 30% of permit revenues), compensation should be given to all qualifying businesses
- Issue permits to new TEEI facilities outside the emissions cap, assuming 'world's best' emissions practice

Exhibit 3.20 summarises these findings, which are described in more detail below.

Exhibit 3.20

**PROPOSALS FOR COMPENSATION FOR IMPACTS ON TEEIIS BUSINESSES**

| Proposal | Rationale |
|---|---|
| **1. Provide full compensation only for emissions above a threshold** | • Avoids providing an incentive to increase emissions to make the threshold<br>• Fair to businesses just under the threshold |
| **2. Use a threshold based on the financial impact of carbon costs** | • Avoids large carbon price risk being placed on TEEI businesses<br>– Prior to international agreements, Government can best manage prices |
| **3. Set a threshold of between 3 and 5% of industry value add** | • Limits EBIT impacts while creating an appropriate abatement incentive<br>• Avoids unfairly punishing highly profitable but low margin industries |
| **4. Compensate all businesses which face material impacts** | • Set compensation based on risk to TEEI industries, not within the artificial 30% limit<br>• At modest carbon prices, the compensation proposed here is consistent with proposed limits on TEEIIs compensation |
| **5. Issue permits to new TEEI facilities outside the emissions cap, assuming "world's best" emissions** | • The alternative is to stop investment or place unreasonable demands on other sectors<br>• Maximises chances of investment consistent with a global carbon price |

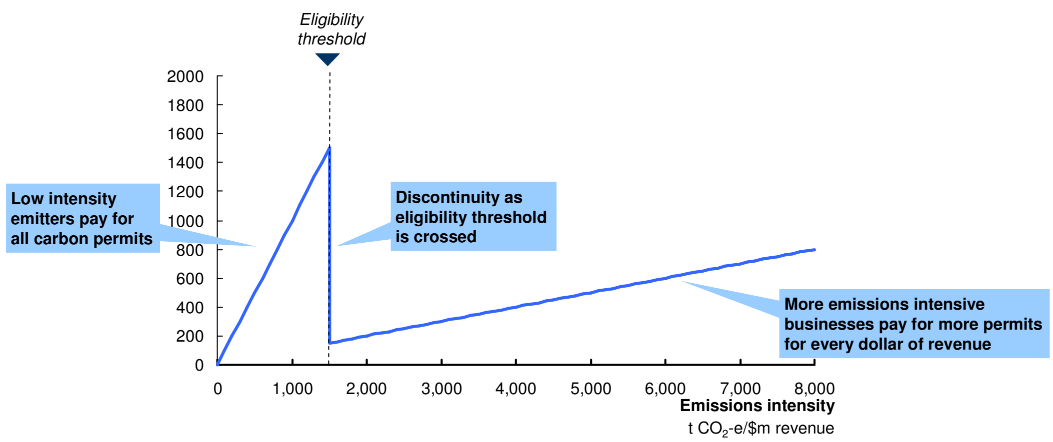
### *3.2.3.1 Provide full compensation only for emissions above an intensity threshold*

The proposal is to provide compensation to a company only for its emissions *above* an intensity threshold, rather than for a proportion of *all* the company's emissions. This produces equitable outcomes, and avoids creating incentives to increase emissions.

This can best be understood by considering a "straw man" alternative – paying compensation for 90% of all emissions for any company whose emission intensity is above a threshold.

Exhibit 3.21 illustrates such an arrangement. In this case, the threshold for compensation is set to 1,500 tonnes of $CO_2$-e per million dollars of revenue. The blue line on the chart represents the volume of permits a TEEI business would have to buy under such a scheme. Given a particular permit price, higher permit volumes will translate directly to larger reductions in business performance.

Exhibit 3.21




Source: PJPL analysis

It is clear that the arrangement shown is inappropriate. There are three reasons for this:

- There are large differences in financial impact for businesses on either side of the threshold. In this case, a business with emissions of 1,400 tonnes per million dollars of revenue would pay for all its permits, but one with 1,500 tonnes per million dollars would pay for just 10%

- Consequently, there is also an incentive created for businesses just below the threshold to increase their emissions, and for those above the threshold to maintain their emissions at current levels

- Finally, as compensation is awarded for 90% of permits, more emissions intensive firms pay for more permits per dollar of revenue

The compensation arrangements proposed in the Green Paper are a variant on the 'straw man' presented here, and will be addressed in Section 3.4.

*3.2.3.2 Use a threshold based on the financial impact of carbon costs, not on tonnes of emissions intensity*

A threshold based on the financial impact of carbon costs will most effectively provide compensation to TEEI industries across all carbon prices.

The final reports of the NETT, the PMTG and the Green Paper all envisage compensation thresholds based on tonnes of emissions intensity. All recommend using a threshold based on tonnes of $CO_2$-e per million dollars of revenue.

Using such a threshold will create a TEEI industry compensation scheme whose effects vary considerably with carbon price. For example, the financial impact at a threshold of 1,500t $CO_2$-e/$m of revenue is significantly more at a carbon price of, say, $50/t $CO_2$-e, compares with a carbon price of, say, $20/t $CO_2$-e.

This effect can be eliminated if the threshold is defined using the financial impact of carbon costs. One way of doing this would be to declare businesses eligible for compensation once the cost of their carbon emissions (as opposed to the number of permits required) rises to a set percentage of value add or revenues.

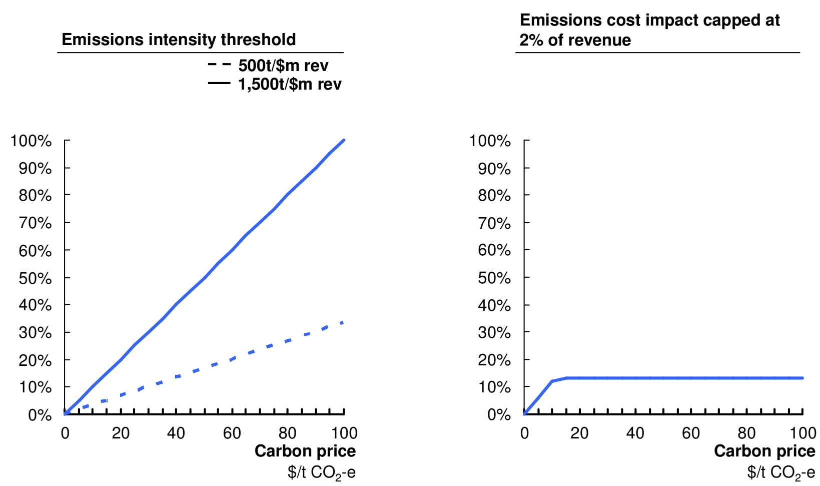
The difference between the two approaches is illustrated by Exhibit 3.22, which shows how the EBIT of a hypothetical TEEI business would vary under each type of threshold at various carbon prices. The hypothetical business is assumed to have the median EBIT margin and emissions intensity of the case study businesses. The left hand side of Exhibit 3.22 shows the outcome, measured as change in EBIT after compensation, of a threshold based on tonnes – either 500 or 1,500 tonnes per million dollars of revenue. The right repeats the analysis for an example threshold based on financial impact – in this case one which assumes compensation is given for carbon costs which exceed $20,000 for every million dollars of revenue (i.e. a threshold of 2% of revenue).

Exhibit 3.22

**EBIT IMPACT OF DIFFERENT COMPENSATION SCHEMES**

Percent reduction in EBIT after compensation

15% EBIT MARGIN




Source: Case study companies; PJPL analysis

For the former, even after compensation, high carbon prices create substantial EBIT impacts. The effect is reduced if the threshold is lowered – in this example from 1,500 to 500t $CO_2$-e/$m revenue – but remains substantial. At a carbon price of $100/t $CO_2$-e, 100% of profits are lost at 1,500t $CO_2$-e/$m revenue; but 'only' 35% are lost using 500t $CO_2$-e/$m revenue.

By contrast, using a threshold of 2% of revenue means the impact on the hypothetical business' EBIT is independent of the carbon price. A compensation scheme whose impacts do not vary with carbon price will be much more successful in avoiding the consequences for TEEI industries described above. Such a scheme would materially reduce the uncertainty associated with the introduction of the ETS. Under these circumstances, TEEI industries businesses could make decisions regarding existing and new investments with greater confidence.

An important outcome of a threshold based on the financial costs of carbon is that the risks associated with the emissions permit price is transferred from TEEI industries to Government. Using a threshold based on tonnes, the quantity of permits issued to TEEI industries does not change with the carbon price. In contrast, using a threshold based on the carbon costs means individual TEEI industries receive more emissions permits as carbon prices rise.

In addition, more businesses become eligible for compensation as they face an increased carbon cost impact. The implication is that the portion of total permit revenue required to compensate TEEI industries will vary with carbon price.

It is appropriate, however, that this risk is placed with Government rather than TEEI industries. In the early stages of Australia's ETS, the most important driver of carbon price will be the initial emissions trajectory chosen, and the conditions under which that trajectory will be varied. It is Government, therefore, that can best manage carbon prices.

*3.2.3.3 Use a threshold of between 3% and 5% of industry value add*

Assuming a threshold based on the financial impact of carbon costs is chosen, three important questions must be answered:

- Should eligibility be assessed for an entire industry, or like facilities within an industry, or for individual facilities?
- How should the threshold be defined? In other words, what is the denominator which best matches the carbon cost numerator?
- Given the above, at what level of carbon cost to businesses should the threshold be set?

It is most appropriate to assess eligibility for the facilities in an entire industry, not for each potential TEEI business separately. Depending on the metric chosen, assessing eligibility for individual businesses risks awarding compensation to relatively poorly run (i.e. low margin) and relatively high emissions intensity businesses, while excluding well run, emissions efficient businesses. TEEI compensation payments should not create or destroy competitive advantages within industries. This preference for industry average facilities is consistent with the approach outlined in the Green Paper[8].

For this approach to be appropriate, however, care must be taken to define each industry precisely. Data in Appendix D of the Green Paper[9] uses ANZSIC codes to define industries. These are clearly too broad. For example, the case study businesses classified within "other non-ferrous metals and products" have actual emissions intensities far higher than the value shown. Industry assessments based on Appendix D would provide inadequate compensation for those case study companies.

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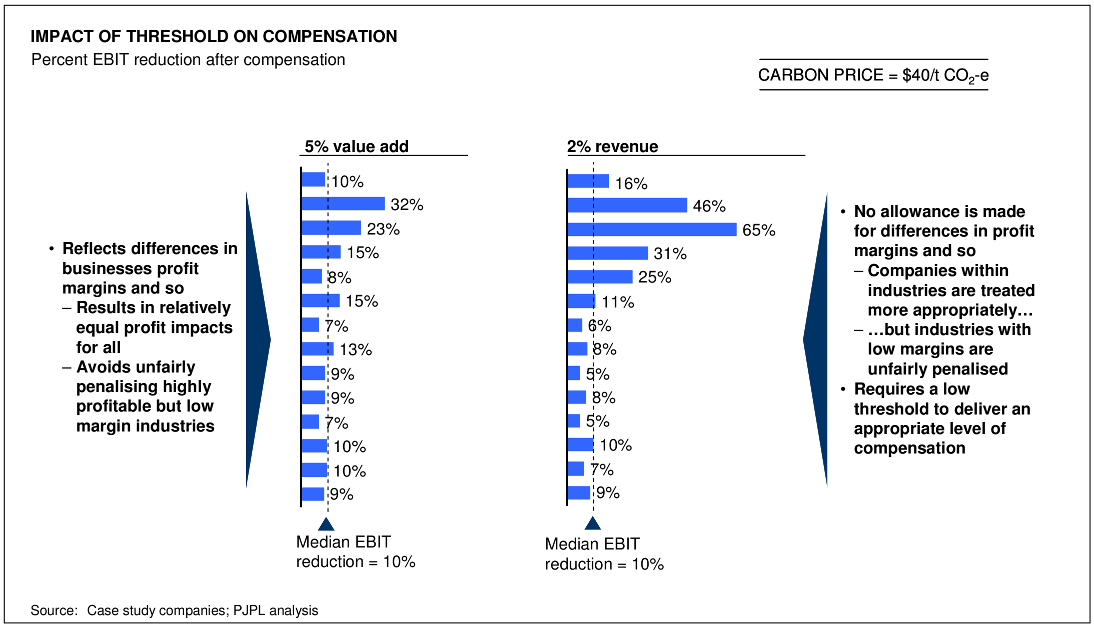
[8] Dept of Climate Change, 'Carbon Pollution Reduction Scheme Green Paper', July 2008, page 304

[9] ibid, page 497

The most appropriate denominator to use when calculating the threshold is value add, defined as earnings before interest, tax, depreciation, and amortisation (EBITDA) plus labour. On balance, this option is superior to its principal alternatives, revenue and profit.

Thresholds based on revenues are often proposed. The case study sample, however, suggests a threshold based on value add should be preferred because it creates fairer outcomes for all TEEI industries. This is illustrated in Exhibit 3.23.

Exhibit 3.23




The Exhibit shows the potential EBIT impacts for the case study businesses after compensation under both value add and revenue based thresholds. The revenue based threshold of 2% has been set to create the same median EBIT impact as a 5% value add threshold, the highest in the range. It is important to note that in these Exhibits, and in the ones that follow, it has been assumed all the case study companies meet the relevant test for trade exposure.

The revenue based threshold creates a much wider distribution of outcomes across the group. Importantly, under the revenue based threshold case study businesses with low margins suffer larger EBIT impacts than those with higher margins.

This bias is inappropriate. It can only be justified if low margins are assumed to be linked to 'marginal' industries. Low margins, however, are not in themselves evidence of unattractive industries. Many businesses successfully combine low margins with low capital employed to provide attractive returns to investors. Construction is one obvious example of such an industry.

A more specific example of how revenue measures can be inappropriate is for businesses which earn their returns from a very narrow 'spread' between a globally priced feedstock and a globally priced product. Petroleum refining is the most obvious example of this – in this case the 'spread' is between delivered crude oil and delivered refined product.

In these cases, the majority of the revenue earned is in effect a pass-through of the costs of relatively expensive raw materials. As a percentage of total revenue, these businesses can, therefore, appear to have very small emissions intensities.

To all intents and purposes, however, it is the ‘spread’ which drives the economics of these businesses. Assessing emissions intensity on the basis of total revenue is close to a meaningless measure for the petroleum refining industry.

Value add is also more appropriate than simple profit measures, such as PAT or EBIT. This is because it is a broader measure, reflecting what a company adds to the inputs it buys from others to create a product. Profit-based measures are too narrow, and so are too susceptible to distortion by one-offs even if the calculation is made on an industry basis.

Estimating value add is more complex than revenue. The equitable and effective compensation which results from a value add based threshold is, however, likely to outweigh this additional complexity.

Based on the above, and on the economics of the case study businesses, a threshold of between 3% and 5% of average facility value add within an industry should be used in order to provide appropriate compensation.

A compensation scheme based on a 3% threshold would limit the median EBIT impact on the case study businesses to 6% (Exhibit 3.24). Choosing a higher threshold of 5% increases the median impact to 10% (Exhibit 3.25). Note that although these impacts are expressed as changes to EBIT, the underlying calculations are based on value add as defined above (EBITDA plus labour).

Exhibit 3.24

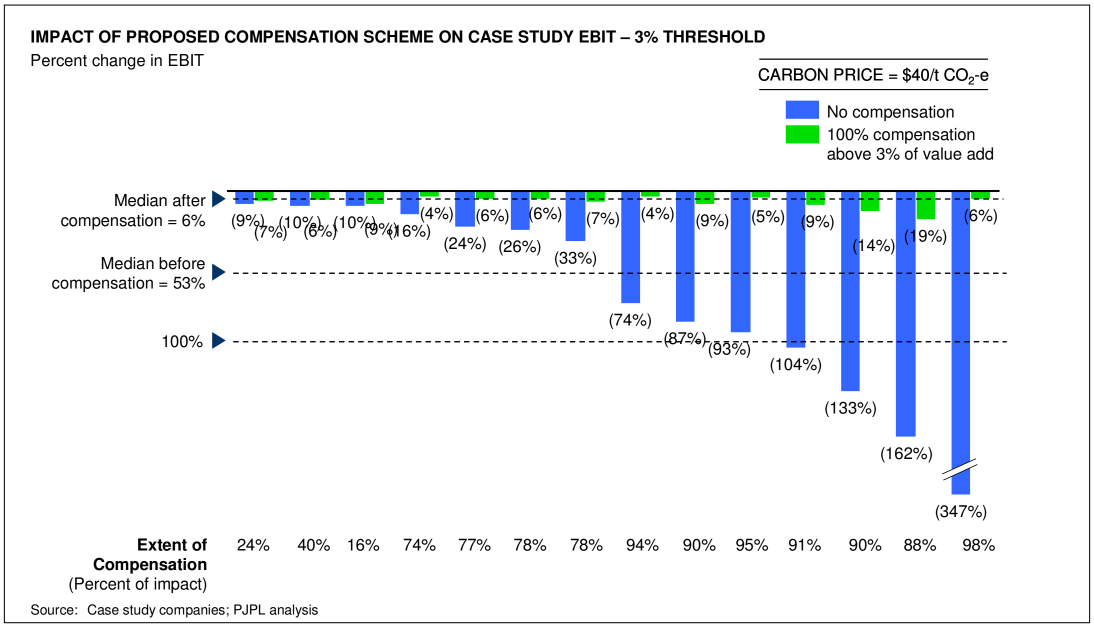
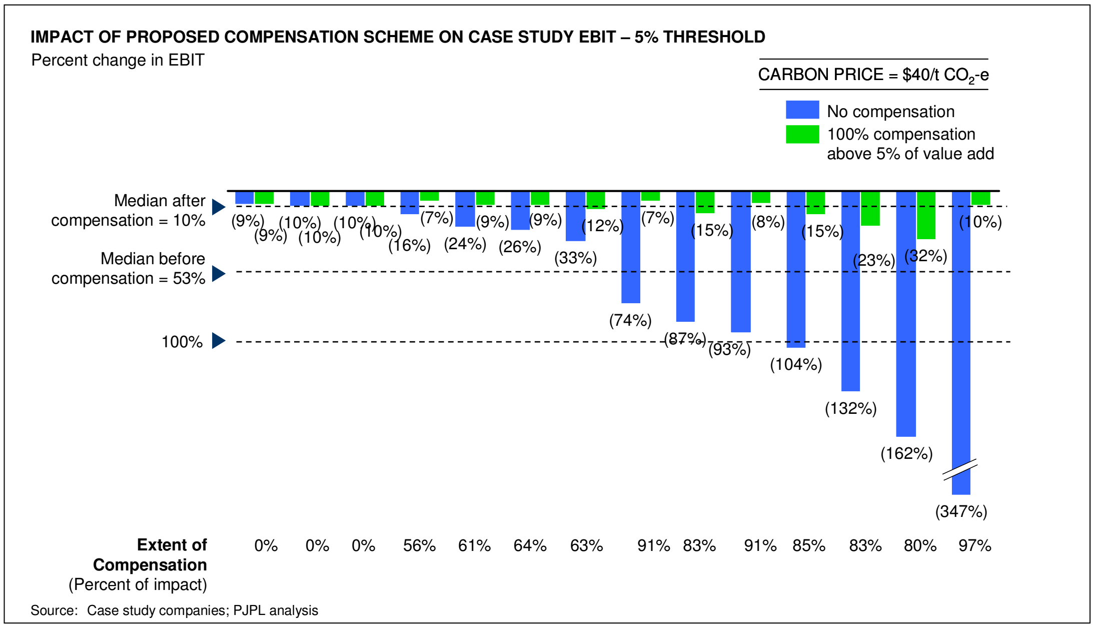


Exhibit 3.25




Neither of these thresholds would result in full compensation for TEEI businesses. On balance, this is appropriate for two related reasons:

- It seems reasonable that TEEI industries share in the overall reduction in community welfare that will result from the introduction of an ETS
- Experience suggests that businesses typically respond more vigorously to signals sent through falling profits rather than by missed opportunities. This means that while in strict economic terms free and purchased permits provide the same incentive to abate, some profit 'hit' is likely to create more rapid activity

Of course, these reasons are only valid if businesses are not too strongly affected by the initial affect of the ETS. On the basis of industry experience, thresholds higher than 5% of value add risk allowing earnings impacts which are too large to avoid the consequences described above.

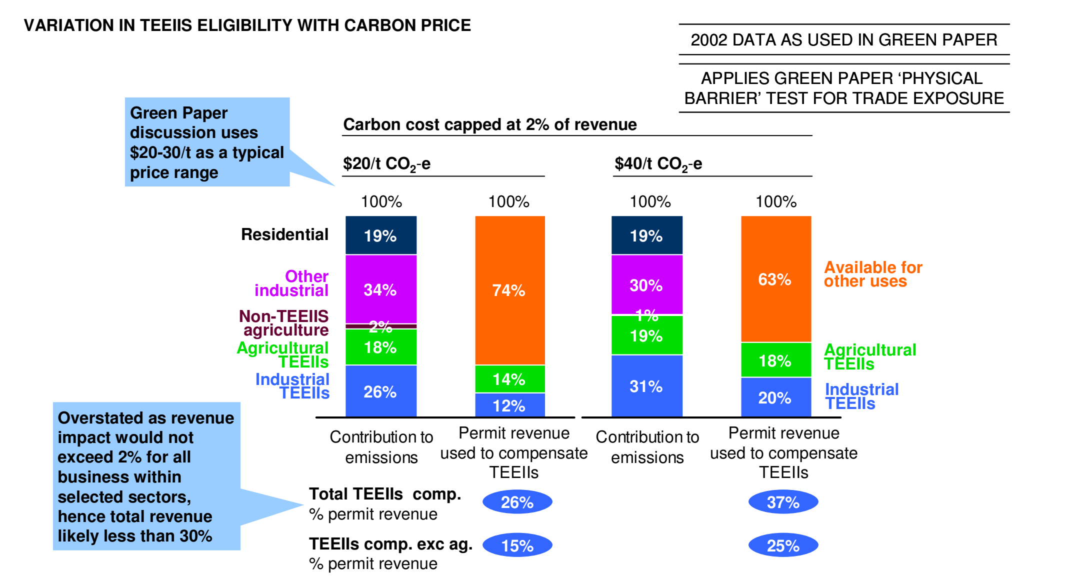
*3.2.3.4 Give compensation direct to all businesses which pass established tests*

TEEI industry compensation can only be effective if it prevents the immediate and widespread consequences which arise from the earnings reductions described above. If preventing business risks is the priority there is no logic for making these judgements solely to fit within an artificial limit. Such a predetermined limit will be appropriate under some circumstances, but not in others.

It is, however, worth keeping this problem in perspective. The Green Paper envisages a cap on TEEI industries compensation at about 30% of total permit revenue, after including all sectors. The arrangements proposed above, on the available data, are broadly consistent with that allocation.

Exhibit 3.26 illustrates this. As discussed above, data in Appendix D of the Green Paper can be used to estimate which particular industry sectors will be eligible for compensation at various carbon prices. At $20/t $CO_2$-e, payments to TEEI industries will comprise less than the 30% target. At $40/t $CO_2$-e, around 37% of permit revenue is required. Note that these estimates are only broadly correct. They assume that all businesses in each of the sectors will be eligible for TEEI industries compensation, which will not be the case. In addition, the data is from 2002, and so may not accurately reflect today's circumstances.

Exhibit 3.26



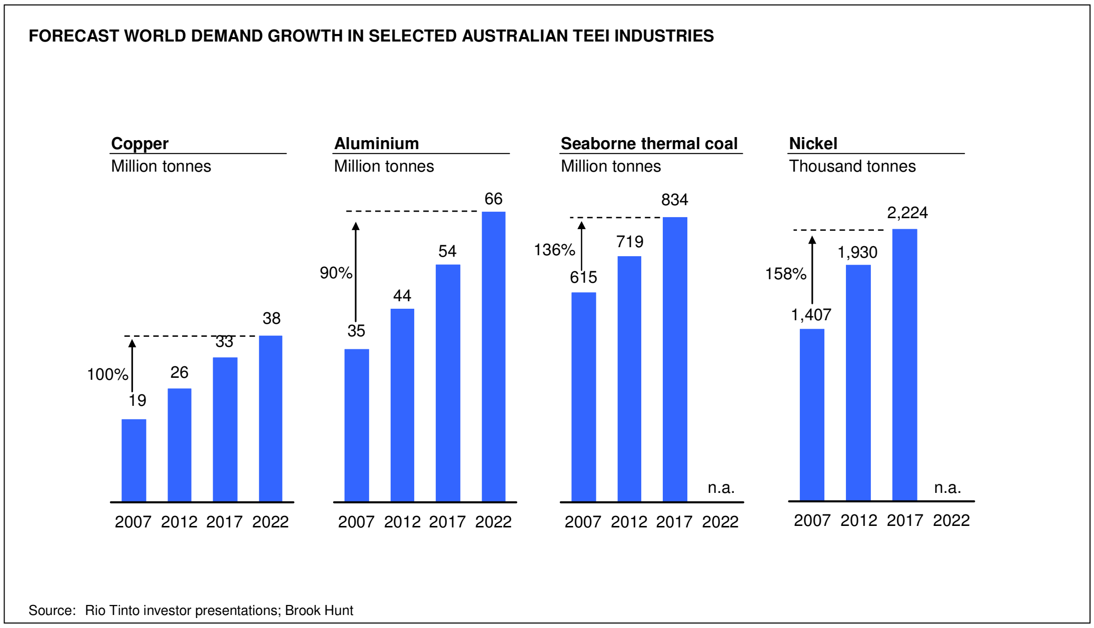
Source: DCC Green Paper; PJPL analysis

It is worth remembering that it is the Government that can best cap the revenues provided to TEEI industries, through its emission trajectory and so permit price. If industry is asked to take this risk the objective of compensation will be defeated.

*3.2.3.5 Issue permits for new TEEI facilities from outside Australia's emissions cap, on a 'world's best' basis*

Many potential TEEI industries sectors are forecasting strong demand growth in the short to medium term. As Exhibit 3.27 shows (Exhibit 3.7 repeated here for convenience), refined metal demand is forecast to grow at around 7% per annum over the next 10 to 15 years.

Exhibit 3.27




If Australia's TEEI industries are to play a role in satisfying this demand growth, the way in which new facilities are included in the ETS is an important consideration.

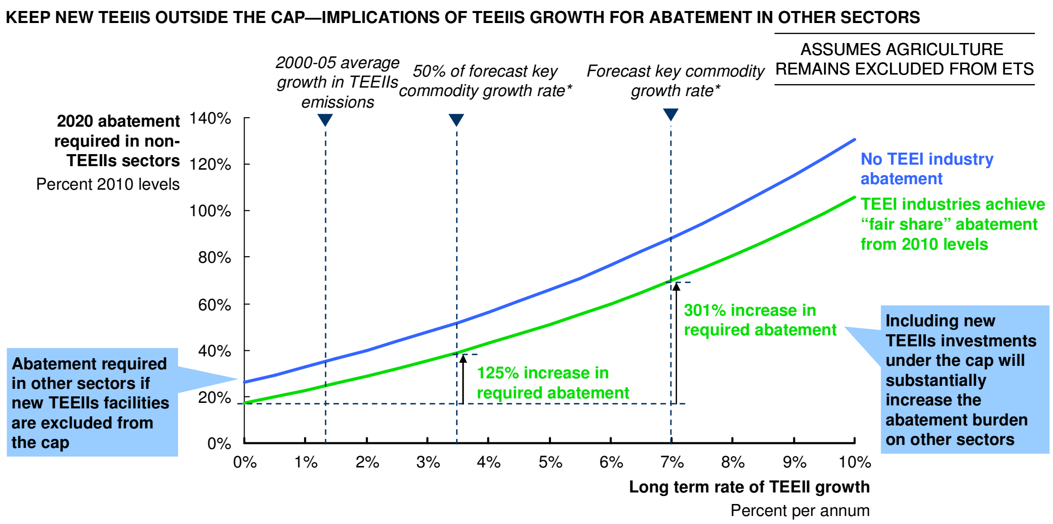
There are three principal options:

- Treat these new investments as any other new capacity investment, by requiring them to buy permits from within the national emissions cap
- Provide free permits as for other TEEI industries businesses, taken from within the national emissions cap
- Provide free permits, at world's best practice emissions intensities, and expand the emissions cap by the amount of free permits issued

As discussed in Section 3.2.1 the first option would mean new TEEI industries investment would generally not occur. This option has all of the environmental and economic implications previously described. Given that low carbon technology will be most easily implemented in new facilities, this option also has negative implications for Australia's path towards a low carbon economy.

The second option avoids crippling new TEEI industry investment. If these new investments are included in the national cap, however, the abatement demands on other sectors could quickly become unreasonable. Exhibit 3.28 shows the abatement required by sectors included in the ETS but without TEEI industry status. The sectors assumed as TEEI are those shown in Exhibits 3.4 and 3.6. The analysis also assumes a straight line reduction in emissions, sufficient to achieve a 60% reduction on 2000 levels by 2050.

Exhibit 3.28




* Arithmetic average of annual growth rates for global copper, aluminium, seaborne thermal coal and nickel demand from 2007 to 2022 (copper, aluminium) and 2017 (thermal coal, nickel)

Source: Australian National Greenhouse Accounts; DCC, "Tracking to the Kyoto Target" (2007); Rio Tinto investor presentations; Brook Hunt; PJPL analysis

As the Exhibit shows, if it is assumed that TEEI industries grow at 7% per annum, which is the forecast growth shown in Exhibit 3.27, then by 2020 this growth will require abatement from non-TEEI sectors to increase by 300%. Of course, not all TEEI industries will grow this quickly, but if they grew by 3½% pa then non-TEEI sectors will need to abate by around 125% more than they otherwise would. These numbers highlight the difficulties with this option.

The third option anticipates that Australia's emissions cap will be adjusted upwards by the amount of free permits issued to new TEEI industries facilities. This limits the impact of new TEEI industries on other sectors within the ETS, and preserves the effectiveness of the compensation scheme.

Adjusting the emissions cap in this way allows TEEI industries to grow through a mechanism not available to other sectors. Growth in other industries will occur within the emissions cap, and must be achieved through reducing emissions intensity. However, to avoid carbon leakage, this is the best approach from an economic and environmental point of view.

If new investments occur at world's best standards of emission practice, which would be a condition of being granted permits outside of the cap, the growth allowed under these arrangements has a greater chance of being consistent with that which would occur under a global emissions cap. It would very likely create a better environmental outcome than if the investment was to occur in a non-ETS country.

A comment is required about how to define 'new facilities' for the purposes of adjusting the cap. Care must be taken to avoid carbon leakage from existing facilities inside the cap to new facilities outside the cap.

To do so, emissions from new facilities must represent a significant increase in production capacity, net of any capacity the new facility replaces. It is the net increase that should be assumed to be at 'world's best' for the purposes of calculating compensation. Both significant 'brownfields' expansions on existing sites, and 'greenfields' expansions at new locations should be eligible to be placed outside the cap.

## 3.3 Other design features are required to ensure effectiveness and avoid unintended consequences

Determining the tests for TEEI industries compensation, and the level of compensation to be given, are the key design questions to be resolved prior to the introduction of the ETS. Examination of the case studies, however, suggests a number of other design features that should be incorporated if the TEEI industries compensation scheme is to be appropriate.

Exhibit 3.29 summarises these design features. The remainder of this section will describe each in detail.

Exhibit 3.29

**OTHER PROPOSALS FOR ETS DESIGN**

| Proposal | Rationale |
|---|---|
| **6. Determine TEEI facility eligibility and compensation over long time intervals (e.g. every 5 years)** | • To provide a continuing incentive for firms to abate |
| **7. Calculate eligibility based on long run economics** | • Provides certainty over eligibility<br>• Fair to businesses who may receive less compensation when prices are volatile |
| **8. Compensate for Scope 1 and 2 emissions** | • Given the potential impacts of Scope 2 emissions, there is no logic to compensating for only Scope 1 |
| **9. Compensate using a combination of permits and cash** | • Scope 1 emissions will cost permits, Scope 2 will cost cash<br>• It is appropriate to match the type of cost with the type of compensation – for example, to eliminate mispricing risk |
| **10. Continue compensation until key competitors all face a like carbon cost** | • Consider allowing significant new TEEIs investments, with world's best emissions practice, to sign a contract with Government – Creates a legally enforceable 'property right' to provide sufficient certainty over policy changes, which would cease with a world scheme |

### *3.3.1 Determine TEEI facility eligibility and compensation over long time intervals*

Eligibility must be relatively long lasting to avoid creating disincentives to abate. If eligibility was reassessed every year, for example, successful abatement efforts would result in a reduction of compensation, and consequently a reduction in profits.

Making assessments on an industry basis would reduce the extent of this problem, as relatively high emissions firms would always have an abatement incentive, especially if abatement led to a continuous reduction in industry emissions. Some potential TEEI industries, however, have relatively few players. In these cases, the variation from industry averages may be small, and the resulting abatement incentives may not be sufficient for average emissions intensities to reduce.

The definition of long lasting will, however, require judgement. The Green Paper envisages a "once and for all" assessment[10]. This approach prohibits adjustments in future years. These may be needed, however, if international agreements are not concluded for some time, or if some industries seem to be receiving unreasonable benefits through compensation. On the other hand, care must be taken to guarantee sufficient time for abatement incentives to repay any capital invested.

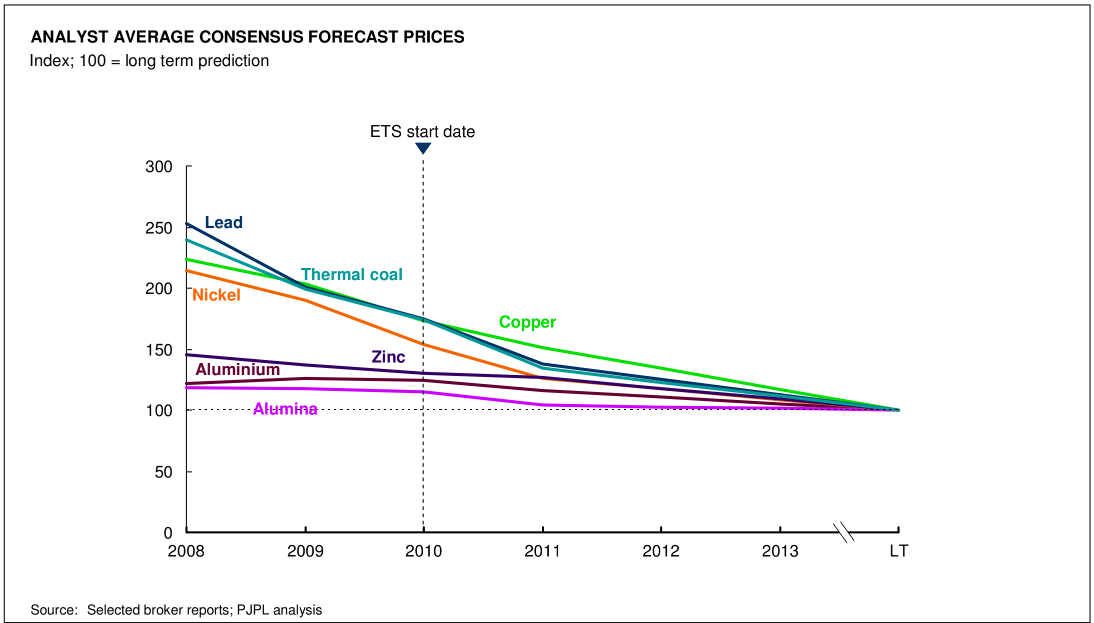
It may be that an interval of, say, five years between assessments strikes an appropriate balance.

These repeated assessments will place additional demands on the scheme regulator. Reviewing industries on a rolling basis, with a staggered start, could make these demands more manageable.

### *3.3.2 Determine eligibility for compensation using long run economics*

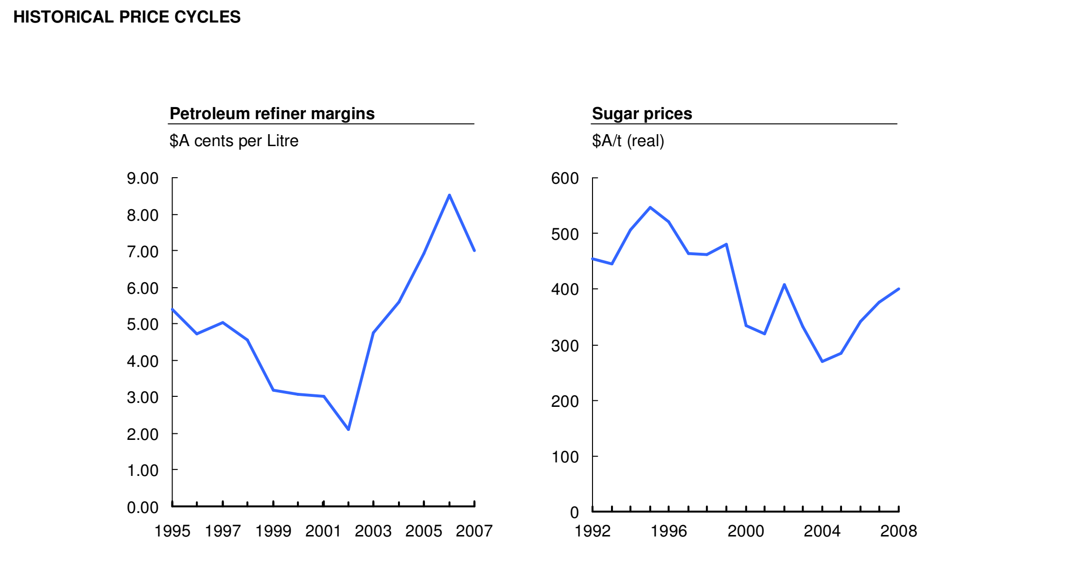
In some potential TEEI industries, a business' economics in any period can vary considerably from the long run. The most obvious driver of these variations are commodity prices, which for some industries are currently at or near historic highs (Exhibit 3.30) or are subject to large price cycles (Exhibit 3.31).

Exhibit 3.30




10 Dept of Climate Change, 'Carbon Pollution Reduction Scheme Green Paper', July 2008, page 312

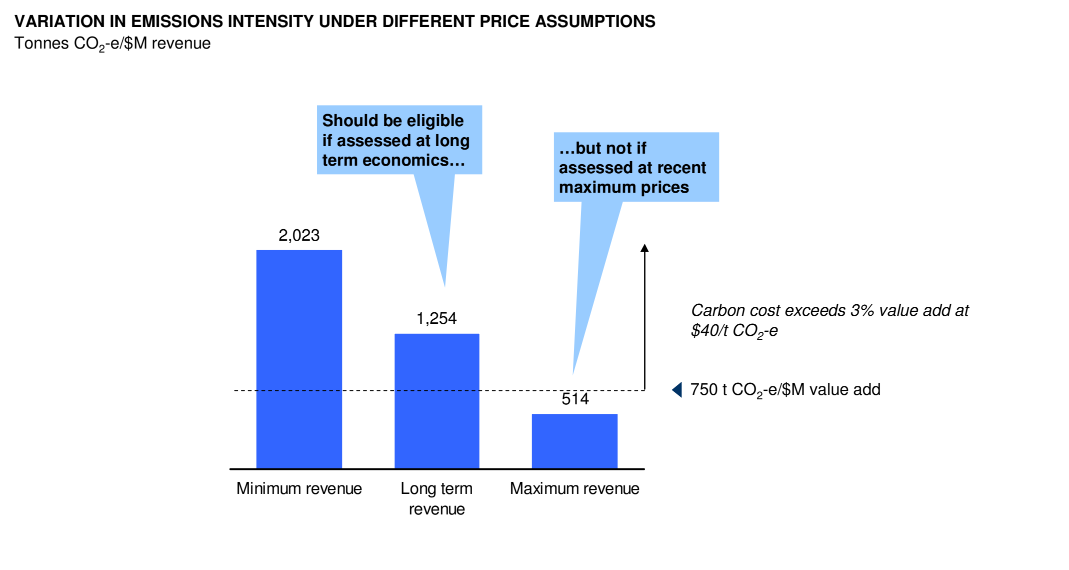
Exhibit 3.31




Source: ABARE; Annual Reports; Bloomberg; Broker Reports

These variations from the long run could be sufficient to affect the eligibility of some TEEI businesses for compensation. Exhibit 3.32 shows the impact of price variations on one of the case study companies.

Exhibit 3.32




Source: Case study company; DCC Green Paper; PJPL analysis

This business would be eligible for compensation if assessed at long term economics but not if assessed at recent high prices. Many businesses could potentially be in similar circumstances.

There are three problems with this.

First, it reduces certainty for TEEI firms. To allow investment in TEEI industries, businesses will require a long run view of the extent of compensation they will receive.

Second, it unfairly penalises TEEI industries with volatile prices. In times of high product prices, emissions intensity, whether assessed as a percentage or on the basis of tonnes, will fall and compensation will be reduced or denied. When prices fall, compensation will again be given. This will have the effect of diluting the benefit provided to companies with highly volatile prices for their products. They will receive less compensation than companies with the same average price levels but with less price volatility.

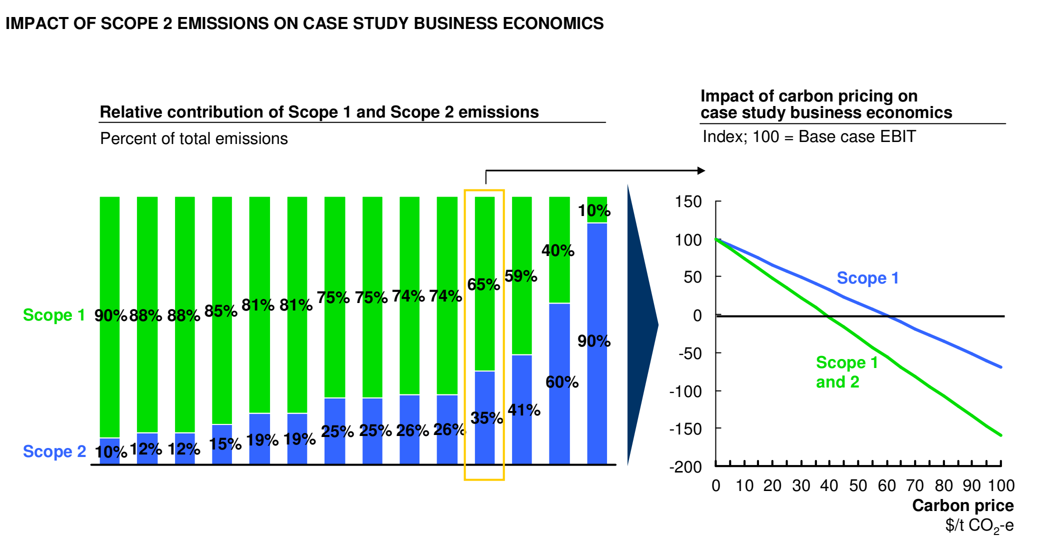
Third, long term economics must be used to assess eligibility over long time intervals, as just discussed. To do otherwise risks unfairly excluding businesses that would be eligible for compensation in most other years.

Making assessments using long run economics will be more difficult than, for example, using last year's results, and will involve a degree of judgement. Yet for the reasons outlined above a pragmatic approach must be found. One possibility might be to assess eligibility on the basis of historic actual results for industries, except where current prices are above or below long term averages by a set threshold.

### *3.3.3 Provide compensation for both Scope 1 and Scope 2 emissions*

Indirect emissions have a material impact on the economics of many of the case study businesses, and it is reasonable to assume that this will be true for TEEI industries in general. Exhibit 3.33 shows the impact of Scope 2 emissions on the case study companies. The left hand side shows the contribution of Scope 2 to the overall emissions of the case study companies. The right shows, for the highlighted company, the additional impact of Scope 2 emissions on profits, before compensation, at various carbon prices.

Exhibit 3.33




Source: Case study companies; PJPL analysis

There is no logic in excluding these emissions from any TEEI industries compensation scheme.

### *3.3.4 Compensate for Scope 1 emissions using permits, and Scope 2 emissions using cash*

Eligible TEEI businesses will need to be compensated for both direct and indirect emissions. Under the ETS, businesses will pay for direct emissions by purchasing and then acquitting permits, and for indirect emissions essentially through increased electricity bills.

It is appropriate to match the form of compensation with the type of cost incurred.

Scope 1 emissions should be compensated using emissions permits, paid in advance. In this way, the value of permits awarded can be matched to the cost of permits acquitted. Payment in arrears risks mis-matched permit prices. Advance payment also removes the working capital impacts associated with purchasing permits prior to compensation.

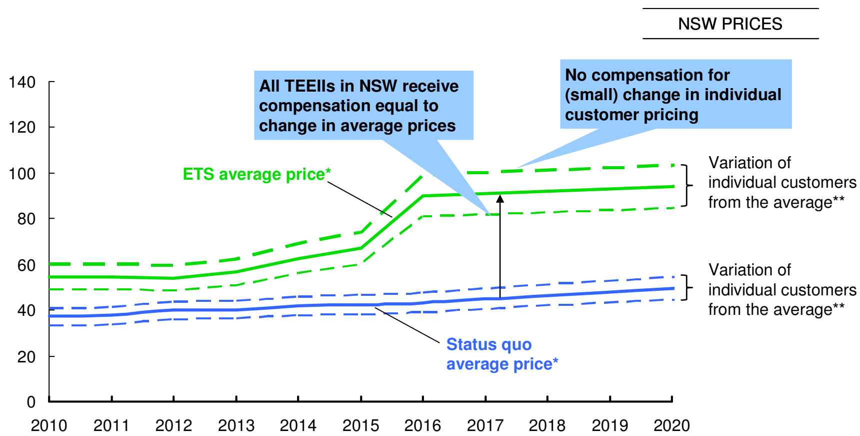
Scope 2 emissions should be compensated using cash payments, based on estimated increases in electricity prices.

Ideally, TEEI businesses should be compensated for the Scope 2 emissions they are responsible for, at the price paid by electricity suppliers. The nature of Australia's electricity market, however, means that making these estimates is impractical. As Chapter 4 will describe, the impact of the ETS on individual generation assets will vary considerably. As few TEEI businesses can attribute their electricity to any particular generator, the true impact of Scope 2 emissions can only be estimated through changes in electricity prices.

Compensation should, therefore, be based on the average change in electricity prices due to the introduction of the ETS in each State. Exhibit 3.34 illustrates how this might work. Compensation payments would be calculated by comparing actual prices paid with a modelled outcome of the 'status quo' electricity price; that is, the price that would have been paid had an ETS not been introduced.

Exhibit 3.34

**POSSIBLE APPROACH TO CALCULATING COMPENSATION FOR SCOPE 2 EMISSIONS—AVERAGE POOL PRICE**
$/MWh, load-weighted




* CRA model Level 2 capex base case scenario used for status quo and Level 2 capex 120Mt emissions by 2030 (without nuclear) used for ETS case
** Variation of individual customers from average price caused by characteristics of individual customer demand (e.g. load profile throughout the day)

Source: CRA international; PJPL analysis

This analysis is complex, but a number of existing models can make reasonable estimates, and this analysis is likely to be already underway to support the general economic analysis surrounding the introduction of the ETS.

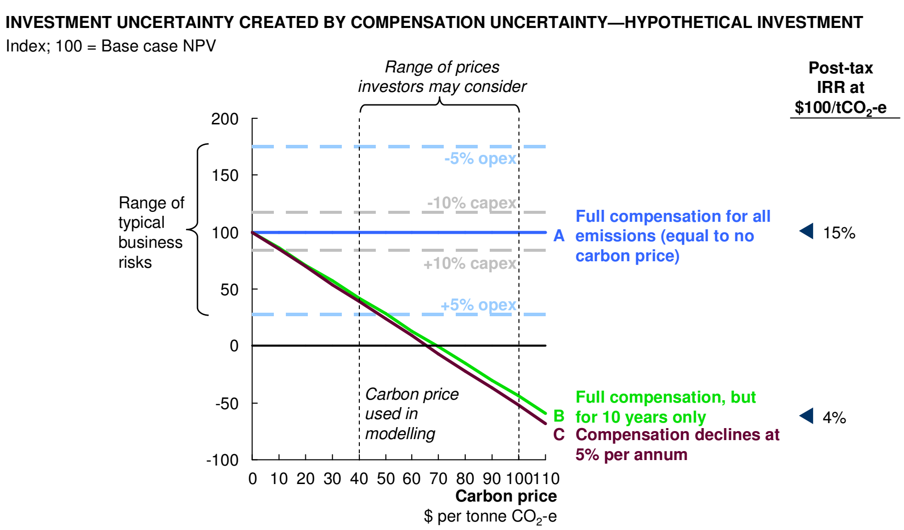
### *3.3.5 Make arrangements to ensure TEEI industries compensation continues until international competitors face a like carbon price*

Once market participants in each TEEI industry sector operate under a like carbon price, there is no need for any further compensation to Australian TEEI businesses.

Unless compensation is assured until this time, however, it will not be possible for TEEI businesses to invest in new capacity. Without this assurance, businesses considering new investments will have to anticipate a range of alternative compensation scenarios.

For investments with typical TEEI industry economics, most plausible scenarios would result in unsatisfactory investment returns. Exhibit 3.35 illustrates this. The graph shows the value such an investment, in terms of NPV and IRR, under each compensation scenario and for a range of carbon prices. The investment values shown cover a large range, and are often unattractive, especially when compared to potential offshore investments which may have far less uncertain returns.

Exhibit 3.35




* Assumes typical investment economics: 15% ROA (set to give attractive base case returns), 15% EBIT margin (median of case study companies), capex spend of $100m, build time 2 years with production in 3rd year; 15% pre-tax WACC, 2.5% long term growth estimate; 15 year average depreciation schedule; SIB equivalent to 70% of depreciation)

Source: Case study companies; PJPL analysis

Boards routinely make commercial investments despite uncertain returns. But uncertainty regarding TEEI industries compensation is different for two reasons. First, the magnitude of the uncertainty is larger than typical businesses risks. The grey lines on Exhibit 3.35 provide examples of typical business risks – in this case, changes in capital and operating costs. Outcomes under most combinations of carbon prices and compensation scenarios lie outside the range of these lines. This indicates the uncertainty associated with compensation is of larger magnitude.

Second, unlike typical business risks, there are very few actions businesses can take to mitigate against compensation uncertainty.

Finally, uncertainty around TEEI industries compensation is increased substantially if Boards choose to consider a large range of possible carbon prices. Again, Exhibit 3.35 shows that as carbon prices increase, so does the variation in investment outcomes.

To provide sufficient assurance, the TEEI industries compensation scheme should include two design features.

The first is a clear specification of the criteria that will be used to determine whether competitors face a like carbon price.

The second is that the scheme should provide protection equivalent to a property right, for firms undertaking large, long lived investments using world's best emission efficiency. This would enable TEEI businesses to seek compensation for the impact of any changes in these criteria. One way to do this would be to allow significant new TEEI industry investments to sign a contract with government setting out the criteria under which compensation will continue.

## 3.4 A comparison with the Green Paper arrangements

In some ways the proposals described above are consistent with those in the Green Paper. At the highest level, the Green Paper acknowledges that compensation for TEEI industries is required if the objectives of Australia's ETS are to be met.

There are, however, five important problems with the Green Paper which the proposals in this Report seek to address. They are:

- Inappropriate discontinuities in the compensation scheme
- Inadequate compensation for many TEEI businesses
- Significant carbon price risk is imposed on TEEI businesses
- Current economics will be used to make "once and for all" assessments
- Too much uncertainty remains around the extent of compensation, particularly to allow new TEEI industry investment

This remainder of each section describes each problem in detail.

### *3.4.1 Inappropriate discontinuities in the compensation scheme*

The arrangements described in the Green Paper create issues of equity and inappropriate incentives.

Section 9.4.4[11] of the Green Paper describes the Government's preferred position in the following terms:

*"Initial assistance would cover around 90 per cent of emissions for EITE activities that have emissions intensities above about 2,000 tonnes $CO_2$-e per million dollars of revenue and around 60 per cent of emissions for EITE activities that have emissions intensities between about 1,500 and 2,000 tonnes $CO_2$-e per million dollars of revenue"*

Exhibit 3.36 illustrates the Green Paper arrangements. It does this by showing the volume of emissions permits that would be bought by a TEEI industry business – after compensation – at various levels of emissions intensity.

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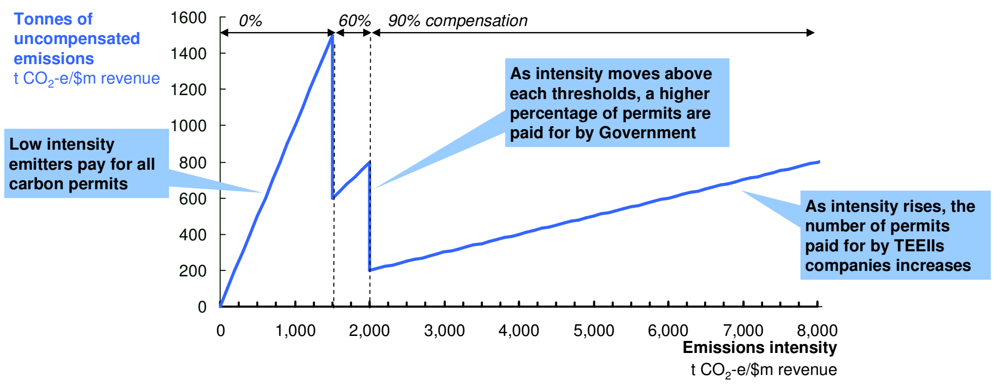
[11] Dept of Climate Change, 'Carbon Pollution Reduction Scheme Green Paper', July 2008, page 321

Exhibit 3.36

TEEIIS COMPENSATION SCHEME ENVISAGED IN THE GREEN PAPER




* Excludes sectors with emissions intensity less than 300t $CO_2$-e/$m revenue
Source: DCC Green Paper, PJPL analysis

These arrangements have three important problems, which together make the scheme unworkable.

First, they create discontinuities in the level of compensation provided. Businesses which fall either side of the two thresholds, at 1,500 and 2,000 tonnes $CO_2$-e per million dollars of revenue, face large differences in the permits they must purchase. This difference leads directly to large differences in the financial impact of the introduction of a carbon price. Intolerable comparisons of outcomes for different businesses will be made.

Second, there are inappropriate incentives. Businesses whose emissions are just below each threshold may find it economically rational to increase emissions to qualify for compensation if there is any future assessment period. Equally, businesses above each threshold have an incentive not to reduce their emissions. Both incentives are counter to the intention of the emissions trading scheme.

Third, businesses with higher emissions intensity must buy more permits in proportion to their revenue. This creates an inequity amongst businesses receiving compensation.

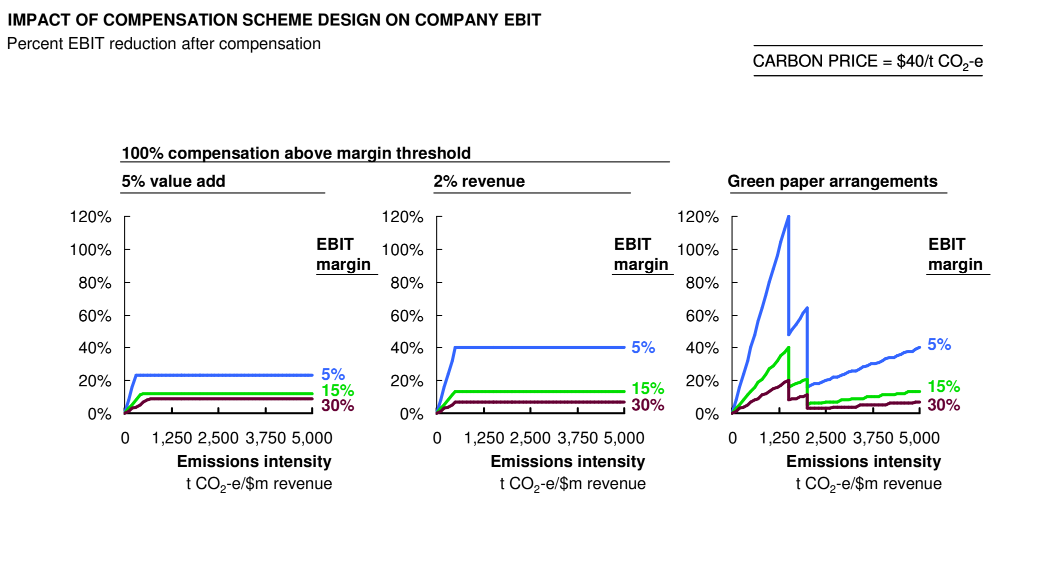
The solution is to provide compensation only above an appropriate threshold, as discussed above.

### *3.4.2 Inadequate compensation for many TEEI businesses*

The arrangements described in the Green Paper run the risk of providing inadequate compensation to many businesses. This is due not only to the threshold design discussed above, but the nature of the threshold chosen.

The net effect of these two design choices is illustrated in Exhibit 3.37. Three graphs are shown. They represent, from left to right, the highest value add based threshold proposed in Section 3.2, an example revenue based threshold, and the arrangements proposed in the Green Paper. Each graph shows the EBIT impact – after compensation – for TEEI industry businesses at varying levels of emissions intensity. To aid in making comparisons, emissions intensity is expressed in tonnes of $CO_2$-e per million dollars of revenue in each case. The three coloured lines on each chart represent businesses with different EBIT margins before the impact of carbon costs. Each chart is to the same scale, so direct comparisons can be made between them. As usual, the analysis assumes a permit price of \$40/t $CO_2$-e.

Exhibit 3.37




Source: DCC Green Paper; PJPL analysis

Exhibit 3.37 suggests a number of important conclusions.

- For businesses at any EBIT margin, the Green Paper arrangements allow large earnings impacts at moderate emissions intensities of between 500 and 1,000 tonnes of $CO_2$-e per million dollars of revenue. This is an anomaly
- The Green Paper arrangements lead to larger earnings impacts for modest margin industries than compensation based on value add. This is a problem shared with any threshold based on revenue, including the 2% threshold shown in the left hand chart
- As emissions intensity rises, the Green Paper arrangements allow increased earnings impacts. This is offset somewhat by the 90% compensation allocated to high intensity businesses

The views of prospective TEEI businesses on their preferred threshold design will vary greatly depending on their individual circumstances. Businesses with relatively high emissions intensities, and high margins, may find little difference between the three approaches shown.

Those with more modest margins, and with lower emissions intensities, will see the Green Paper arrangements providing inadequate compensation. This is a potentially large group, as illustrated in Exhibit 3.38.

Exhibit 3.38

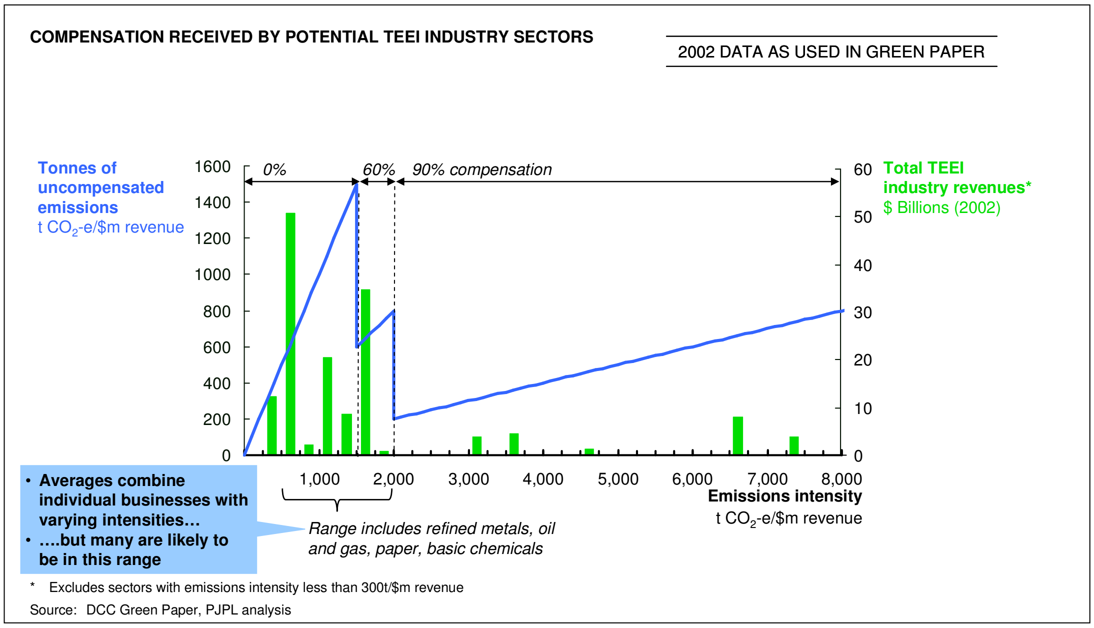



Exhibit 3.38 repeats in blue the illustration of the Green Paper compensation arrangements used in Exhibit 3.36. The green bars represent revenues earned by industries at various emissions intensities, using data provided in the Green Paper.

It must be pointed out that this data does not reflect the enormous variation in emissions intensity within industry sectors. Nevertheless, many businesses are likely to receive little compensation under the Green Paper arrangements.

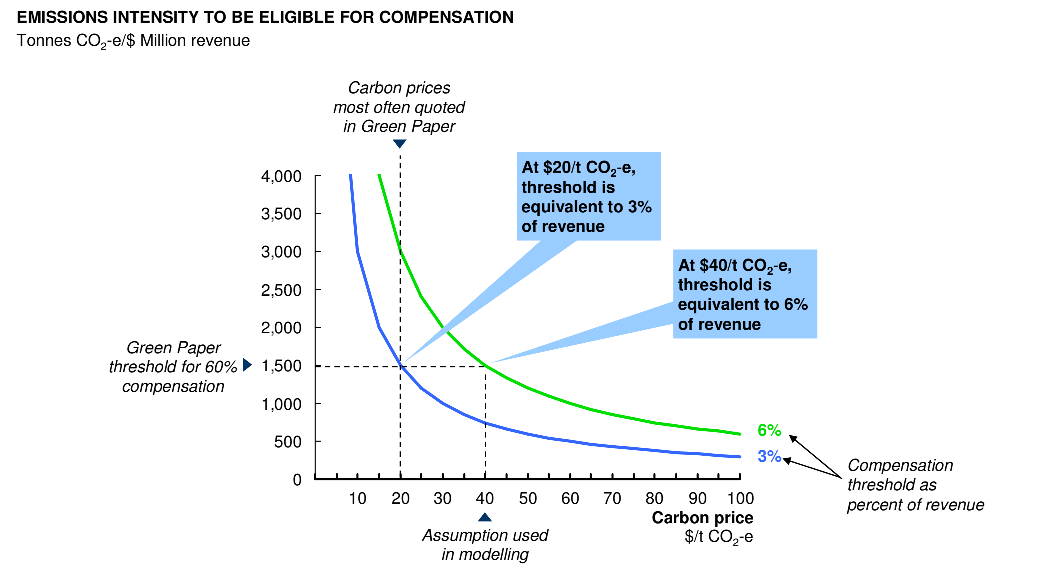
### *3.4.3 Significant carbon price risk is imposed on TEEI industries*

One of the important aspects of a threshold based on carbon costs is that the earnings impact on TEEI industries does not vary with carbon price. As discussed above, this has the benefit of increased business confidence to maintain existing and commence new investment.

The Green Paper arrangements leave this risk with TEEI businesses. Discussion in the Green Paper most often considers a carbon price of around \$20/t $CO_2$-e. For a business at the Green Paper's lowest compensation threshold of 1,500 t $CO_2$-e/\$m revenue, this is equivalent to 3% of revenue. It can be assumed that it is at this point that the economic impact of carbon pricing is judged to be sufficient to begin awarding compensation.

This price risk is illustrated by Exhibit 3.39, which shows the emissions intensity at which a particular carbon price leads to a cost impact of 3% of revenue. As prices rise, the emissions intensity required to lose 3% of revenues falls. At \$40/t $CO_2$-e, it is 640 tonnes per million dollars of revenue.

Exhibit 3.39




Source: DCC Green Paper; PJPL analysis

The implication is that a constant threshold at 1,500 tonnes will provide inadequate compensation at higher carbon prices. For a business at the compensation threshold, a carbon cost of $40 per tonne will result in an impact equivalent to 6% of revenue. This would lead to a 40% profit reduction for a 15% EBIT margin business; and zero profit for a 5% EBIT margin business.

This effect will occur for any threshold design based on an emissions intensity expressed in tonnes, not dollars.

As discussed above, it is appropriate this price risk not be passed to TEEI industries prior to international agreements.

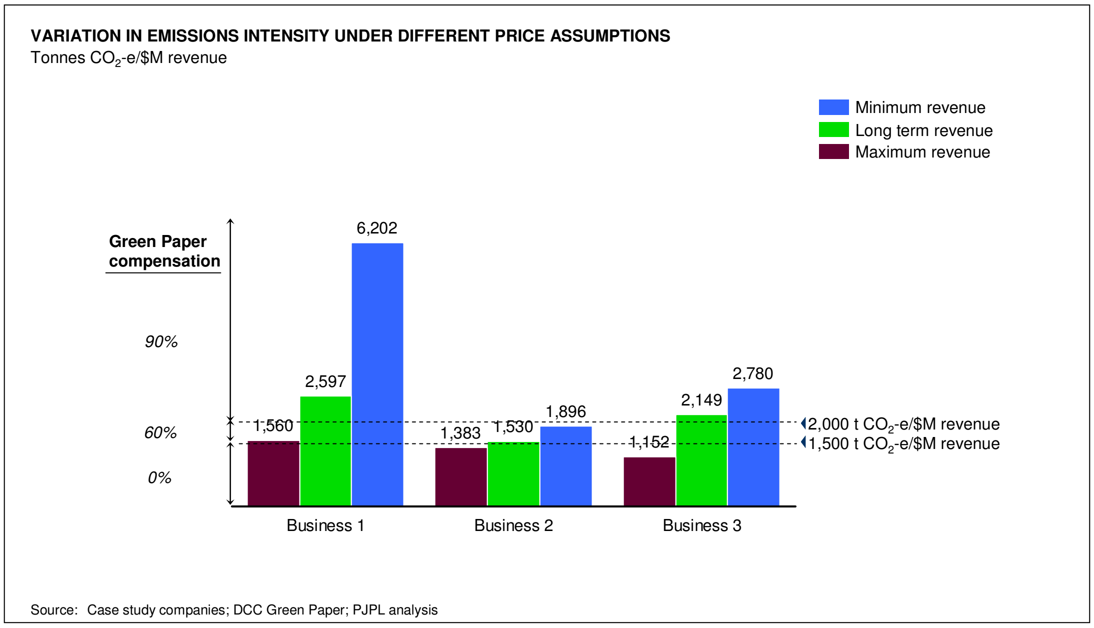
### *3.4.4 Current economics will be used to make "once and for all" assessments*

The Green Paper proposes to use data from 2006 to 2008 to make estimates of emissions intensity, and therefore eligibility for compensation.

The essential problems with this approach have already been described in Section 3.3.2. It is appropriate, however, to illustrate how using historic actuals has the potential to unfairly exclude TEEI businesses.

Exhibit 3.40 shows the emissions intensity for three case study businesses at historic high, long term and historic low prices. All of these businesses would be entitled to compensation at long run revenues. If assessed at high prices however, all would see their compensation reduced, and 'Business 2' and 'Business 3' would receive no compensation at all.

Exhibit 3.40




There is no logic to making long term assessments at other than long term economics.

### *3.4.5 Considerable uncertainty remains over the extent of compensation*

Many of the proposals in this report emphasise the need to create certainty over the nature of TEEI industry compensation, in order to allow businesses to plan and invest with confidence.

The arrangements proposed in the Green Paper leave too much scope for uncertainty for business to continue to invest in existing and new facilities. There are two key problems, summarised in Exhibit 3.41.

Exhibit 3.41

**CAUSES OF UNCERTAINTY IMPLICIT IN THE GREEN PAPER COMPENSATION SCHEME DESIGN**

| Green paper position | Problems | Practical implications for business decision makers |
|---|---|---|
| • **Rates of TEEI industry compensation will be adjusted to target a fixed 30% of permit revenue** | • Actual levels of compensation paid to a TEEI business will be related to many factors, such as:<br>– emissions cap size<br>– rate of TEEI industry growth<br>– emissions abatement achieved by TEEI businesses | • Estimating the future economics of new or existing businesses will be made difficult<br>• Reasonable assumptions will see TEEI business' earnings decline dramatically by 2020 |
| • **TEEI industry compensation will be phased out according to broad criteria** | • Suggested criteria are too broad to be useful…<br>• … especially after 2020, where compensation could end under a range of scenarios | • It will be difficult to determine in advance the timing and economic impacts of reductions in compensation<br>• As there will be no recourse if policies change, Boards must make very conservative assumptions when considering investment |

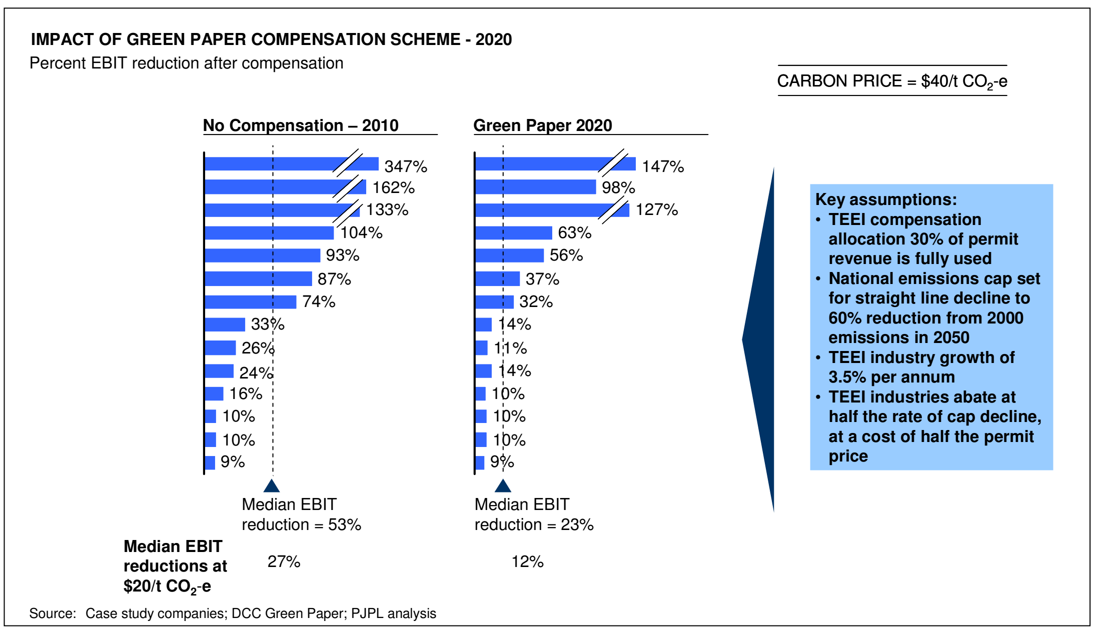
The first problem is caused by limiting TEEI industries compensation to a fixed proportion of permit revenue. Both the Garnaut Review Draft Report and the Green Paper suggest 30% as an appropriate figure for this limit.

Under these arrangements, compensation to any individual TEEI business will be determined by a combination of complex factors. In particular, these include the rate of growth of the TEEI industries sector as a whole, and the shape of the overall emissions cap.

In these circumstances, individual TEEI businesses will find it very difficult to predict the level of compensation they will receive. More importantly, businesses that do make predictions are unlikely to feel assured that sufficient compensation will be available.

Exhibit 3.42 illustrates this issue. EBIT impacts with no compensation, shown on the left, are compared with the EBIT impacts after compensation based on the Green Paper arrangements in 2020. These graphs are based on four key assumptions: that the proposed 30% limit on compensation payments has been filled; that TEEI industries grow at 3.5% in real terms; that Australia's emissions cap reduces in a straight line from 2010 to 60% reduction on 2000 levels by 2050; and that individual businesses achieve abatement equal to 50% of the cap reduction at 50% of the permit price.

Exhibit 3.42




As the Exhibit shows, under these reasonable assumptions the profits of existing TEEI businesses are materially affected by 2020. Given the extent of profit erosion allowed, there is little practical difference between the two comparisons. Boards are likely to reshape existing businesses as discussed in Section 3.3.2 and will be unlikely to invest while such outcomes are possible. In turn, estimating the future economics of new or existing businesses will be made too difficult.

The second problem is caused by the proposed arrangements to phase out TEEI industries compensation. The Green Paper criteria are shown in Exhibit 3.43. In general they are expressed in broad terms. More importantly, after 2020 the criteria create so much uncertainty that Boards will have to ‘bet’ on achieving a world scheme to justify investment. In addition, no specific provision is made to address the potential impact of future policy changes on new, long lived investments.

Exhibit 3.43

**POSSIBLE BOARD VIEW OF GREEN PAPER CRITERIA TO PHASE OUT OF TEEI INDUSTRY COMPENSATION**

| Green Paper criteria | Possible Board perspective | Affect on investment economics |
|---|---|---|
| **Between 2010 and 2020:**<br>• Assistance would be provided to emissions-intensive trade exposed industries as proposed unless broadly comparable carbon constraints are introduced in key competitor economies, in which case assistance would be withdrawn<br><br>**Beyond 2020:**<br>• Assistance would be withdrawn if broadly comparable carbon constraints are introduced in key competitor economies or<br>• Assistance would be phased out over a five-year period in the event of acceptable international action that places obligations on an industry’s major competitors or<br>• Assistance would be continued as proposed in the absence of broadly comparable carbon constraints or acceptable international action | • There is a real risk assistance could be unwound before level playing field was achieved<br>– This risk increases after 2020<br>• Changes to these criteria could quickly make a previously attractive investment uneconomic<br>• In any event, compensation will be reducing with the overall trajectory | • For hypothetical investments that would have earned 15% post-tax IRR<br>– at \$100/t CO2-e returns drop to 4% if<br>. compensation stops after 10 years, **or**<br>. compensation declines by 5% per annum |

Source: DCC Green Paper; PJPL analysis

Again, individual TEEI businesses will find it difficult to estimate the level of compensation they will receive.

Unless addressed, both problems will result in a level of uncertainty that is likely to create an environment in which new investment decisions cannot be taken without incurring unacceptable levels of business risk. As illustrated previously in Exhibit 3.35, uncertainty regarding the extent of compensation substantially increases the risk associated with investment in TEEI industries projects. Companies will find investments in non-ETS locations, which are not subject to the level of uncertainty, increasingly attractive.

The proposals described in this report would largely remove this uncertainty, thereby creating an environment conducive to continued investment.

## 3.5 A brief comment on ‘overshooting’

The Garnaut Review Draft report[12] describes the concept of ‘overshooting’ for TEEI firms.

According to the Garnaut Review, ‘overshooting’ occurs when:

- Australian businesses face an increase in costs through the introduction of a carbon price

[12] Garnaut Climate Change Review, ‘Draft Report’, June 2008, page 397

- Prices remain unchanged, as businesses who do not face a carbon cost continue to set prices
- Australian business reduce production in response
- This reduction in production is larger than would occur if the world faced a carbon price.

As the Garnaut Review suggests, overshooting is the fundamental TEEI industry problem. In discussions of TEEI industry compensation, however, this link to overshooting is lost.

Evidence from the case studies illustrates this link, and is illustrated in Exhibit 3.44.

Exhibit 3.44

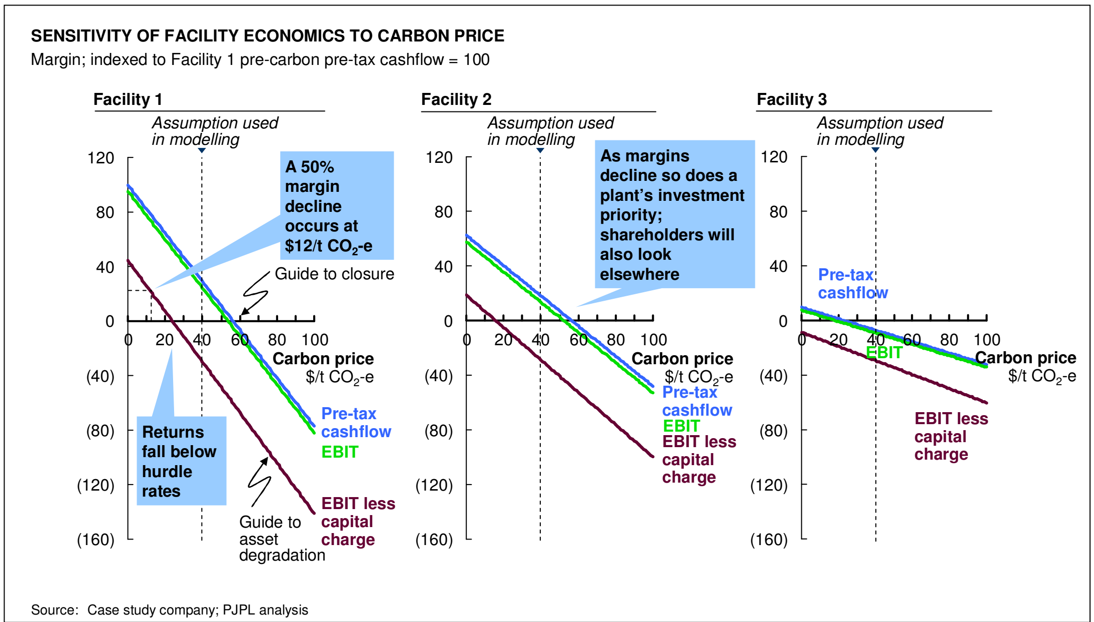



Exhibit 3.44 shows the economics of three facilities within the production network of a case study business. While the specific details of the facilities cannot be disclosed, each has subtly different technologies which lead to different emissions intensities. On the basis of this analysis, it would be difficult to see what role "Facility 3" would have to play in a carbon constrained world. On balance, the other facilities should have a role to play, especially if a range of abatement options can be developed. Unfortunately, without compensation, even these relatively low carbon facilities would shut at a price approaching $60/t $CO_2$-e.

# CHAPTER 4

## ADDRESSING THE CHALLENGES IN APPLYING AN ETS TO THE ELECTRICITY SECTOR

# 4. ADDRESSING THE CHALLENGES IN APPLYING AN ETS TO THE ELECTRICITY SECTOR

The electricity sector has been examined in considerable detail given that it is the largest and fastest growing emitter, and that it is an essential sector in the Australian economy. Understanding the impact of the ETS on this sector is, therefore, central to assessing the likely initial limits to and effectiveness of the ETS.

The first section (Section 4.1) provides some background on this complex sector and describes how an ETS will bring about reductions in emissions from electricity generation. It also provides important background on two comprehensive electricity models that have been analysed to support the findings and conclusions.

Sections 4.2 to 4.7 provide the conclusions from a detailed examination of the electricity industry's economics as well as analysis of the results from these two models. In summary, these conclusions are as follows:

- The Government needs to set the cap trajectory to 2020 with a clear eye to what can be delivered by the electricity sector
- Given the extent of asset impairment, compensation should be provided to affected generators
- Working capital and hedging issues need to be taken into account in designing the ETS
- Wholesale and retail electricity prices should be allowed to rise to reflect fully the impact of an ETS (including removal of retail price caps or appropriate rapid adjustments)
- The RET scheme should cease with the introduction of the ETS, as its continuation will mean that emissions reductions are not achieved at the lowest cost
- The Government's Green Paper addresses many concerns, although some outstanding concerns remain

## 4.1 Introduction and approach

This section provides background on the emissions reduction task for the electricity sector and the drivers behind higher electricity pool prices under an ETS. It also provides details on two comprehensive electricity models that have been analysed to support the findings and conclusions.

### *4.1.1 The electricity sector must contribute at a minimum its share of emissions abatement*

The electricity sector is the largest and fastest growing emitter in the Australian economy. According to Australia's National Greenhouse Accounts[13], direct emissions from electricity generation accounted for 198.1Mt or 34.5% of national emissions in 2006. Emissions from electricity generation have grown by 53% since 1990 when they accounted for 129.5Mt or 23.5% of national emissions (see Exhibit 4.1).

Exhibit 4.1

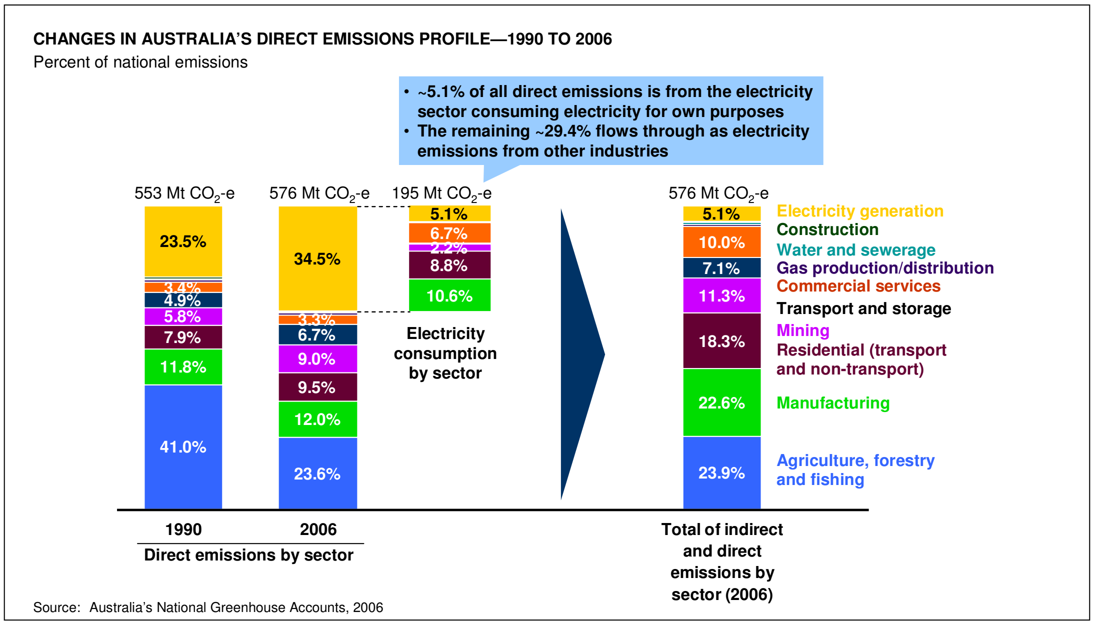



Exhibit 4.1 also shows that electricity is an essential input to households and much of industry. Emissions from purchased electricity represent 167.0Mt or 29% of national emissions with the largest users being the manufacturing, residential and the commercial services sectors.

Electricity generation will need to contribute at least its proportional share of national emissions abatement under an ETS. This follows from the size and growth of its emissions, the potential to substitute existing generation with low emission technologies and the likelihood that electricity generation has more abatement alternatives at a lower cost than other sectors. Exhibit 4.2 provides a high-level assessment of the abatement potential of other sectors compared with the electricity generation sector.

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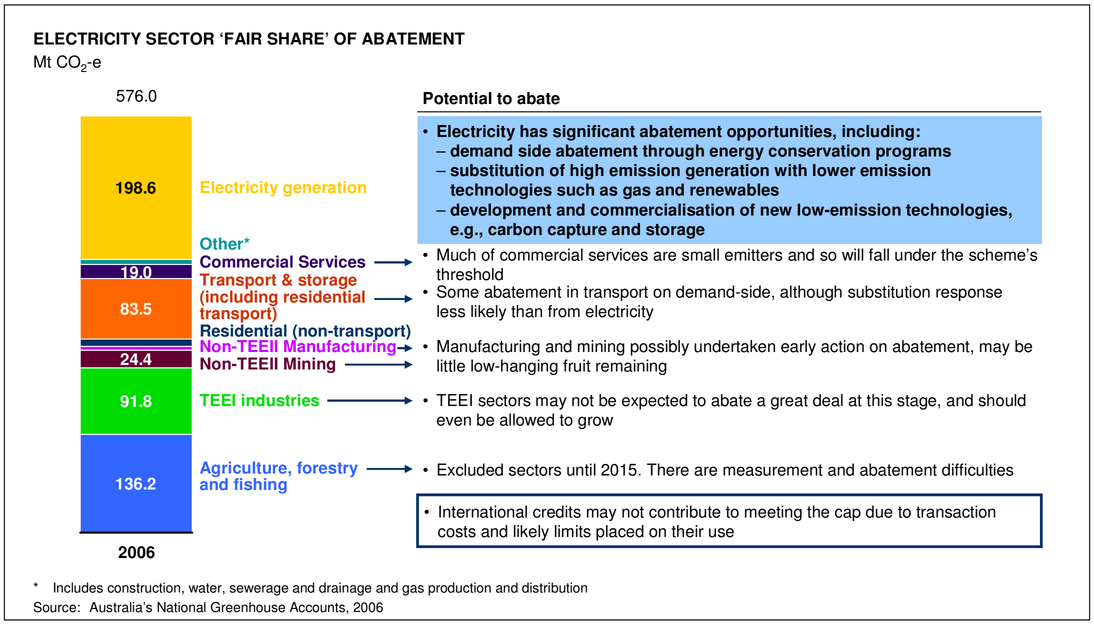
[13] Dept of Climate Change, 'Australia's National Greenhouse Accounts', July 2008

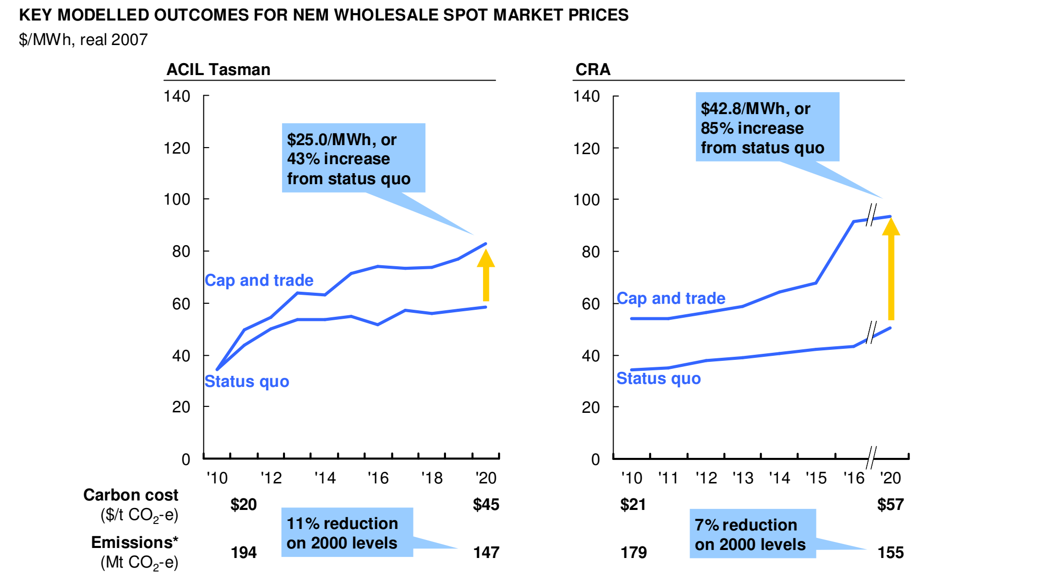
Exhibit 4.2




### *4.1.2 Electricity prices will need to rise considerably to deliver this abatement*

Electricity prices will need to rise considerably to achieve emissions reductions. Exhibit 4.3 shows wholesale electricity pool price outcomes in the National Electricity Market (NEM) that have been modelled by two industry studies. In the scenarios shown, pool prices in 2020 under an ETS are modelled to rise by between \$25 – 43/MWh, or 43 – 85% above the status quo. The lower price outcome is largely due to a more aggressive assumption in the ACIL Tasman model for demand reduction in response to rising electricity prices. Carbon prices in 2020 are modelled to reach ~\$45 – 57/t $CO_2$-e, being the levels that the models require to achieve the targeted level of emissions abatement. The level of emissions in 2020 from the electricity sector is modelled to reduce to 147 –155Mt $CO_2$-e or ~10% below 2000 levels.

Exhibit 4.3



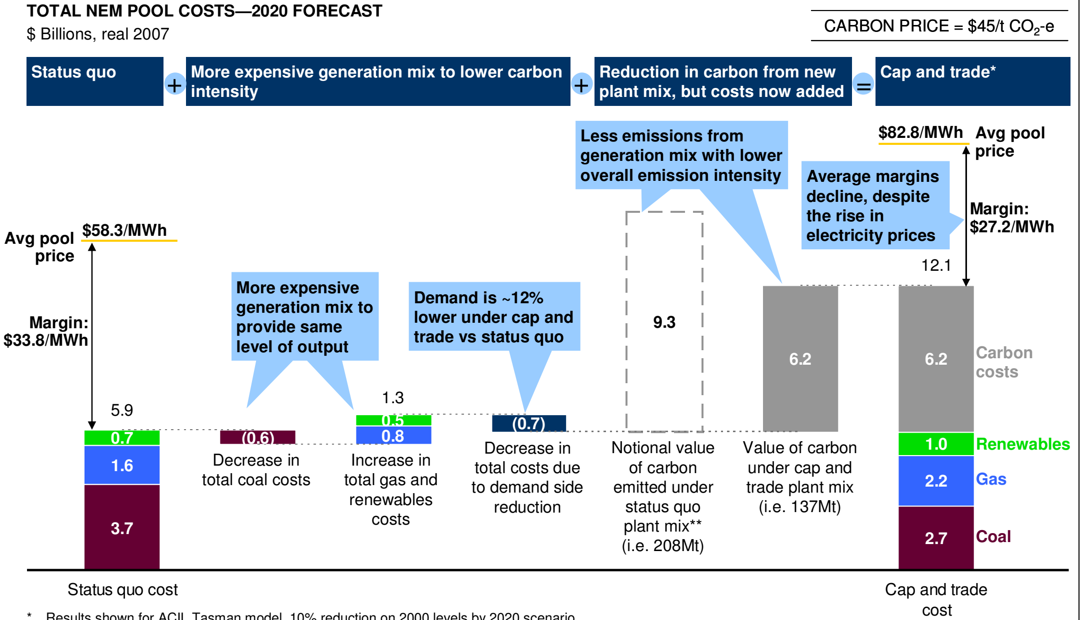

* Emissions shown are under the cap and trade scenario - NEM and SWIS for ACIL Tasman; all scheduled generators nationally for CRA
Source: ACIL Tasman; CRA International

The main factors driving the increase in the electricity price are the shift to a more expensive (but lower emitting) generation mix and the addition of the cost of carbon. Exhibit 4.4 disaggregates these factors as modelled by ACIL Tasman for 2020 for the National Electricity Market (NEM, or east coast states only). In the status quo, the cash cost of generation (including fuel cost, variable operations and maintenance and fixed operations and maintenance) is modelled to reach $5.9b in 2020. This is composed of $3.7b from coal generators, $1.6b from gas generators and $0.7b from renewable generators. The generators on average are modelled to earn a cash margin of ~$33.8/MWh. This margin provides returns to cover sunk capital costs. The resulting average pool price is $58.3/MWh in 2020 in the status quo case.

The first impact of an ETS is to alter the generation mix to one that is more expensive but with lower overall emission intensity. The cost of coal generation decreases by $0.6b as less high-emission coal plant is used while the cost of gas and renewable generation increases by $0.8b and $0.5b respectively as these technologies become a larger part of the generation mix.

The higher electricity price causes a demand-side response which reduces the volume of electricity consumed and consequently reduces the cost of generation by $0.7b. ACIL Tasman modelling expects considerable demand side reduction (significantly more than the other model reviewed) which will reduce electricity consumption by ~12% from the status quo case in 2020. This would still deliver emissions ~16% above 2000 levels, while the total emissions reduction assumed is ~10% below 2000 levels.

Exhibit 4.4



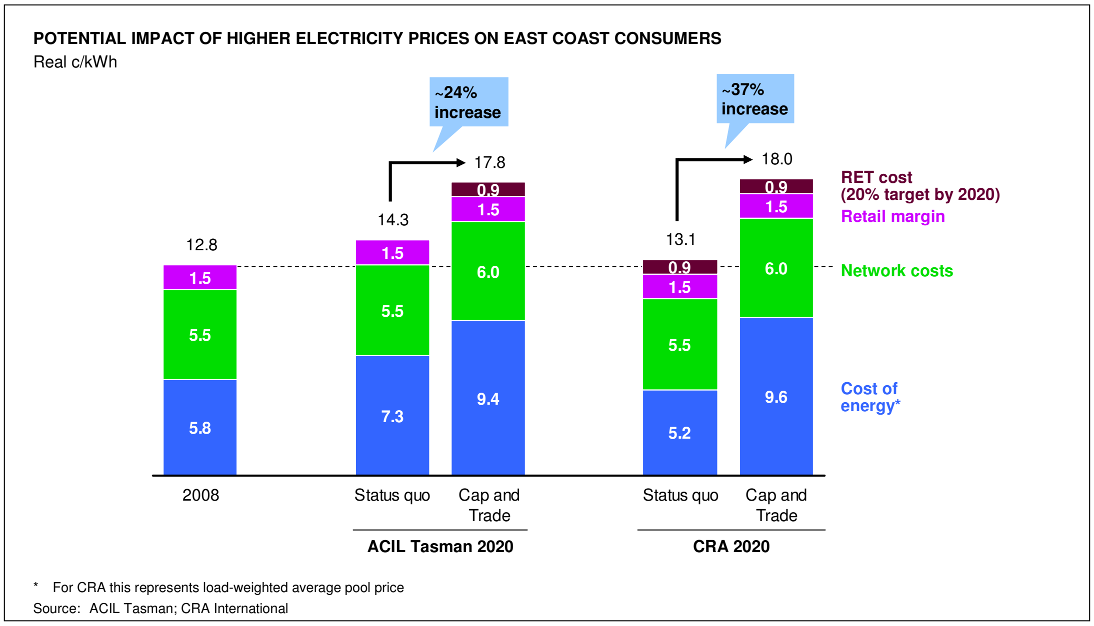

* Results shown for ACIL Tasman model, 10% reduction on 2000 levels by 2020 scenario
** Value based on carbon price in 'cap and trade' scenario applied to status quo mix emissions
Source: ACIL Tasman

The shift in generation mix away from coal towards gas and renewables as well as the demand reduction drives the reduction in carbon emissions from 208Mt $CO_2$-e in the status quo case in 2020 to 137Mt $CO_2$-e in the ETS case in 2020 (NEM only). The cost of the carbon emissions in the ETS case is $6.2b at a carbon price of $45/t $CO_2$-e, which represents the price required to achieve the targeted level of emissions abatement in the electricity sector.

As a result, the total cash cost of generation in the ETS case is modelled to be $12.1b in 2020. Gross margins are modelled to be lower in the ETS case at $27.2/MWh, resulting in an average pool price of $82.8/MWh in 2020.

Higher wholesale electricity prices as modelled are likely to increase average consumer electricity prices by ~24–37% over the status quo by 2020 (see Exhibit 4.5), and about 40% over today. In addition to the higher cost of wholesale electricity, network costs are higher in the ETS case due to additional network investment required for new gas and particularly renewable generation. The Australian Government's Renewable Energy Target will add further costs.

Exhibit 4.5




The Government's Green Paper estimates that a \$20/t $CO_2$-e carbon price in 2010-11 will increase consumer electricity prices by ~16%. This is broadly consistent with the results from the modelling, assuming carbon prices are fully passed through into electricity prices.

### *4.1.3 The economics of the industry as well as the results from the two most respected electricity models available have been analysed to support the findings and conclusions*

Two industry studies that model the impact of an ETS on the electricity sector have been analysed to support the findings and conclusions:

- ACIL Tasman, prepared for the Energy Supply Association of Australia (June 2008)[14]
- CRA International, prepared for the National Generators Forum (May 2008)[15]

Electricity is one of the most difficult industries to model given its complexity and volatility. The underlying premises, however, of each of the models are broadly as follows:

- Each model assumes a national emissions trajectory target and that the electricity sector must meet its share of this reduction in emissions from 2000 levels. The modelling does not account for abatement opportunities in other sectors of the economy.

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[14] ACIL Tasman, 'The impact of an ETS on the energy supply industry', July 2008

[15] CRA International, 'Market modelling to assess generator revenue impact of alternative GHG policies', May 2008

- Each model assumes emissions targets are met without the use of international offset credits, the availability of which remains unclear. International credits could help lower the permit price and reduce the transition task required by the generation sector to meet a given abatement target

- Each model sets a carbon price in each year that ensures that the electricity sector meets its emissions target. The emissions target can be met by new investment in low emission generation technology, by generation substitution from high emission plants to low emission plants, or by demand reduction

- The generation mix is optimised to meet electricity demand at the lowest cost (including the cost of carbon). This takes into account existing plant with fixed and variable operating costs (but sunk capital costs), and new plants that will in addition require a return on capital investment

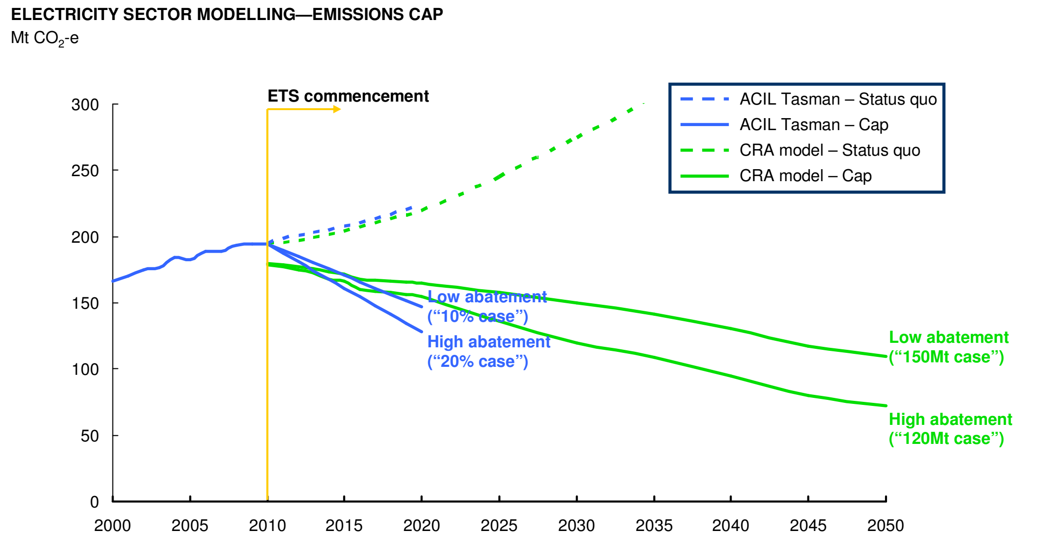
- Each model takes into account a multitude of additional constraints and assumptions such as build rates for new generation, availability of low emission generation technology, gas availability, gas and coal prices, capital construction costs, regional interconnector constraints, etc. ACIL Tasman and CRA have applied their technical expertise in arriving at these constraints and assumptions. These have not been independently reviewed in this Report

- Electricity prices are modelled through a load block/load duration curve, or through a series of half hourly or hourly modelling for each year. Assumptions are made regarding generator contract levels and bidding strategies

More detailed key assumptions used in each of the two models are as follows.

First, each model assumes an emissions target trajectory which the electricity sector must achieve, as shown in Exhibit 4.6. In addition to the status quo case, ACIL Tasman has modelled a "10% case" and a "20% case" under an ETS. These cases target 10% and 20% reductions in emissions on 2000 levels by 2020 respectively. This report predominantly represents the "10% case". Given the 'lumpiness' of plant entries and exits, this case reaches ~11% (rather than 10%) reduction in emissions from 2000 levels by 2020. This case requires ~34% reduction in emissions by 2020 from the status quo case and is close to a straight-line trajectory from 2010 to a 60% reduction on 2000 levels by 2050.

Exhibit 4.6




Source: Australian National Greenhouse Accounts; "Tracking to the Kyoto Target", DCC, 2007; ACIL Tasman; CRA International

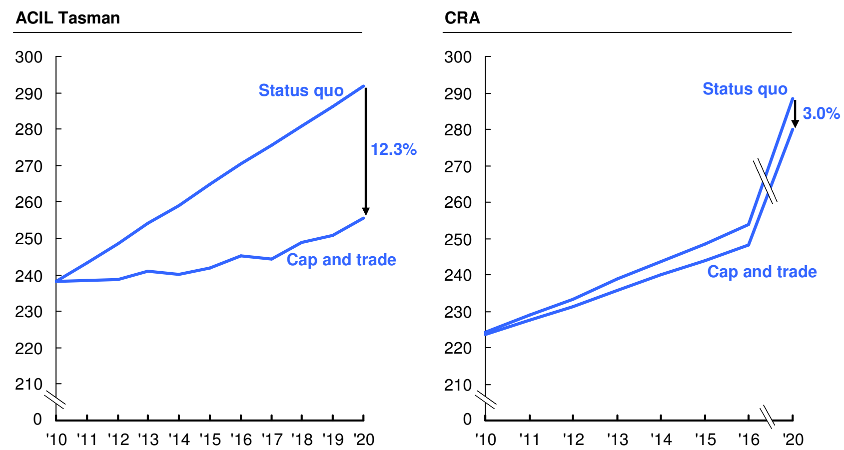
Similarly, CRA have a "120Mt, Level 2 capex without nuclear case" and "150Mt, Level 2 capex without nuclear case" (among other cases) which represent the level of emissions targeted in 2030, and the capital cost of new plant. This report predominantly presents the "120Mt, Level 2 capex without nuclear case". This case reaches ~7% reduction in emissions on 2000 levels by 2020, or around 29% reduction in emissions by 2020 from the status quo case.

It is worth noting that CRA's ETS cases have a starting point for emissions that is ~5 Mt below the status quo case. This was done to avoid the modelling producing a carbon price of ~$0/t in the early years of the scheme due to the high level of renewable capacity installed as a consequence of the Renewable Energy Target (RET) scheme.

The second key assumption concerns the level of demand growth and demand response under an ETS compared to the status quo, as shown in Exhibit 4.7. ACIL Tasman assumes that demand grows at 2.0% per annum to 2020 under the status quo while CRA assume growth at 2.5% per annum.

Exhibit 4.7

**IMPACT OF DEMAND SIDE ABATEMENT IN ELECTRICITY SECTOR MODELLING**
TWh energy consumption*




* ACIL Tasman figures are for actual generation; CRA figures are for sent-out generation (after auxiliary load)
Source: ACIL Tasman; CRA International

ACIL Tasman assumes a demand reduction in response to high electricity prices under an ETS of 12% of demand by 2020. This is based on their general equilibrium model of the economy that estimates the impact of higher electricity prices on electricity demand in each sector of the economy.

CRA assumes the level of demand reduction to be ~3% of demand by 2020, based on an estimate of the elasticity of demand of 0.2.

The third key assumption is regarding increases in gas and coal prices. Exhibit 4.8 shows the gas price assumptions and Exhibit 4.9 shows the coal price assumptions for the ACIL Tasman and CRA models. ACIL Tasman's gas price assumptions are based on detailed analysis of supply and demand curves for gas, and their black coal costs are based on detailed analysis of coal contracts by plant and the ability of the coal to access export markets.

Exhibit 4.8

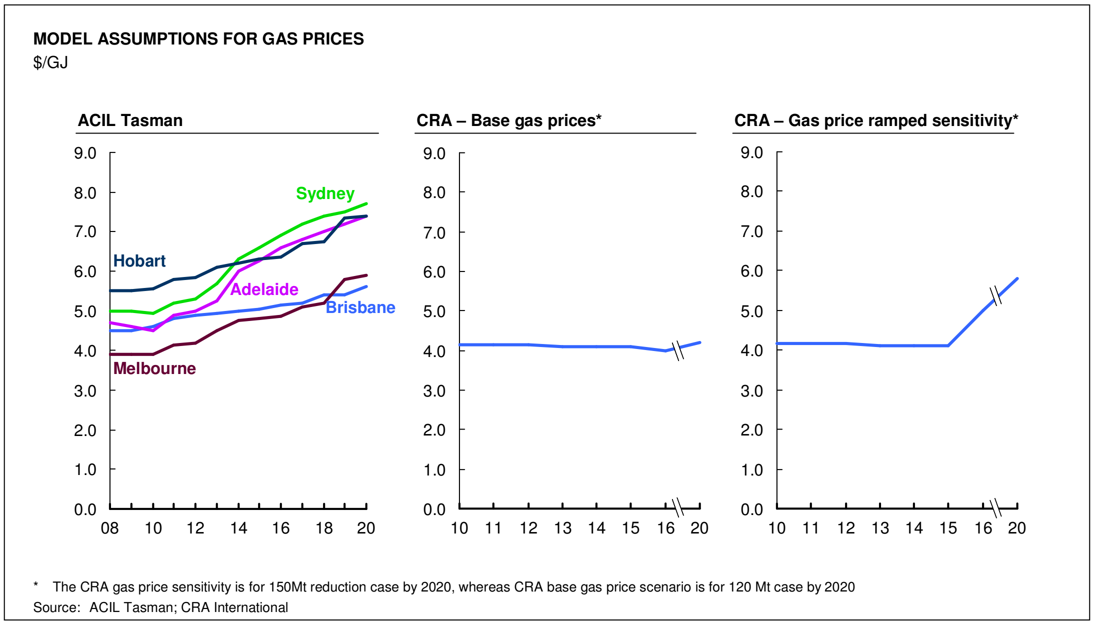
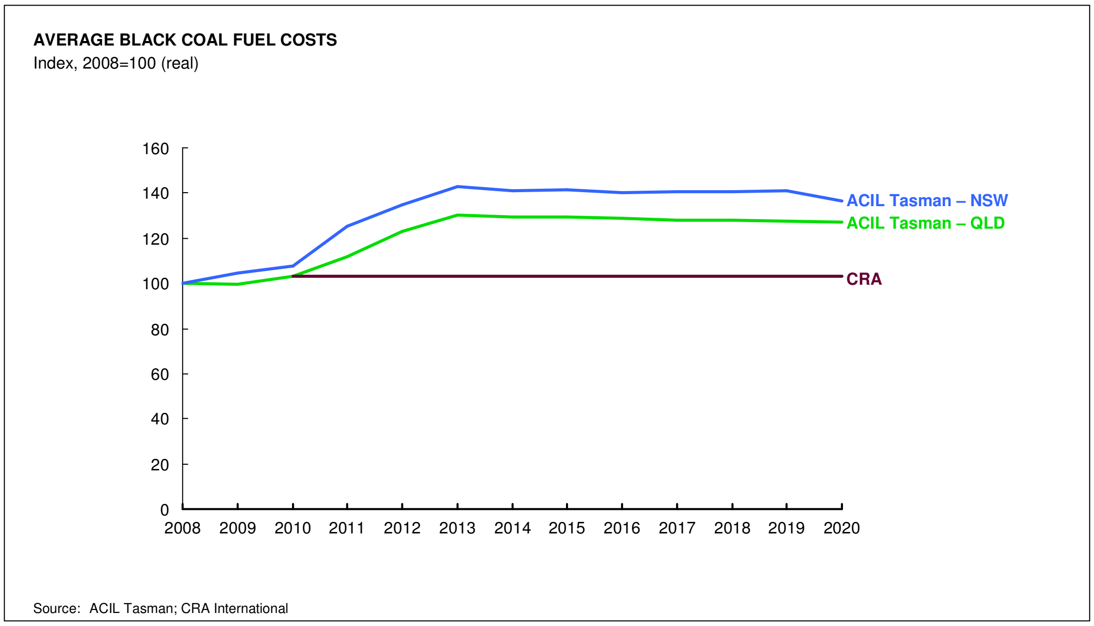



Exhibit 4.9




The fourth key assumption is regarding other emission reduction schemes. Both ACIL Tasman and CRA assume the RET scheme is implemented under an ETS, although ACIL Tasman assumes there is no RET scheme in their status quo case. CRA also assumes that the Queensland Gas Scheme continues.

Additional assumptions are made regarding new generation capital costs, build rates, and the availability of new technologies such as carbon capture and storage (CCS) and geothermal (see Exhibit 4.10). Nuclear generation is not included in the model scenarios analysed. This reflects ACIL Tasman's view that nuclear generation will be unavailable by 2020 given the lead times required even if Government policy were to change. While CRA modelled scenarios both with and without nuclear generation, only those without nuclear generation have been analysed in this report.

The models also assume current hedging and bidding strategies are unchanged under an ETS.

It should also be noted that the types of electricity models used by ACIL Tasman and CRA are complex and dependent on assumptions. While the models are useful for identifying key trends and testing sensitivities and scenarios, they cannot be considered to be 'forecasts' of what may occur. Many other variables including weather events, load variability, resource constraints (e.g., water, gas, etc), and bidding behaviours will have significant impacts on actual outcomes.

Exhibit 4.10

**NEW GENERATION—CAPITAL REQUIREMENTS AND BUILD RATES**

| | ACIL Tasman | | CRA | |
|---|---|---|---|---|
| **Plant technology** | **Average capital costs*** ($/kW) | **Total capacity installed 2010-20** (MW) | **Capital costs*** ($/kW) | **Maximum build rates 2010-20** (MW/year) |
| **Gas turbines** | | | | |
| CCGT | 1,045 | • 4,750 | 1,375 | • 600 MW/year |
| OCGT | 1,045 | • 2,340 | 958 | • 600 MW/year |
| **Renewables** | | | | |
| Wind | 3,723 | • 4,278 | 2,750 | • Long-term limit of ~7,500MW |
| Solar | 3,723 | • 920 | - | • None |
| Biomass | 3,723 | • 284 | 4,261 | • Long-term limit of ~2,500MW |
| Small Hydro | 3,723 | • None | 3,617 | • Long-term limit of ~700MW |
| Geothermal | 3,723 | • 1,500 | 4,286 | • 100 MW/year from 2010-15<br>• 150 MW/year 2015 onward |
| **CCS-based** | | | | |
| CCGT with CCS | - | • None by 2020 | 2,841 | • 1,000 MW/year<br>• First plants built by 2020 |
| Black coal with CCS | - | • None by 2020 | 4,865 | • 1,000 MW/year<br>• First plants built by 2025 |

* 2008 dollars. Modelling assumes costs decline in real terms due to 'experience curve' effects

Source: ACIL Tasman; CRA International

## 4.2 The government needs to set the cap trajectory to 2020 with a clear eye to what can be delivered by the electricity sector

While the electricity sector has many opportunities to meet long-term emission reduction targets, care needs to be taken to avoid supply reliability concerns during the first decade of adjustment under an ETS. This section discusses these concerns with the following conclusions:

- There is a physical limit to the maximum rate at which the electricity industry can reduce its emissions
- Based on industry modelling, a 10% reduction on 2000 levels by 2020 will be a large challenge for the electricity sector (this represents a ~34% reduction from status quo levels)
- In addition, a target that is more moderate than a 10% reduction in overall emissions by 2020 may be necessary
- There are additional supply uncertainties given the nature of the electricity industry
- Additional mechanisms should be investigated to ensure supply reliability, even if this compromises the emissions cap

Each of these conclusions will now be discussed in turn.

### *4.2.1 There is a physical limit to the maximum rate at which the electricity industry can reduce its emissions*

The electricity sector has significant potential to lower its emissions to achieve long-term targets given the current and future potential to generate electricity with low or zero emissions. The electricity industry is, however, currently composed of plants with a wide range of emission intensities and different operating characteristics (see Exhibit 4.11). These plants range from high-emitting brown and black coal plants to low emitting closed cycle gas turbine (CCGT) gas plants and extremely low emitting plants from renewable sources. Low emission technologies which may become available in future include carbon capture and storage and geothermal generation.

Exhibit 4.11

**CHARACTERISTICS OF TYPICAL GENERATION TECHNOLOGIES**

| | | Plant characteristics | | | Plant costs | | |
|---|---|---|---|---|---|---|---|
| **Plant technology** | **Emissions intensity** ($t\ CO_2$-e/MWh) | **Start-up times** (hours) | **Ramp rates** (MW/hour) | **Minimum load factors** (% capacity) | **Short-run marginal costs** ($/MWh) | **Capital investment** ($/kW) | **Share of generation FY07** (% demand) |
| **Brown coal** | 1.2-1.4 | 8-24 hours | 20-300 | 60-70% | 2-10 | 2250 | 25% |
| **Black coal** | 0.8-1.0 | 8-14 hours | 20-300 | 40-50% | 10-30 | 1900 | 57% |
| **Gas-turbine (CCGT)** | 0.3-0.4 | 20 minutes | 120-1800 | 30-50% | 30-70 | 1200 | 12% |
| **Gas-turbine (OCGT)** | 0.5-0.8 | <15 minutes | 120-1800 | 0-10% | 70-120 | 850 | |
| **Hydroelectric** | 0 | 1 minute | 300-3600 | 0% | 0 | 2500 | 6% |
| **Wind** | 0 | Weather dependent | Weather dependent | 0% | 0 | ~1900-2800 | <1% |
| **Concentrated solar** | 0 | Weather dependent | Weather dependent | 0% | 0 | ~5000-5500 | 0% |
| **Geothermal** | 0 | ? | ? | ? | 4-10 | ~4,500 | 0% |
| **CCGT with CCS** | 0.08-0.10 | As CCGT + 4-8 hours | ? | 0-10% | 40-90 | ~2,800 | 0% |
| **Black coal with CCS** | 0.03-0.15 | As for black coal + 4-8 hours | ? | 40-50% | 9-30 | ~4,800 | 0% |

Source: ACIL Tasman; NEMMCO; CRA International; ESAA

An ETS will achieve reductions in emissions in the electricity sector by creating the required incentives to substitute high emission plants with lower emission plants (both existing and new). There is, however, a maximum rate at which this can occur within the first ~10 years of the ETS, given:

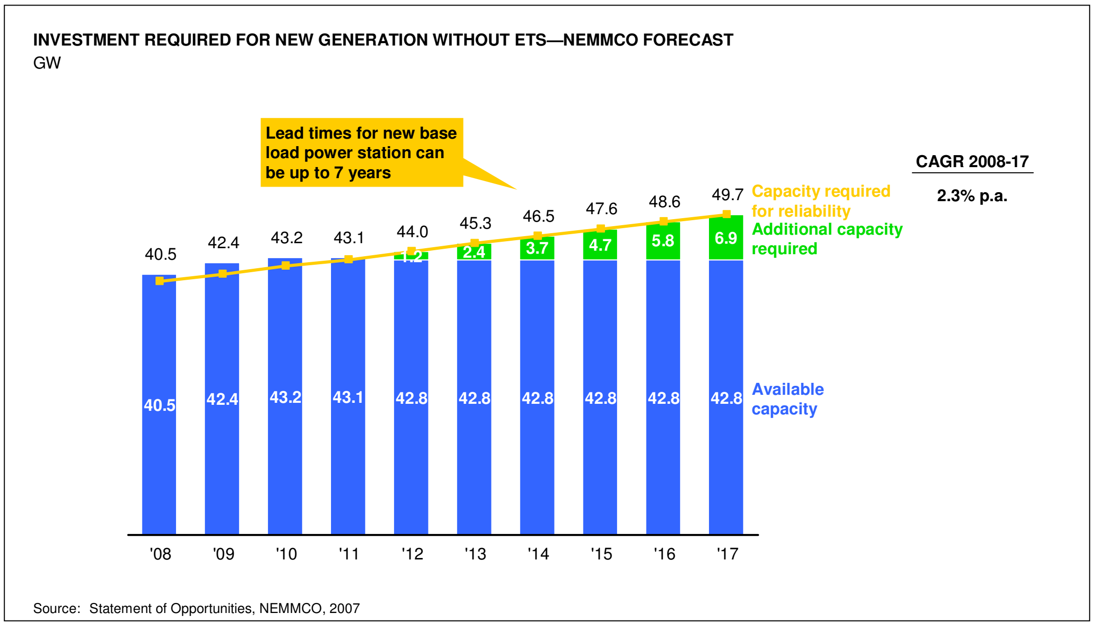
- Emission-intensive coal plants currently constitute ~85% of current generation
- Existing gas plants have limited capacity to substitute for coal generation
- There is a maximum build rate at which new gas generation can be built, including the rate at which associated infrastructure such as gas supplies, production and transport can be provided
- There is a limit to the amount of renewable generation that can be installed in this timeframe given maximum build-rates for available technologies and associated transmission networks. In addition, time

will be required to develop new renewable technologies such as geothermal and concentrated solar

- There is likely to be limited additional new low emission technologies such as carbon capture and storage (CCS) within this timeframe

In addition to changing the generation mix, the electricity sector must also install additional capacity to meet a growing level of demand. For example, the National Electricity Market Management Company (NEMMCO) forecasts that up to 6.9GW of capacity is required by 2017 to meet the then expected levels of demand (see Exhibit 4.12).

Exhibit 4.12




Ensuring supply reliability with such significant and rapid changes in the generation mix is a primary concern. As electricity cannot be easily stored, the level of electricity demand must be instantaneously met by the same level of generation supply in real-time. There are immediate and costly implications (including brownouts) when supply fails to meet demand at any single point in time. This is different to almost all other industries where supply and/or demand does not need to be met instantaneously, but can be typically met over some timeframe (e.g., days, weeks or months).

The Government therefore needs to set the cap trajectory to 2020 to ensure that it can be delivered by the electricity industry. A cap trajectory that is more aggressive can cause supply reliability concerns as low emission plants are unable to be installed sufficiently quickly to replace high emission plants that must close to deliver the required emission reductions.

Beyond the first, say, 10 years of the ETS there should be sufficient opportunities for the electricity sector to achieve long-term required emission reduction targets by bringing on the required levels of low emission and renewable technologies.

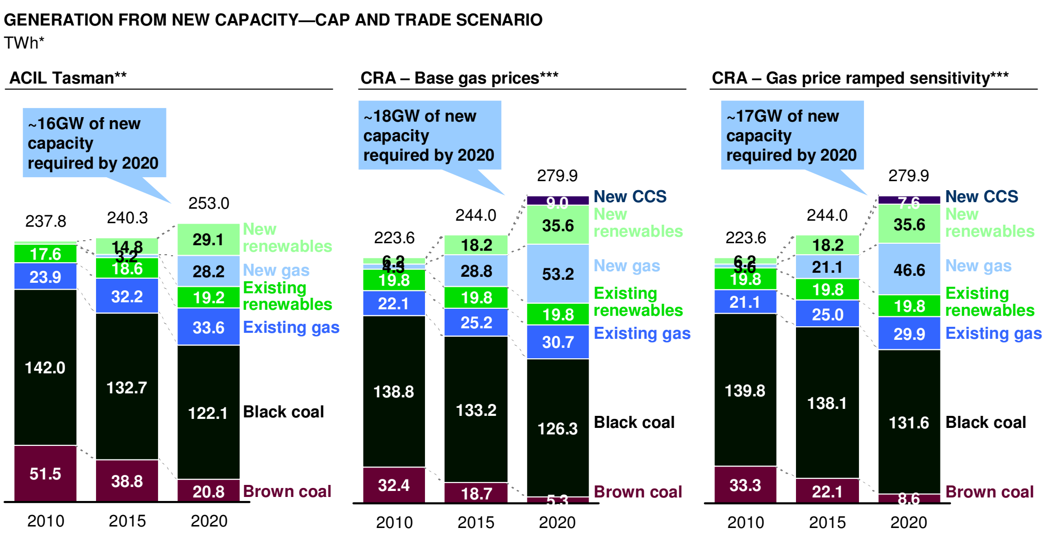
### *4.2.2 Based on industry modelling, a 10% reduction on 2000 levels by 2020 will be a large challenge for the electricity sector (a ~34% reduction from status quo levels)*

Industry modelling shows that ~16-18GW of new capacity is required by 2020 both to achieve a 10% reduction in emissions on 2000 levels by 2020 and to meet expected demand levels. For example, Exhibit 4.13 shows the change in generation mix required by the ACIL Tasman and CRA models under their ETS scenarios:

- Existing gas generation must increase by 9-10 TWh to 30-34 TWh
- New gas generation must grow to 28-47 TWh
- New renewable generation must grow to 29-36 TWh
- Brown coal generation must reduce from ~50 TWh to 5-21 TWh (with capacity reducing from ~6.7 GW to ~2.6 GW)
- Black coal generation must reduce from ~140 TWh to 122-132 TWh

Delivery of sufficient gas and renewable generation capacity to meet a 10% reduction in emissions on 2000 levels by 2020 (which is a 34% reduction from status quo levels) is likely to be a challenge due to the magnitude of the overall investment required as well as the requirements from each type of technology.

Exhibit 4.13




* ACIL Tasman figures are for actual generation; CRA figures are for sent-out generation (after auxiliary load)
** Assumes 10% abatement from 2000 levels by 2020
*** The CRA gas price sensitivity is for 150Mt reduction case by 2020, whereas CRA base gas price scenario is for 120 Mt case by 2020
Source: ACIL Tasman; CRA International

ACIL Tasman and CRA estimate that around 1,450 MW of new gas and renewable generation capacity is required to be installed every year from 2010 to 2020 at an estimated capital cost of $31b. ACIL Tasman notes that this rapid rate of replacement has not been achieved previously in Australia[16]. In addition ~$4b in

[16] ACIL Tasman, 'The impact of an ETS on the energy supply industry', July 2008, page 3

electricity transmission networks and ~$0.5b in gas pipelines is estimated to be required from 2010 to 2020. This level of investment compares with new capacity being installed in the NEM at ~750 MW per year in the last 8 years.

The requirements for installing each type of generation technology are likely to have their own challenges, as shown in Exhibit 4.14 and described in turn below. Note that the results from ACIL Tasman and CRA are directionally very similar, despite some variations that are due to differences in their assumptions including demand side response, gas prices, coal prices, generation build rates, etc.

Exhibit 4.14

**REQUIREMENTS TO MEET A 10% REDUCTION ON 2000 LEVELS BY 2020**

| New generation required | Additional capacity required by 2020 to meet 10% reduction on 2000 levels | | Comments |
|---|---|---|---|
| | ACIL Tasman | CRA | |
| 1. Gas plants | 6,690 MW | 8,157 MW | • Gas use for electricity must rise from 139PJ pa today to 375-466PJ pa which requires:<br>– Significant development of undeveloped and yet to be defined reserves in Bass Strait<br>– Continued expansion of production and reserves base in Qld coal seam gas (CGS)<br>– Successful exploration and establishment of production capability in NSW coal seam gas (CSG) |
| 2. Wind generation | 5,896 MW | 6,313 MW | • Approaching maximum levels of wind generation of 7,500 MW estimated by NGF:<br>– Must build at rate of ~600 MW/yr (currently only ~1,000 MW installed wind capacity)<br>– Assumes no transmission constraints, even though transmission spend may be difficult to justify |
| 3. Geothermal | 1,500 MW | 1,350 MW | • Likely a large challenge:<br>– Technology not yet demonstrated on a commercial scale<br>– Assumes no transmission constraints despite issues similar to wind |
| 4. Concentrated solar | 1,110 MW | None | • No concentrated solar generation currently in production |
| 5. Biomass | 540 MW | 1,287 MW | • Biomass has failed to grow under MRET in recent years |
| 6. Carbon capture and storage | None | 1,129 MW | • Technology currently unproven and may not become commercially viable within this timeframe |

First, it is estimated that 6,700-8,200 MW new gas plant capacity will be required by 2020. This requires gas supplies to grow from 139 PJ to 375-466 PJ by 2020. ACIL Tasman estimates that the production potential in eastern Australia could reach ~3,500 PJ per annum by 2020 (see Exhibit 4.15) based on analysis of existing gas fields, current projects, and potential developments. Given estimated supply and demand curves for gas, ACIL Tasman estimates that supply will grow to ~1,400 PJ per annum and domestic demand to ~1,390 PJ per annum by 2020 (see Exhibit 4.16). This includes ~220 PJ of gas used for LNG from 2014. Gas prices are estimated to rise to ~$5.6 – 7.8/GJ by 2020 (see Exhibit 4.8 above).

Exhibit 4.15

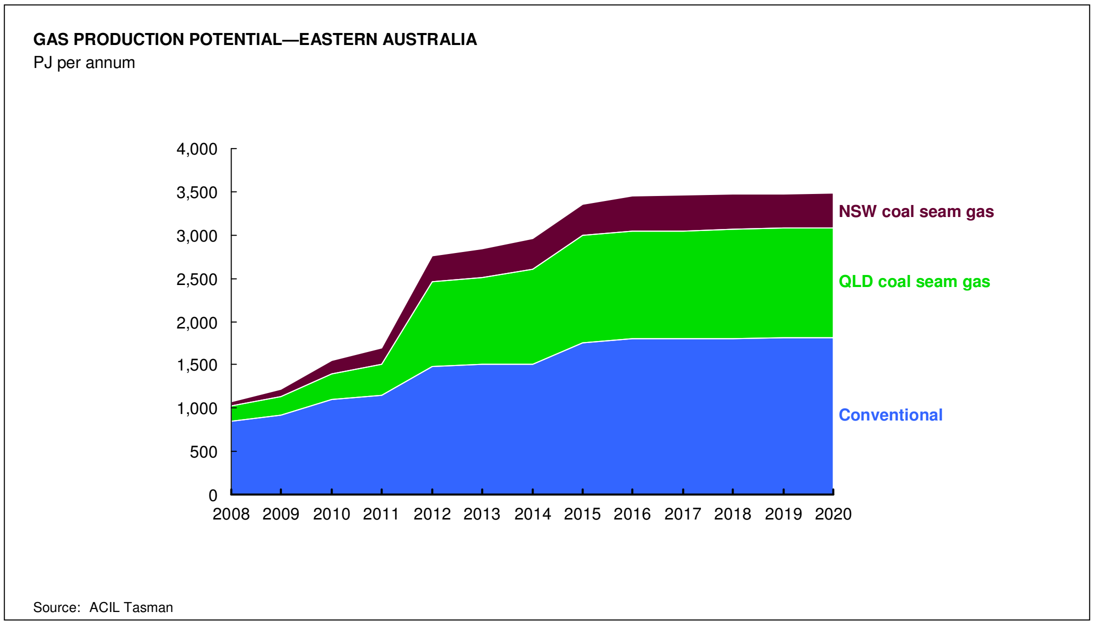
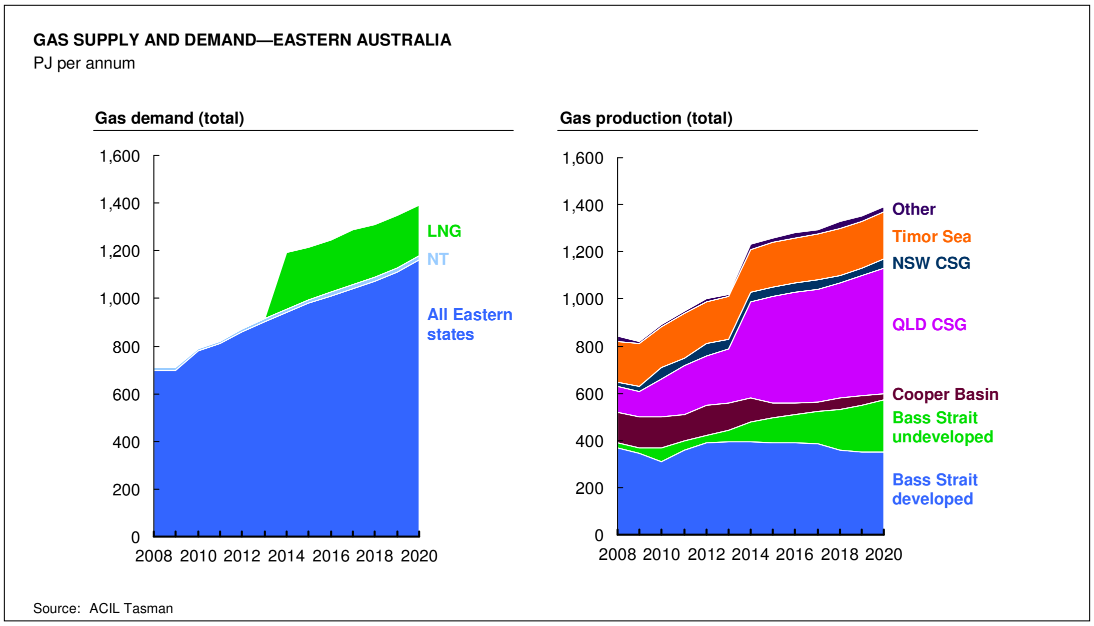



Exhibit 4.16




While sufficient gas is potentially available, substantial investment and development must occur for the required level of gas generation to occur as modelled, including:

- Significant development of undeveloped and yet to be defined reserves in the Bass Strait (see Exhibit 4.16 above)
- Continued expansion of Queensland Coal Seam Gas from ~110 PJ today to ~530 PJ by 2020
- Growth in New South Wales Coal Seam Gas to ~40 PJ by 2020, including successful exploration and the development of necessary production and transport infrastructure

- The ability to build CCGT plants at a rate of ~600MW/year, which is the maximum build rate assumed by the CRA modelling. There is believed to be 3-4 year waits for delivery of key equipment from suppliers

Second, it is estimated that 5,900-6,300 MW of new wind generating capacity will be required by 2020. This is likely to be a significant challenge, given:

- Investment must occur at close to 600MW/year, which is once again the maximum build rate assumed by the CRA modelling (current total capacity is only ~1,000MW)
- The level of generation from wind by 2020 is approaching the long-term resource limit of 7,500MW assumed by CRA. Plants may become less economic as this long-term limit is approached
- No transmission constraints have been assumed. Many wind sites are located in remote areas and will require lengthy transmission connections to the main networks. Investment in many of these transmission connections may not be justifiable under existing regulatory tests

Third, it is estimated that 1,350 – 1,500 MW of geothermal generation capacity will be required by 2020. This is likely to be a large challenge, given:

- Geothermal generation technology has not yet been demonstrated at a commercial scale in Australia. There is, however, significant activity in this area with 33 companies undertaking development projects and many reporting positive results
- Like wind generation, many of these sites are located remotely and face substantial transmission hurdles

Fourth, up to 1,110 MW capacity could be required from solar generation. This is also likely to be a challenge given that the technology for such large scale supply remains unproven on a commercial scale.

Fifth, 540 – 1,300 MW capacity could be required from biomass technologies. Biomass includes generation from landfill gas, sewage gas and bagasse (sugar cane waste). While this is proven technology with some sites currently operating, achieving the amount required is likely to be a challenge given that the level of biomass generation has failed to grow in recent years under the MRET scheme.

Sixth, CRA assume 1,130 MW of new coal-fired generation with carbon capture and storage technology will be installed by 2020. This technology is as yet unproven and may not be available within this timeframe (which is what has been assumed by ACIL Tasman).

Finally, several additional factors create challenges, including the following:

- Long periods are required to construct new electricity generation plants. While some plants (particularly gas) may be able to be constructed on existing generator sites, many will need to be greenfield. New plants can require 3-4 years to obtain the required permits and construction can require a further 3-4 years. Few greenfield plants can be developed and constructed in under, say, 5-6 years

- Resource constraints may cause delays. In addition to the 3-4 year wait on key equipment from OEM suppliers described above, there are skills shortages in the engineering and construction sectors
- There may be equity and debt market constraints in raising the considerable amounts of funding required
- Existing generators will often be best placed to undertake the new investments that are required. The impairment of the financial strength of many existing generation companies (see Sections 4.3.2 and 4.3.3 below) and a possible increased perception of investor risk may create difficulties for these companies to undertake these new investments

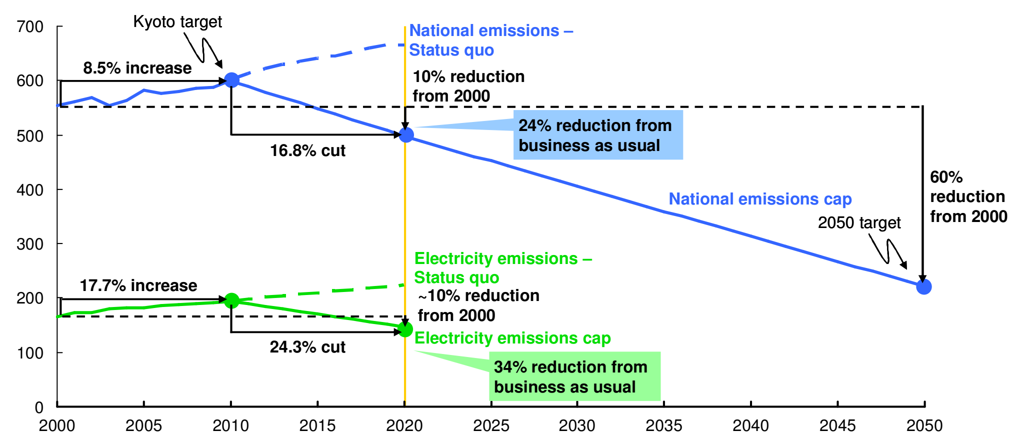
#### *4.2.3 An overall target that is more moderate than a 10% reduction in overall emissions from 2000 levels by 2020 may be necessary*

The conclusion from the analysis above is that a 10% emission reduction target from 2000 levels by 2020 (a 34% reduction from status quo) in the electricity sector is very challenging. If the overall emission reduction target is a 10% reduction on 2000 levels by 2020, this already means that the electricity sector is contributing more than its proportionate share (see Exhibit 4.17). This is because the electricity sector grew over four times faster than other sectors from 2000 to 2006, and hence must fall faster from 2010 to 2020 to achieve the same level of reduction from 2000 levels.

While the electricity sector is likely to find a 10% reduction target very challenging, other sectors are likely to find such a target even more challenging. A 10% overall target will require sectors other than electricity to reduce emissions by ~21% from the status quo, and these sectors appear to have relatively less abatement options than in electricity. This may mean that a more moderate target overall is necessary.

Exhibit 4.17

**ELECTRICITY SECTOR'S SHARE OF AUSTRALIAN EMISSIONS ABATEMENT**
Mt $CO_2$-e




Source: Department of Climate Change, 2008; ACIL Tasman

### *4.2.4 There are additional supply uncertainties given the nature of the electricity industry*

In addition to the technological, physical and resource constraints to achieving the required shift in generation mix described above, the unique nature of the electricity industry creates additional uncertainties that can impact supply reliability. These uncertainties are summarised in Exhibit 4.18.

Exhibit 4.18

**POTENTIAL UNCERTAINTIES IN SUPPLY RELIABILITY**

| Potential uncertainties | Elaboration |
|---|---|
| 1. Complex investment signals for new generation | • Uncertainty in the frequency of high price events creates considerable uncertainty for investment decisions<br>• Carbon prices and development of new low emission generation technologies create additional uncertainties for any new plant's long-term competitiveness |
| 2. Increased intermittent generation | • Increased wind generation requires more reserve capacity given their intermittent nature |
| 3. Ability to meet system ramp | • With increased quantities of gas-fired generation acting as base-load and increased levels of intermittent generation, the system may experience times when it has insufficient ability to meet ramp-ups |
| 4. Potential for brown coal plants to exit early | • Brown coal plants may shut before the modelling assumes they do because:<br>– They become financially unviable under current capital structures and re-financing may not necessarily occur<br>– They may not be able to physically operate at load factors below a certain point |
| 5. Reduced plant reliability | • Plants whose asset values have been impaired may be maintained less, leading to increased forced outage rates |

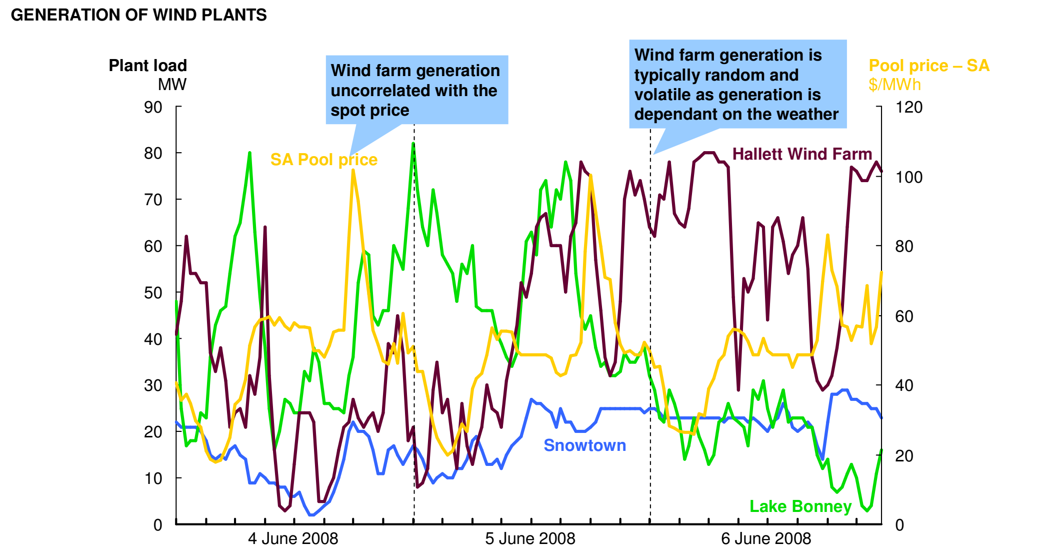
First, the investment signals in the electricity industry are complex. The primary investment signal in the NEM comes from the pool price. There is, however, high volatility in spot prices (up to \$10,000/MWh) and uncertainty in the frequency of high price events. As these events can significantly impact the viability of generation, this creates considerable uncertainty for new investments and for retaining existing plant that are close to closing.

Furthermore, new plants, particularly those that run baseload such as new CCGT generators, require long-term forecasts of plant competitiveness. While this has always been a concern, it is more complex and difficult under an ETS where the carbon price and addition of new technologies with lower emission intensities create significant additional uncertainty of the plant's future relative competitiveness.

These uncertainties in investing in generation have led many electricity retailers to bring on peaking plants themselves. Retailers can be significantly impacted by periods of price volatility if they have insufficient hedge contracts with generation and therefore have some volume of their electricity sales exposed to pool prices. Peaking plants provide retailers with physical coverage for their pool price exposure at times when demand is likely to be high. They will also effectively reduce pool prices at these times for any remaining pool exposure that the retailer may have. This increasing vertical integration may, therefore, help bring on some of the required generation investment.

The second uncertainty is the potential for increased intermittent generation (such as wind and solar) to require more reserve capacity. The market operators who control dispatch have limited control over the level of generation from these plants at any point in time as they rely on unpredictable weather patterns. Exhibit 4.19 shows the intermittent nature of generation from a number of wind plants. As the level of wind capacity approaches 6,000MW or 20% of estimated average load, significant amounts of backup capacity are required to support the intermittent nature of wind generation. It is possible that potential extreme short-term fluctuations in wind generation, combined with other 'low-probability' events such as plant outages and transmission constraints, may cause problems with supply reliability. For example, such a situation occurred in Texas USA in February 2008 when industrial loads were curtailed following a drop in wind production from 1,700 MW to 300 MW at a time when evening electricity load was increasing.

Exhibit 4.19




Source: NEMMCO

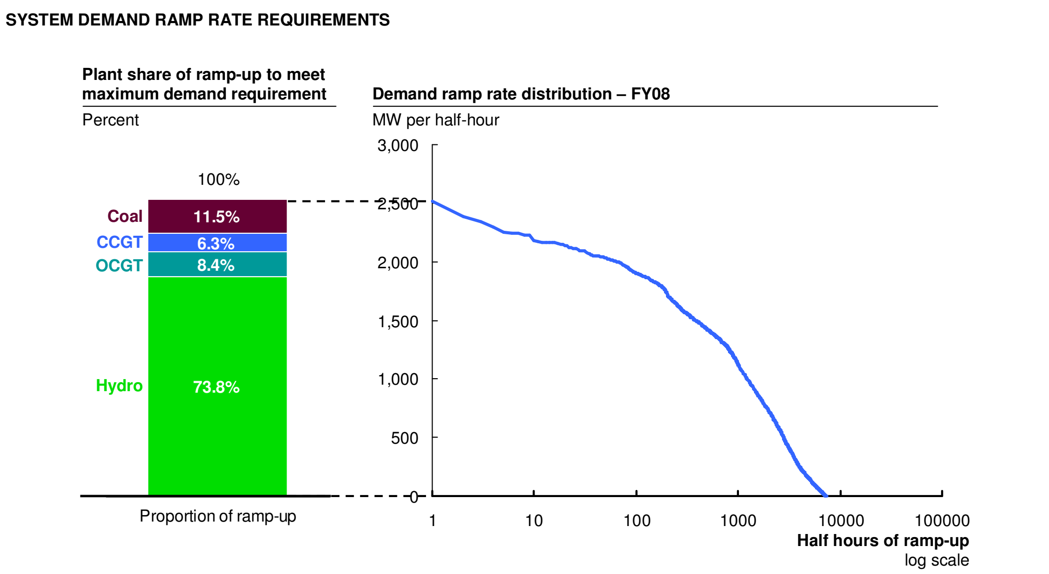
The third uncertainty is the ability of the electricity system to meet system ramps. The system ramp is the rate at which the system load increases (or decreases) in a particular time period such as five minutes or a half hour. Exhibit 4.20 shows the half-hourly ramp-rates of the NEM for FY2008 ranked in descending order. The highest half hourly system ramp in FY2008 was on 19 July 2007 from 6.30am to 7.00am. In this half hour period the NEM load increased by 2,519 MW from 25,410 MW to 27,929 MW. The available generation plants must be capable of meeting this increase in load in the half hour. Hydro and gas plants contributed 88% of this ramp capability:

- Baseload plants such as coal typically have a ‘ramp-rate’ of between 30-75 MW/half-hour given they are large, inflexible plants. In any case, these plants may be operating close to full capacity and thus have limited ramp capability.
- The majority of the ramp-up is typically met by gas and hydro plants.

Under an ETS there may be some concerns that the system cannot meet extreme short-term ramp rates as gas plants operate at higher load factors and there is increased levels of intermittent wind generation (as described above). There is also little prospect that significant additional hydro capacity will be installed. While the NEM is designed to ensure these ramps can be met (e.g., through the ancillary services market and pool price signals), problems may occur when these factors are combined with other low probability events such as unplanned plant outages or particular transmission constraints.

The fourth uncertainty is the potential for high emission plants (e.g., brown coal and possibly black coal) to close prior to when the modelling assumes they will be shut. Exhibit 4.13 above showed that brown coal generation output is modelled to decrease from ~50 TWh today to ~5-21 TWh by 2020 to meet the required emission reduction targets.

Exhibit 4.20




Source: NEMMCO

Some plants may become insolvent under current capital structures (see Section 4.3.3 below for details on how and why this may occur). Theoretically, the plant will continue operating so long as it has positive operating cashflows. For example, it may be operated by:

- The existing owner if they contribute additional equity to reduce debt to a level that is sustainable given the reduced level of profitability of the asset
- The receiver if they take possession of the asset after it becomes insolvent to the existing owner
- A new equity owner if the asset is sold

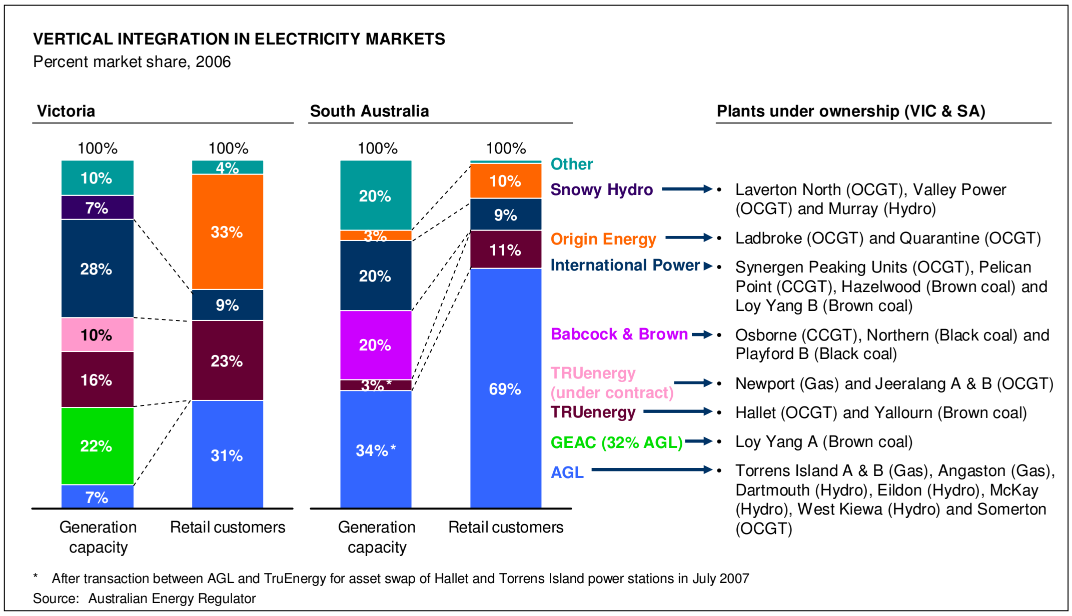
There are, however, reasons why the asset may shut earlier:

- The existing asset owners may prefer to remove these plants from the system to improve the economics of their remaining plants
- It may be difficult to sell the asset to a new equity owner without a large discount from its fair value as the new owner would require a very short payback period given uncertainties in the carbon price trajectory and in the potential entry of new low-emission plants. They would also face significant reputational challenges in purchasing and operating a brown coal plant in a carbon trading environment
- A new entrant buyer would require significant prudential capital to enter the electricity industry to back their multi-year hedge contracts
- It may also be difficult for a new entrant buyer to obtain sufficient debt market support for a refinancing

In any event, the refinancing of high emission plants is likely to be disruptive and require some time to occur.

Increasing vertical integration of electricity generation and retail assets may lessen some of these potential issues to some extent. Retailers may have a greater incentive to retain generation in operation as they benefit from reducing potentially costly exposure to extremely high pool prices. Exhibit 4.21, however, shows the extent of vertical generation in Victoria and South Australia. Both International Power (owner of the Hazelwood and Loy Yang B brown coal plants) and Truenergy (owner of the Yallourn brown coal plant) have higher levels of generation exposure than retail exposure. Loy Yang A is likely to be operated as a pure generation asset despite being 32% owned by AGL.

Exhibit 4.21




In addition to impacts from plants becoming insolvent, some high emission plants might also close prior to when the modelling assumes. The CRA modelling does not appear to take proper account of particular physical characteristics of the baseload plants. For example, it appears that minimum generation levels, start-up costs, start-up times and ramp rates are not fully modelled. As a result the plants are assumed to operate with high levels of flexibility that cannot be achieved in practice, capturing high prices at times of high demand only. In reality the economics of these plants may deteriorate sooner than has been modelled.

The final uncertainty is the potential for plants whose asset lives have been shortened to have reduced levels of maintenance leading to increased incidences of unexpected plant outages. The ETS will necessarily shorten the asset lives of some generation plants, particularly brown coal and some black coal generators. It is usual for assets approaching the end of their useful lives to have a lower level of maintenance that maximises their cashflows rather than their asset life.

### *4.2.5 Additional mechanisms should be investigated to ensure supply reliability, even if this compromises the emissions cap*

As discussed above, there is a physical limit to the rate at which the electricity sector can reduce its emissions and a trajectory that is beyond this limit will cause supply reliability concerns. A 10% reduction in emissions from 2000 levels by 2020 appears to be a target that is challenging. In addition, the electricity industry has significant levels of complexity and uncertainty making it difficult to predict outcomes and to be completely confident that sufficient supply will exist to meet demand at every point in time across the year.

To ensure the NEM maintains high levels of supply reliability following the introduction of the ETS, additional mechanisms and changes to the NEM should be investigated in consultation with NEMMCO. This approach is consistent with the Ministerial Council on Energy's (MCE) recent direction to the Australian Energy Market Commission (AEMC) to conduct a review of the energy market frameworks to determine whether they need to be amended to accommodate the ETS.

Examples of possible mechanisms that exist but which may require enhancement include:

- NEMMCO ancillary services, which create markets for frequency and voltage control and system re-start, essentially to manage short-term contingent events such as unplanned plant outages, unforeseen system ramp-ups, etc. These markets should adjust to reflect any increased requirements to meet supply reliability
- NEMMCO Reserve Trader function, which allows NEMMCO to tender up to 9 months in advance for additional capacity or demand reduction that would not otherwise have been present to preserve sufficient system reserve
- NEMMCO Powers of Direction, which allows NEMMCO to make directions to plants including remaining available and/or operating
- In addition, it may be worth considering capacity payments for specific plant availability or payments for controlled exit as possible new mechanisms

NEMMCO appears well-placed to operate these mechanisms for the following reasons:

- They have the best information to judge when the mechanisms may be required
- They are well-placed to judge the potential negative impacts on the investment environment from implementing some of these mechanisms
- They are independent from Government

These mechanisms need to be considered and implemented carefully as they may have an impact on the orderly functioning of the market and may create perverse incentives. In addition, some of the mechanisms (e.g., the Reserve Trader, Power of Direction and Capacity Payments) may compromise the level of emission reduction. Nevertheless, they may be necessary to meet the primary objective of 'keeping the lights on'.

## 4.3 Given the extent of asset impairment, compensation should be provided to affected generators

Given their emission intensities, brown and black coal plants must, by definition, be substituted by lower emission technologies to achieve emission reduction targets under an ETS (subject, of course, to any international arrangements which could see Australia meet much of its targets by buying permits internationally). Despite the complexities in modelling the electricity sector, it is likely that these plants will experience a significant reduction in value.

This section describes the following conclusions:

- Asset values of high emission generators are estimated to reduce considerably under an ETS, by ~80% on average for brown coal plants and at least 30% on average for black coal plants
- Compensation for asset impairment is an equity judgement for Government, although the case for coal-fired generators appears strong
- The reduction in asset values can, however, affect supply reliability or price volatility in some specific ways

### *4.3.1 Asset values of high emission generators are estimated to reduce considerably under an ETS*

Modelling estimates that asset values could reduce by 80% on average for brown coal plants in total, and by at least 30% on average for black coal plants in total to meet the required emissions reductions (see Exhibit 4.22). Note that some plants close immediately and lose 100% of their value from the introduction of the ETS. Reductions in asset values can occur for two reasons:

- Brown and black coal plants may see their unit gross margins decline
- Brown and black coal plants may see a reduction in volume

The first of these reasons occurs because brown and black coal plants are unlikely to be able to recover their carbon cost in higher prices under an ETS. Prices in the NEM are set every five minutes by the marginal plant (see Exhibit 4.23). At times when reasonable gross margins are likely to be earned, brown and black coal plants are not typically the marginal plant given they have lower marginal costs, longer start-up times, slower ramp rates and are less able to operate at low and varying load factors. Many of these plants (brown coal in particular) are not designed to ramp-up and ramp-down with varying demand and varying spot prices. At these times, however, the marginal plant is more often a gas plant with higher marginal costs, quicker ramp rates and a greater ability to operate at low and varying load factors. Coal plants earn gross margins equal to the difference between the pool price that is set by these marginal plants and their marginal costs, as shown in Exhibit 4.23. See Appendix 1 for further explanation.

Exhibit 4.22

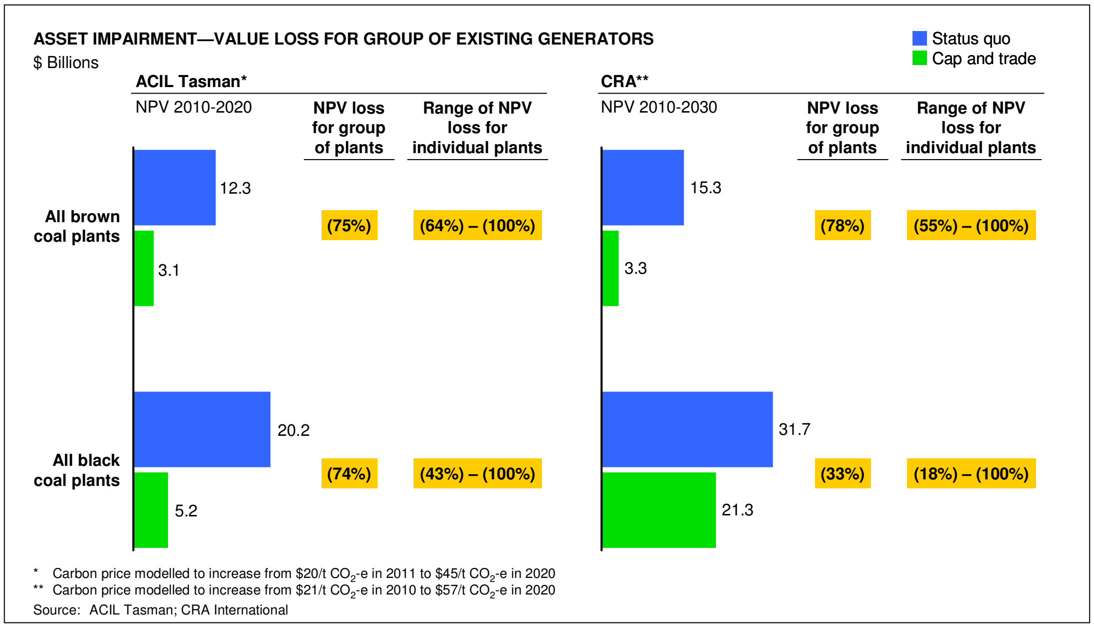
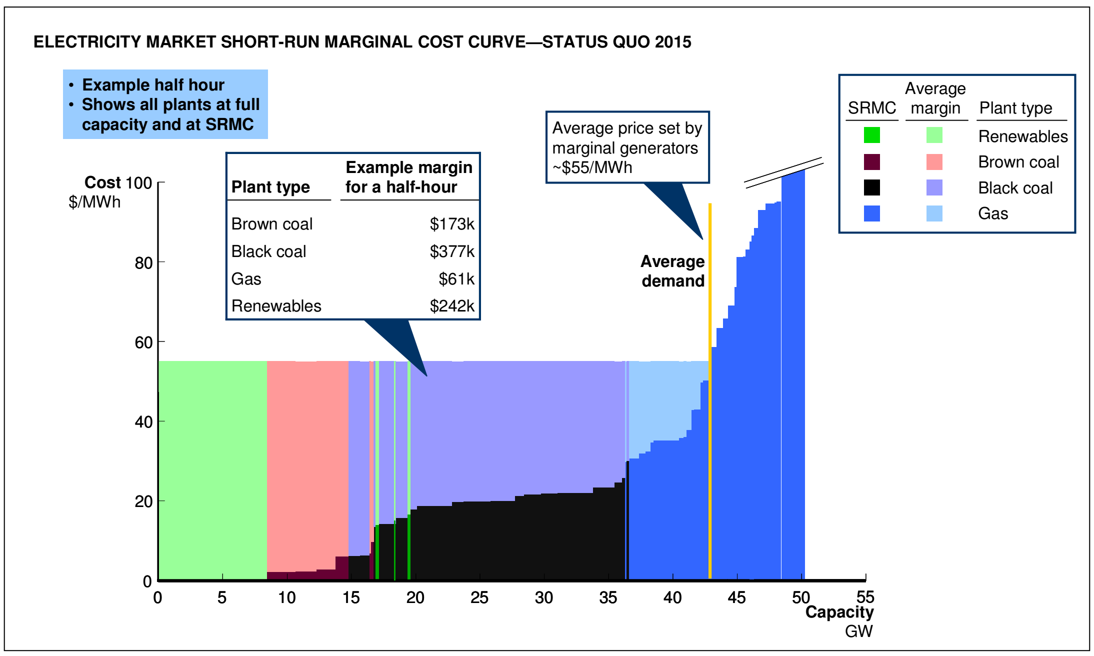
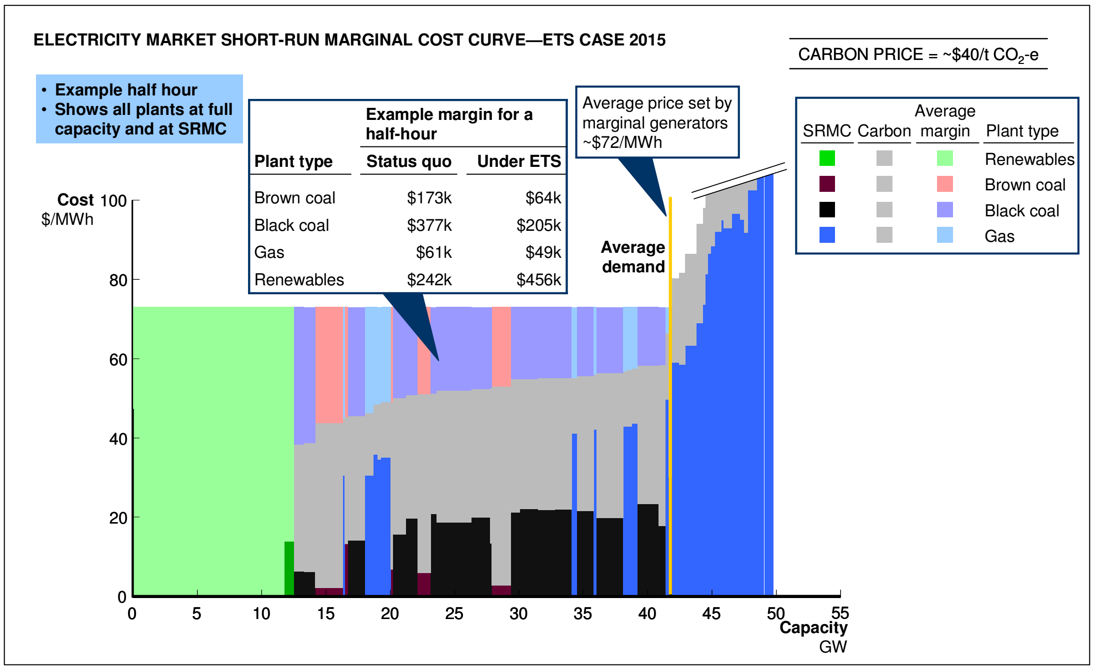



Exhibit 4.23




Under an ETS, the increase in marginal costs of a plant is determined by their emission intensity while the increase in price received is determined by the marginal generator (see Exhibit 4.24). For example, assuming a \$20/t $CO_2$-e carbon price, brown coal plants (with a carbon intensity of 1.2 t $CO_2$-e/MWh) could see their marginal costs increase by ~\$24/MWh while black coal plants (with a carbon intensity of 0.9 t $CO_2$-e/MWh) could see their marginal costs increase by ~\$18/MWh. CCGT gas plants (with a carbon intensity of ~0.5 t $CO_2$-e/MWh) would see their marginal costs increase by only ~\$10/MWh. Since the gas plants are more typically the marginal plant, pool prices would increase by only \$10/MWh for most periods. Brown and black coal plants would therefore see their total gross margins decline, as shown in Exhibit 4.24. Note that ACIL Tasman's model also has black coal gross margins declining due to black coal cost increases, leading to a relatively larger reduction in black coal asset values than CRA, shown in Exhibit 4.22 above.

Exhibit 4.24




The Garnaut Draft Report[17] states that a number of factors will ameliorate these negative impacts on coal generators (particularly brown coal), including the capacity to recover volume loss through price as gas prices and black coal prices increase closer to export parity, while brown coal prices remain linked to resource recovery costs. The ACIL Tasman modelling already assumes gas and black coal prices increase to a considerable extent. While even higher increases can lessen the level of asset impairment to some extent, it is unlikely to be significant and there are a number of practical considerations, particularly the requirement for carbon prices to 'shadow' the fuel cost increases if any emission abatement target is to be met. See Appendix 2 for further explanation.

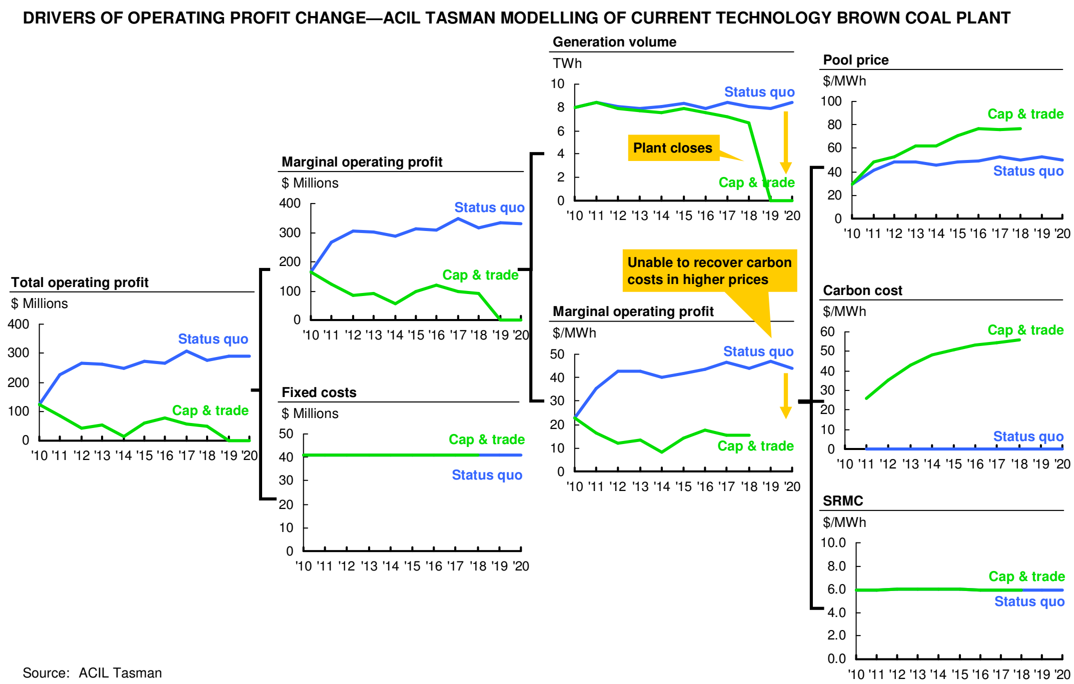
The second potential impact on brown coal plants from an ETS is a reduction in volume. As the costs of brown and black coal plants rise relative to other lower emitting plants, they are gradually displaced to the right of the industry supply curve. As a result, their volumes may decline. The extent of decline before the plants shut is, however, limited by the plant's physical characteristics. Brown coal plants, for example, are typically unable to operate at load factors below ~60–70%.

These price and volume impacts have been modelled for an example brown coal plant under an ETS and are shown in Exhibit 4.25. It can be seen that under an ETS the operating margins of the brown coal plant are modelled to decline from ~\$40/MWh to ~\$15/MWh. Furthermore, volumes are modelled to decline from ~8.0 TWh to ~6.6 TWh by 2018, and the plant is modelled to shut by 2019 as the plant no

[17] Garnaut Climate Change Review, 'Draft Report', June 2008, page 498

longer earns positive operating margins. Note that several high-emitting coal plants are modelled to be uneconomic immediately following the introduction of the ETS.

Exhibit 4.25




Source: ACIL Tasman

It is worth noting that vertical integration of generation companies with retail businesses can reduce these impacts to some extent. A generator may be able to pass on increases through to the retail market. This is, however, unlikely as the vertically integrated company must remain competitive with others in the retail market. Other retailers may not have generation or contracted capacity that is as impacted. Furthermore, while most owners of brown coal plants are vertically integrated to some extent, they have a portfolio that has considerably more generation than retail (see Exhibit 4.21 above).

### *4.3.2 Compensation for asset impairment is an equity judgement for Government*

The provision of compensation for asset impairment of black and brown coal generators is ultimately a judgement for Government. As described in the Government's Green Paper, this can be made on grounds of fairness and views concerning the impact on the investment environment.

The case for compensation of coal generators on fairness grounds is based on at least two considerations. Firstly, the impact of the asset impairment is unusually large. ACIL Tasman and CRA estimate that brown and black coal plants would have their expected NPV reduce from ~$32 – 44b to ~$8 – 22b. This magnitude of value destruction from a single regulatory change is well in excess of liabilities arising from usual regulatory changes.

Furthermore, the impact for shareholders from the reduction in asset values is even more severe. Given that coal plants are typically optimally geared at ~60%, the reduction in asset values is likely to cause many companies (and hence shareholders) to lose all of their investment in these plants. Indeed, significant levels of debt may also need to be written off.

Secondly, most companies have made large, long-term investments in generating assets without an ETS on the horizon. It is true that State and Federal Governments have not had a stated policy that compensation will be provided. The NETT and PMTG did, however, recommend that compensation be provided and the Green Paper concurs with this.

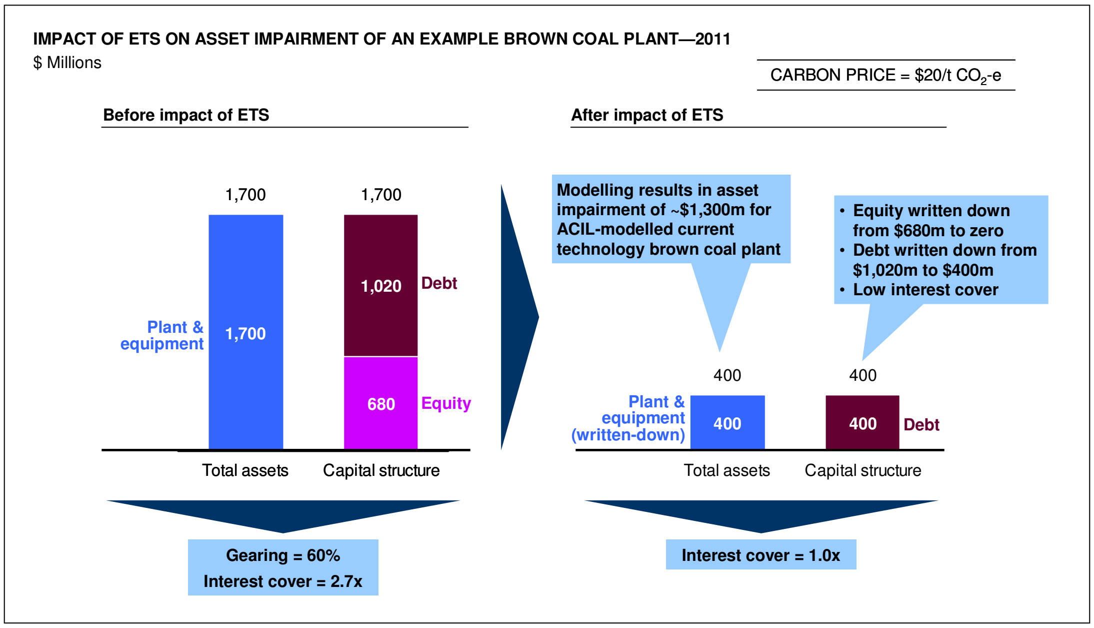
Compensation may also bring incidental benefits to supply security, particularly if it is structured specifically to achieve certain outcomes (see the next section).

### *4.3.3 The reduction in asset values affects supply reliability or price volatility in some particular ways*

The reduction in profitability of high emission plants will require the asset owners to write-down their asset values and will cause the plants to become insolvent in many cases. While theoretically the assets will continue operating so long as they have positive operating cashflows, there are a number of reasons why this may not occur and supply reliability could be threatened, as described above in Section 4.2.3.

Accounting rules require assets to be written down to reflect the present value of their future cashflows, effectively bringing forward the profitability impacts of an ETS to the present. Exhibit 4.26 shows this impairment impact for an example brown coal plant. Modelling estimates that an ETS will reduce the profits of the plant in the first year of an ETS. The present value of these future reductions in profitability has been modelled to be ~\$1.3b. The asset value of the plant, currently at ~\$1.7b, must be written down by this amount to \$0.4b.

Exhibit 4.26




These plants are typically optimally geared at around 60%. The capital structure of this plant today would therefore be ~\$1b debt and \$0.7b equity. An asset write-down of $1.3b would therefore eliminate fully the equity value, and reduce the interest cover from 2.7x to 1.0x. The plant would therefore become insolvent to the current asset owner. In addition, debt is impaired from ~$1b to ~$400m.

Some of the potential impacts from this asset impairment include the following:

- Supply reliability may be reduced as plants may close earlier than modelled (as described in Section 4.2.3 above).
- Plant reliability and hence system reliability may be reduced if plants with shortened asset lives are maintained less (as described in Section 4.2.3 above).
- The asset owners may reduce the contracting levels of these plants and increase their exposure to the spot market. This has the potential to increase pool price volatility.
- The investment environment for new generation assets in Australia may be negatively impacted (as described in Section 4.2.2 above).

Compensation could possibly ameliorate the first two potential impacts if it is specifically structured to do so, for example, through some form of payment for availability, capacity or controlled exit. It could, however, also reduce any perceived negative impact on the investment environment.

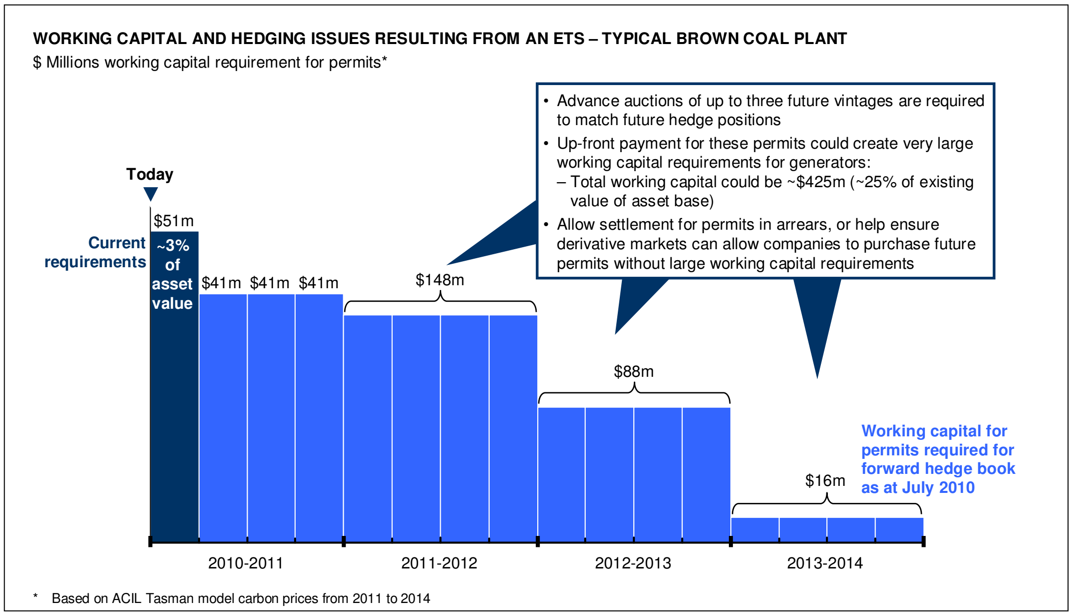
### 4.4 Working capital and hedging issues need to be taken into account in designing the ETS

An ETS can create significant working capital and hedging issues for electricity generators. A typical coal generator with ~1,000 MW capacity could require carbon permits of ~$50m every quarter. The Green Paper’s preferred position of quarterly auctions of permits, including an auction after the relevant financial year, allows the coal generators to manage the associated working capital and cashflow issues.

In addition, electricity generators tend to sell forward their electricity up to three years in advance. Typically a fixed amount of output for a specified time period is sold forward at a fixed price. A typical contracting profile will sell forward ~85% of the output for the current year, ~60% of the output for one year out, ~30% of the output for two years out, and possibly a small amount of the output from three years out (see Exhibit 4.27).

As this electricity is sold forward at a fixed price, electricity generators need to manage their forward costs associated with this electricity. It is likely that generators would therefore seek to lock in their forward carbon costs. The Green Paper’s preferred position helps address this with auctions for vintages up to three years in advance.

Exhibit 4.27




As shown in Exhibit 4.27, however, the working capital requirement could be up to ~$425m from purchasing this profile of carbon permits in advance. It is highly unlikely that this level of working capital could be provided by the coal plants. The Government needs to structure the ETS to ensure generators have a minimal additional working capital requirement. This could be by allowing settlement for permits in arrears, or by working with derivative market operators to increase the chances that generators can access forward carbon permits through derivative products without requiring large working capital commitments.

## 4.5 Wholesale and retail electricity prices should be allowed to rise to reflect fully the impact of an ETS

As described above, wholesale electricity prices could rise by 40-80% and retail electricity prices could rise by 30 – 48% under an ETS. This price impact should be allowed to flow through fully to wholesale and retail electricity prices, as it properly reflects the cost of carbon in the electricity sector to create the required incentives for demand reduction and other efficiency measures from electricity consumers.

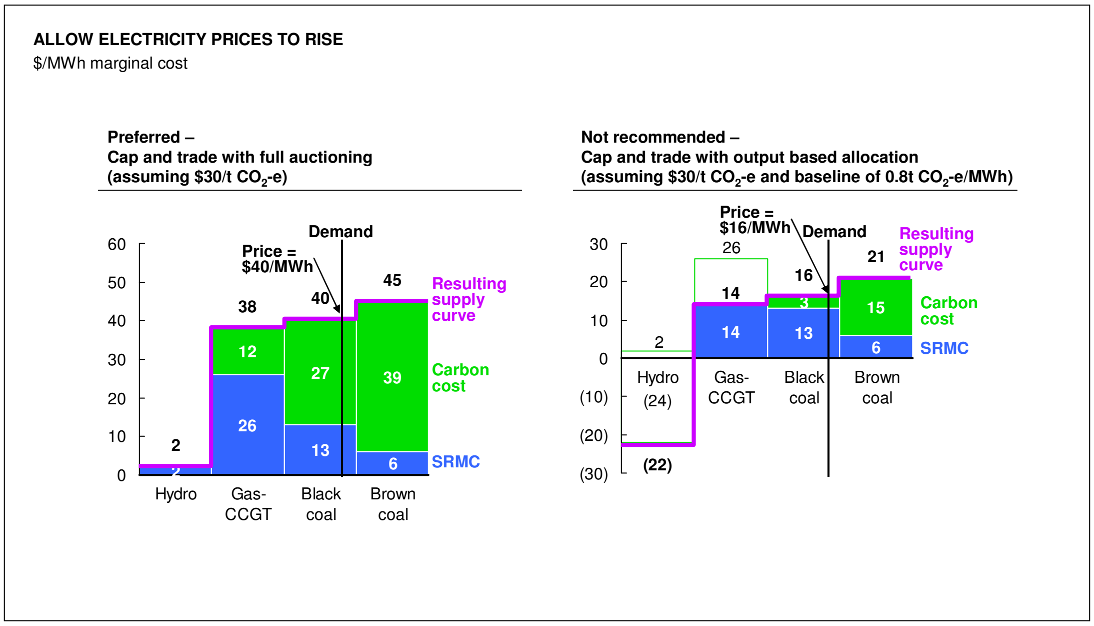
It is important that retail price caps are abolished (or adjusted often by regulators, which will likely be difficult) for the full impact of the ETS. Retailers will otherwise be unable to pass higher wholesale prices through to consumers. Retailers operate with a low margin (generally ~10%) that is unable to absorb higher wholesale prices. Without allowing full pass-through of higher electricity prices it is likely that many retailers will face huge losses and exit, there will be less ability to invest in new low emission generation and there will be less demand side response to reduce electricity consumption.

Compensation for low income households and TEEI companies should be made on a targeted, specific basis rather than generally through a lowering of overall electricity prices.

While not recommended, one example of how wholesale electricity prices could be lowered is by employing an output-based allocation of permits instead of allocating permits by auction. Such an allocation method lowers the entire electricity supply curve without altering the relative incentives between generators. Hence, price increases are lowered by foregoing permit auction revenue, but the emission reduction incentives facing generators remain unchanged.

Exhibit 4.28 shows how such a scheme might operate. A baseline intensity is set that determines the amount of ‘subsidy’ that is provided to the electricity sector. Rather than purchasing permits for their full emission intensity, generators are only required to purchase permits to the extent their emission intensity exceeds the baseline. Generators below the baseline are allocated permits to the extent their emission intensity is below the baseline. In both cases, generators purchase or are allocated permits for their actual output. This ensures the incentives for all generators are no different under an auction-based system and an output-based system for allocating the permits.

Exhibit 4.28




Thus, for a brown coal generator with a marginal cost of $6/MWh, the cost of carbon under a full auction system is $39/MWh (assuming a $30/t carbon price and an emission intensity of 1.3 t/MWh). Similarly, for a CCGT plant with a marginal cost of $26/MWh, the cost of carbon under a full auction system is $12/MWh (given its emission intensity of 0.4 t/MWh).

Under an output-based allocation system with a baseline set at 0.8 t/MWh, the brown coal plant must only purchase permits for their emission intensity above the baseline (i.e. 0.5 t/MWh) for their actual output. Their cost of carbon is therefore $15/MWh). Similarly, the CCGT plant is allocated permits to the extent their emission intensity is below the baseline (i.e. 0.4 t/MWh) for their actual output. They therefore receive a subsidy of $12/MWh. The resulting supply curve is shown on the right-hand-side of Exhibit 4.28. The effect is that the entire supply curve is shifted down by $24/t (i.e. the baseline of 0.8 t/MWh multiplied by the carbon cost of $30/t

$CO_2$-e). The wholesale electricity price is therefore lowered by \$24/t, with the reduction flowing through to the retail price. The relative positions of the generators in this supply curve are otherwise identical to their positions under a full auction system.

An output-based allocation of permits is not recommended. As already stated, the effects of an ETS on electricity prices should be allowed to flow through.

### 4.6 The RET scheme should cease with the introduction of the ETS

The expanded Renewable Energy Target (RET) scheme proposes that renewable generation reaches 45,000 GWh by 2020 above the level in existence prior to the scheme. The scheme is designed to encourage investment in renewable generation such as wind, solar and biomass.

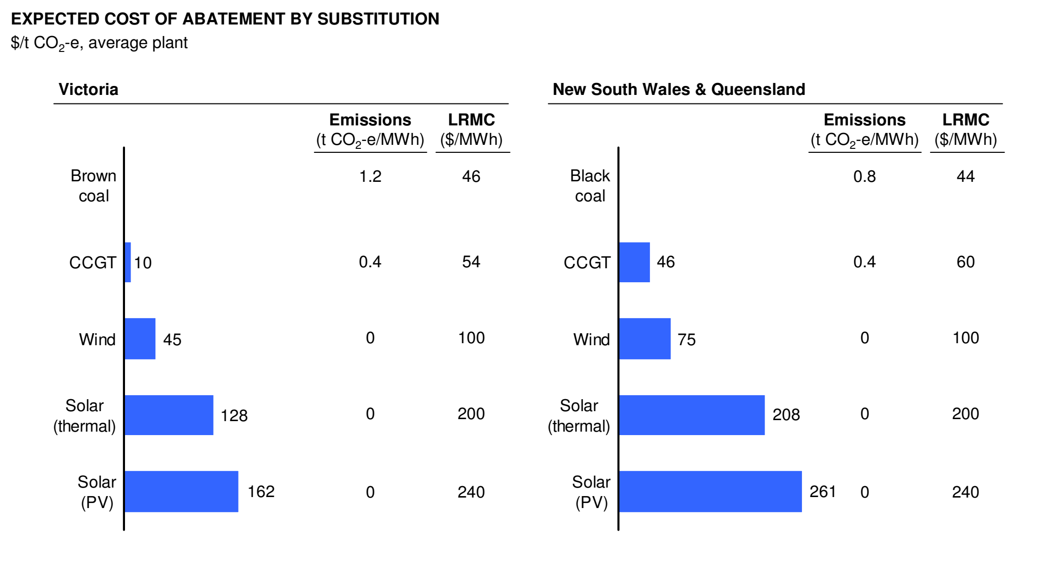
The original MRET scheme has generated ~9,500 GWh in renewable generation. The continuation of the RET scheme will require an incremental 35,500 GWh to reach the 45,000GWh target between now and 2020. To date, the scheme has been met largely by wind generating capacity.

The RET scheme will be based on the existing MRET scheme. Generators are granted a tradeable renewable energy certificate (REC) for every incremental megawatt-hour of renewable energy that is generated. Buyers of wholesale electricity (including retailers and large users) must purchase RECs to cover a given percentage of their total electricity bill. These RECs must be surrendered or a shortfall charge of \$40/MWh is imposed. The cost of compliance is passed on to households through increased retail prices.

The RET scheme has merit to encourage investment in renewable generation in the absence of other measures to lower the intensity of carbon emissions in Australia's electricity sector. The scheme is, however, both inefficient and redundant under an ETS and should be phased out. There are two problems in particular with continuing the RET scheme.

Firstly, the RET scheme favours renewable technologies as a means of lowering emissions intensity. These may not, however, be the lowest cost methods to abate the electricity sector's emissions intensity. The purpose of the ETS is to put a price on carbon that is required to meet a target cap set for the overall economy. This price will therefore create the required incentives to abate emissions at the lowest cost across the overall economy. Within the electricity sector, for example, substituting coal generation with gas or potential carbon capture and storage technologies could be lower cost than most renewable technologies. Exhibit 4.29 shows ACIL Tasman's estimates of the relative costs of emissions abatement from various generation technologies. Substituting gas-fired generation for brown coal to achieve abatement costs ~\$10/t $CO_2$-e, while using wind and solar to achieve the same end on average across various sites should cost \$45 and \$128 – 162/t $CO_2$-e respectively. The effect of this is to increase the cost of electricity to consumers above what would otherwise be required to achieve the targeted level of emissions abatement.

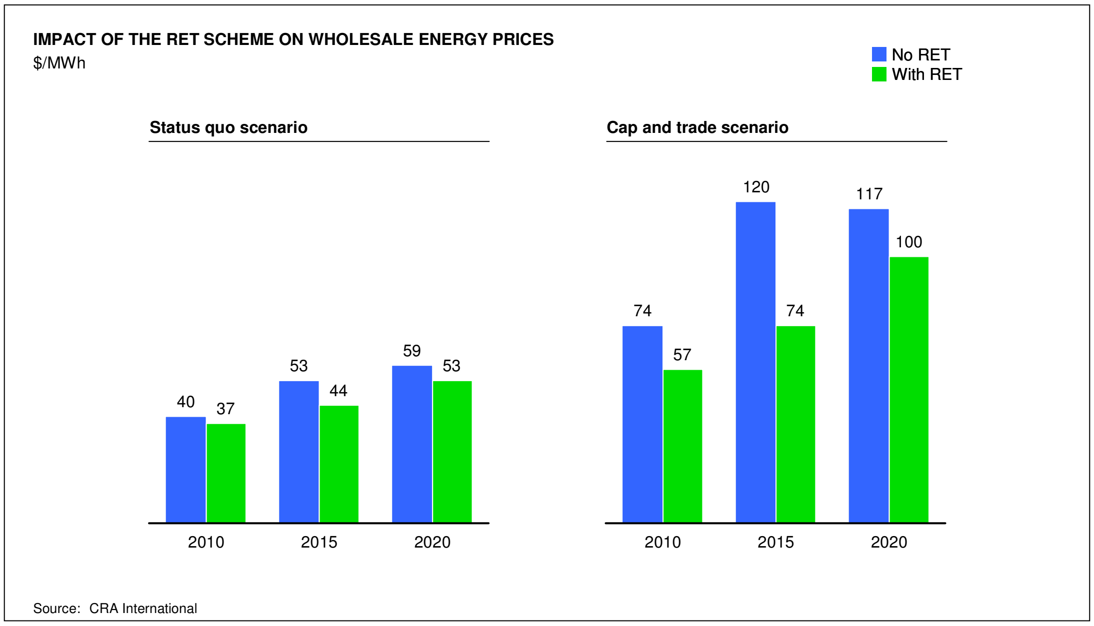
Exhibit 4.29




Source: ACIL Tasman

Secondly, the RET scheme suppresses investment in other generation technologies, potentially further impacting supply reliability. Although retail prices are higher under the RET scheme (due to the obligation on retailers to surrender RECs), wholesale prices are lower, as shown in Exhibit 4.30. This is because renewable generators typically have low marginal costs, and also because they receive a REC revenue "subsidy" that lowers the revenue they require from the energy market to justify their investment. The effect of lower pool prices is to distort further the already complex price signals which bring on new generation investment (see section 4.2.4 above). By favouring renewable generation which are typically intermittent, such as wind and solar, the RET scheme may impact energy supply reliability.

Exhibit 4.30




## 4.7 The Government's Green Paper addresses many concerns although some outstanding concerns remain

Exhibit 4.31 summarises the key points in the Government's Green Paper regarding the impact of an ETS on the electricity sector. While many concerns have been addressed, some outstanding items remain.

Exhibit 4.31

**GOVERNMENT CARBON POLLUTION REDUCTION SCHEME GREEN PAPER**

| | Key points in Green Paper | Comments |
|---|---|---|
| **Supply security** | • Emissions target and trajectory will have the greatest bearing on energy security<br>• Seeking gradual transition, avoiding need for sudden, large-scale retirements of capacity before sufficient replacement capacity can be installed | • Industry modelling suggests that a 10% emission reduction target on 2000 levels by 2020 will be challenging<br>• Other mechanisms should be investigated to ensure supply reliability is maintained, even if this may compromise the emissions cap |
| **Assistance for coal fired generators** | • Assistance justified given the effect on the investment environment and partly on grounds of fairness | • Agree |
| **Working capital** | • Quarterly auctions in the relevant year<br>• Auctions up to three years in advance | • Need also to ensure generators have minimal additional working capital requirement by allowing settlement for permits in arrears, or by working to ensure derivative markets can meet industry needs |
| **RET scheme** | • RET scheme will continue | • The RET scheme should cease with the introduction of an ETS to ensure emissions reduction is achieved at lowest cost |

First, the Green Paper acknowledges that the emissions target and trajectory will have the greatest bearing on supply security. It also acknowledges that the Government needs to seek a gradual transition and to avoid the need for sudden, large-scale retirements of capacity before sufficient replacement can be installed. These views are in agreement with those expressed in this paper.

Further, as described in Section 4.2 above industry modelling suggests that a 10% emission reduction target on 2000 levels by 2020 will be very challenging. In addition to ensuring that the emissions target trajectory can be delivered by the electricity sector, it is also recommended that other mechanisms should be investigated to ensure supply reliability is maintained, even if this may compromise the emissions cap.

Second, working capital and hedging issues can be addressed by the Government's preferred system of quarterly auctions in the relevant year as well as auctions for vintages up to three years in advance. The Government should also structure the ETS to ensure generators have minimal additional working capital requirements by allowing settlement for permits in arrears, or by seeking to help ensure that effective derivative markets develop so that generators can access future carbon permits without large working capital requirements

Finally, the Government has stated that the RET scheme will continue following the introduction of the ETS. As stated in Section 4.6 above, however, the RET scheme should be phased out with the introduction of an ETS to ensure emission reductions are achieved at lowest cost.

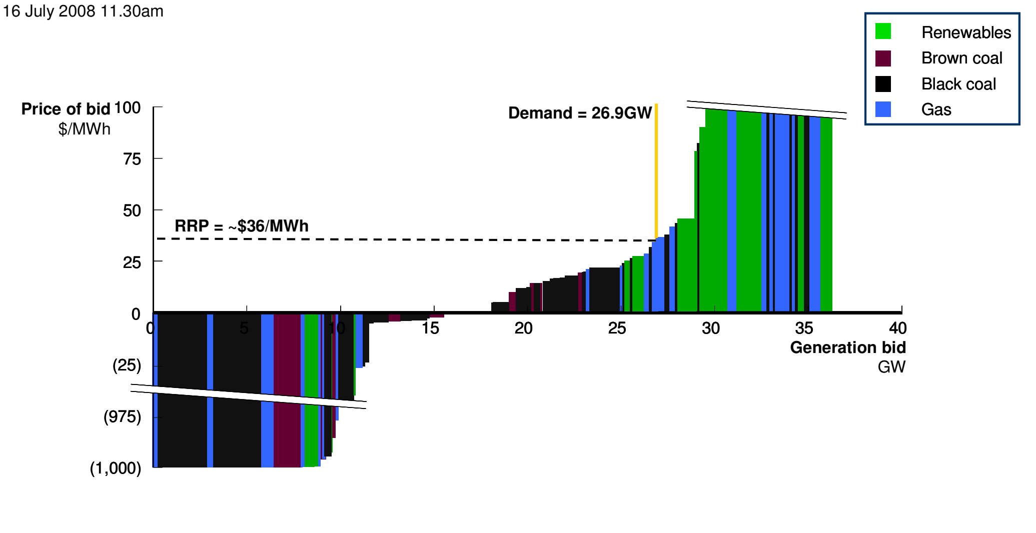
# APPENDIX 1: OPERATION OF THE NEM

As electricity cannot be stored, the level of electricity demand must be instantaneously met by the same level of generation supply in real-time. This is undertaken in the NEM by the National Electricity Market Management Company (NEMMCO) in a centrally-coordinated process to instantaneously dispatch generators to meet demand in the most cost-efficient way.

The market pricing received by all generators is determined every five minutes based on the marginal generator. Each generation plant submits offers to NEMMCO indicating the volume of electricity they are willing to supply at a specified price. Every five minutes (a 'dispatch interval'), NEMMCO stacks the generation offers in order of ascending price and dispatches generators up to the level required to satisfy demand. Generators are able to change their bid volumes up to approximately five minutes prior to dispatch. The dispatch price is the offer price for the last megawatt of generation that is dispatched to meet demand. See Exhibit A1.1 for an example bid-stack and outcome. It is also worth noting that NEMMCO must also solve for several thousand constraints in each five-minute dispatch interval, ranging from frequency control, voltage control, individual generation unit ramp rates, transmission constraints, transmission outages, interconnector capacities, sufficient ancillary services, etc.

Exhibit A1.1

**TYPICAL BID-STACK IN THE NEM AND CORRESPONDING PRICE OUTCOME**
16 July 2008 11.30am




Source: NEMMCO

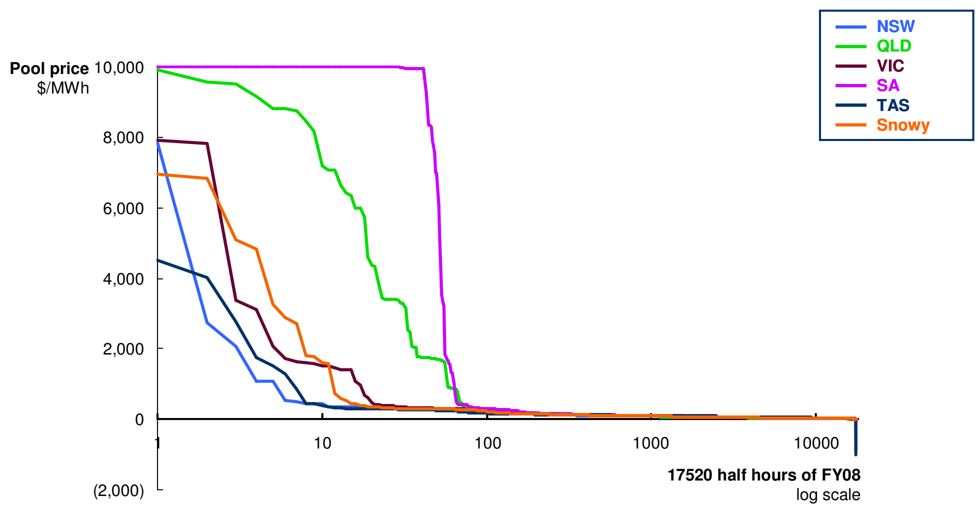
A trading interval is a half-hour period composed of six of these five-minute dispatch intervals. The spot price for each trading interval is the average of the six five-minute dispatch prices. All generators receive this spot price for the volume of electricity which they dispatch in the trading interval, regardless of their offer prices, and dispatch is not guaranteed.

The maximum price that generators can bid is $10,000/MWh. This is also the price that is applied if load is unmet, and is hence called the Value of Lost Load

(VoLL). With average pool prices in the NEM in FY2008 being ~$53.7/MWh, the magnitude of VoLL creates enormous potential volatility in spot prices. For every hour for which the pool price reaches VoLL ($10,000/MWh) the average annual spot price increases by $1.14/MWh, or 2.9%. There were 47 trading intervals (half-hours) when the spot price exceeded $9,000/MWh in FY2008 in the NEM. See Exhibit A1.2 for pool price distributions for each region in the NEM for FY2008.

Exhibit A1.2

REGIONAL POOL PRICE DISTRIBUTIONS—NEM FY08




Source: NEMMCO

Electricity generators and retailers typically manage the risks inherent in this price volatility by entering into derivative contracts whereby they typically agree a firm price for a given volume of electricity over a given time period. As all electricity must be traded through the spot market, these contracts are settled against the spot pool price. A typical contract is a fixed-for-floating swap where the generators pays the retailer the spot price and the retailer pays the generator the contract price for the contracted volume independent of the quantity dispatched.

Generators typically do not enter into contracts for their entire portfolio because they need to ensure they have sufficient physical generation capacity to back their contract volumes. For risk management purposes 'spare capacity' is often retained to protect against unexpected plant and transmission outages.

Generators tend to bid-up to their short-run marginal cost (SRMC) for volumes they have contracted. This is to ensure their physical positions cover their contracted positions to minimise risks from unforeseen price volatility (generators can, and do bid-down to –$1,000/MWh given specific plant characteristics). For available capacity above contracted volumes, generators tend to bid to maximise profits.

There is some debate whether generators can increase pool prices significantly beyond the SRMC of the marginal generator. At times of relatively low demand the pool price is likely to reflect the SRMC of the marginal generator, given the relatively high level of contracted capacity at these times and the relative availability of unutilised generation. As baseload coal generators may be the marginal generator at these times, they should recover their carbon costs during these periods (although higher emission intensity generators may not). Given that generators typically bid their SRMC at these times (as there is relatively high availability of other generation) there is, however, limited ability for generators to recover much more than SRMC (including carbon cost) and gross margins remain low.

At times of relatively high demand the pool price usually rises above the SRMC of the marginal generator. The resulting pool price, however, usually remains the result of a competitive process between a number of generators. Furthermore, the frequency and magnitude of high pool prices is required to ensure all generators earn sufficient gross margins to cover their fixed operating costs and their capital costs. Pool prices significantly above these levels are also one of the main price signals for new investment in generation.

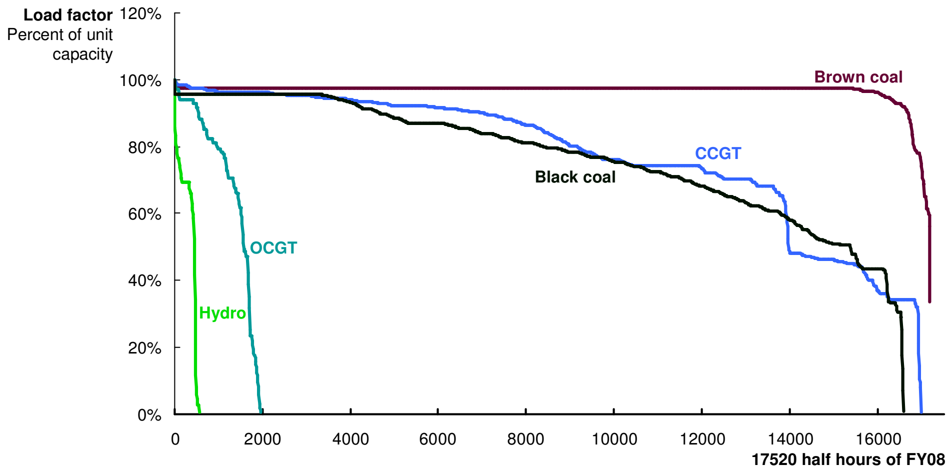
At times of relatively high demand, baseload generators are not, however, usually the marginal generator able to increase prices much above SRMC. For example, brown coal plants typically cannot run below 70% capacity and constant ramping up and ramping down will cause significant physical stresses that will result in increased unreliability and maintenance requirements. These plants therefore tend to be bid so that they operate at reasonably constant and high levels of generation, rather than being bid with significant volumes at the margin to set market prices. At times of relatively high demand, baseload generators therefore tend to be price-takers and rely on the more flexible plants to be the marginal generator to set pool prices. Baseload generators rely on these pool prices to earn sufficient gross margins to cover their long run marginal costs (LRMC).

To illustrate these different operating characteristics of baseload coal plants and more flexible gas and hydro plants, Exhibit A1.3 shows the generation distribution curves for a number of representative plants. It clearly shows that brown coal plants rarely operate at levels below ~90% of capacity whereas gas and hydro plants operate over a wide range of capacity levels.

The brown coal generators may alternatively seek to recover their increased costs in the derivative market. It is unlikely that this market will allow generators to recover their cost increases any more than can be recovered from the spot market as both generators and retailers have the option of simply selling to and buying from the pool. While the spot market and derivative market clearly diverge over time, in the long-term the derivative market must reflect the physical market (adjusted for any associated risk premium).

Exhibit A1.3

LOAD FACTORS OF TYPICAL PLANT UNITS



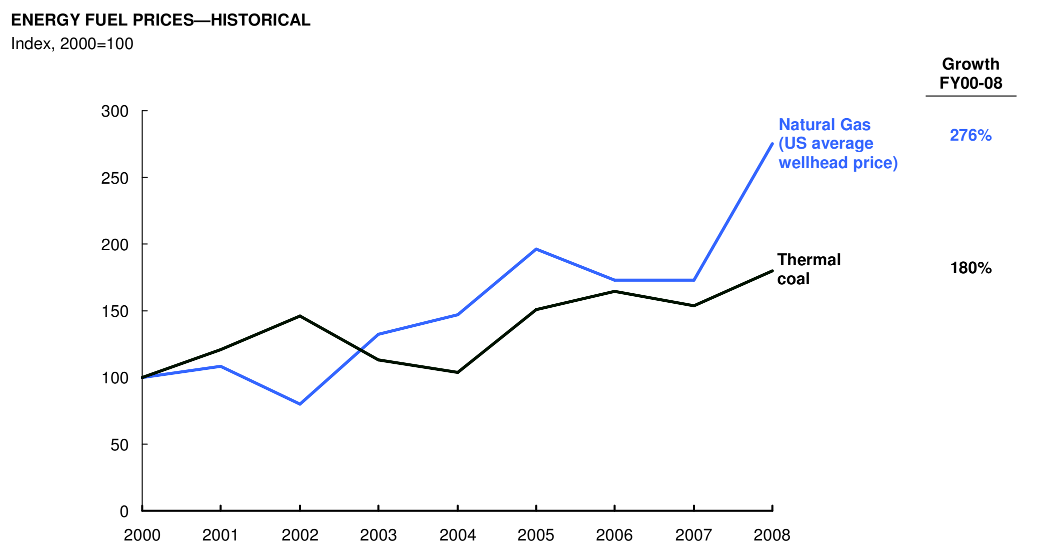

Source: NEMMCO

In addition to the derivative market, the electricity sector has seen increasing vertical integration between generation and retail assets. While this can help reduce the risk in both the generation and retail businesses, it is also unlikely to significantly improve the economics of a high emission plant in the long-run under an ETS. A vertically integrated entity must remain competitive in the retail market, and to do so it must ensure its generation portfolio is competitive. Over the long-term, it cannot operate a high-emission coal plant any more than if the generator was not vertically integrated.

# APPENDIX 2: POTENTIAL IMPACTS FROM RISING GAS AND BLACK COAL PRICES

Traded gas and black coal prices have risen in the last few years, as shown in Exhibit A2.1. As stated in the Garnaut Draft Report[18], this will likely result in fuel cost increases over the coming years as export infrastructure for coal and LNG develops further, and fuel supply contracts are renegotiated to reflect global export pricing for these commodities.

Exhibit A2.2




Source: ABARE; EIA (US Department of Energy)

Exhibit A2.2 lists the possible gas and black coal price increases described in the Garnaut Draft Report, and the potential impact to electricity prices. The Garnaut Draft Report suggests that the cost of fuels will have a larger impact on electricity prices rather than the carbon price. This is a result of the Draft Report's assumption of low carbon prices of \$10/t $CO_2$-e. In contrast, ACIL Tasman and CRA's modelling results in carbon prices of \$20/t $CO_2$-e in early years, rising to \$45 – 57/t $CO_2$-e by 2020. The ACIL Tasman model also includes assumptions on gas price increases, although not to the extent of those mentioned by Garnaut. As described earlier, ACIL Tasman has undertaken detailed modelling of the gas markets in eastern Australia to estimate future gas prices, and these have included the potential for LNG exports. ACIL Tasman has similarly made estimates of black coal prices by considering current contract dates and export potential. These assumptions are fully accounted for in their modelling results, including asset impairment and changes to the merit order of plants as discussed above.

[18] Garnaut Climate Change Review , 'Draft Report', June 2008, page 490

Exhibit A2.2

**IMPACT OF RISING FUEL COSTS**

| | Garnaut Review Draft Report | | ACIL Tasman – 2020 | | CRA: Ramped gas price – 2020 | |
|---|---|---|---|---|---|---|
| **Cost** | **Price** | **Impact to electricity prices** | **Price** | **Impact to electricity prices** | **Price** | **Impact to electricity prices** |
| **Carbon price** | +$10/t $CO_2$-e | +$8-10/MWh | +$45.0/t $CO_2$-e | +$28.5/MWh | +$57.4/t $CO_2$-e | +$38.9/MWh |
| **Cost** | **Price** | **Impact to cost of generation** | **Price** | **Impact to cost of generation** | **Price** | **Impact to cost of generation** |
| **Gas price** | | | | | | |
| CCGT | +$3/GJ | +$20/MWh | +$1.4/GJ | +$10/MWh* | +$1.7/GJ | +$13/MWh* |
| OCGT | | | +$1.4/GJ | +$14/MWh* | +$1.7/GJ | +$20/MWh* |
| **Black coal price** | +$100/t | +$53/MWh | +$50-65/t | +$21-28/MWh** | +$0/t | +$0/MWh |

* Based on average fuel efficiencies for ACIL Tasman of 7.0 GJ/MWh (CCGT) and 10.5 GJ/MWh (OCGT), and for CRA of 7.4 GJ/MWh (CCGT) and 11.5 GJ/MWh (OCGT)
** Based on National Greenhouse Accounts combustion efficiency factors for NSW and QLD and average fuel efficiencies of black coal plants in ACIL Tasman model
Source: Garnaut Draft Report; ACIL Tasman; CRA International; National Greenhouse Accounts, DCC, Feb 2008

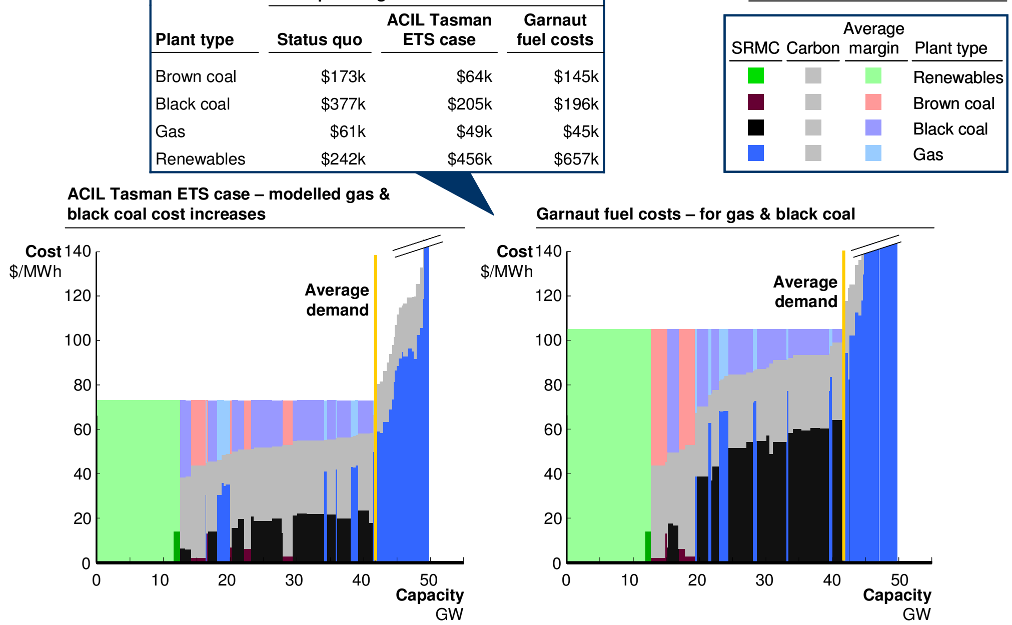
Exhibit A2.3 shows the potential impacts to the short-run marginal cost curve given the fuel cost increases suggested in the Garnaut Draft Report. The impact to gross margins for an example half-hour has also been calculated. Brown coal generators see less asset impairment with higher fuel cost increases compared to those assumed by ACIL Tasman, although their margins remain less than the status quo. Black coal generators are more impaired in this case as they cannot fully pass through their increased fuel costs.

Exhibit A2.3

**IMPACT OF RISING FUEL PRICES TO ELECTRICITY MARKET SHORT-RUN MARGINAL COST CURVE—ETS CASE 2015**

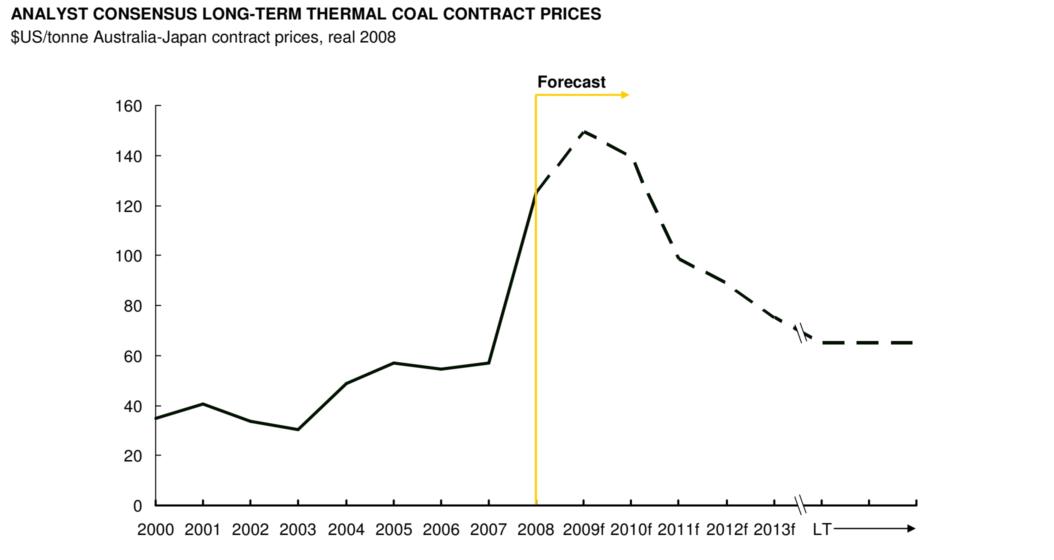
CARBON PRICE = ~$40/t $CO_2$-e

| | Example margin for a half-hour | | |
|---|---|---|---|
| **Plant type** | **Status quo** | **ACIL Tasman ETS case** | **Garnaut fuel costs** |
| Brown coal | $173k | $64k | $145k |
| Black coal | $377k | $205k | $196k |
| Gas | $61k | $49k | $45k |
| Renewables | $242k | $456k | $657k |



It is possible that gas prices could increase to such an extent above black and brown coal prices that coal-fired plants will not experience a decrease in gross margins. For example, domestic gas prices are expected to approach LNG export prices, while thermal coal prices are forecast to decline to more moderate long-term prices (see Exhibit A2.4).

Exhibit A2.4




Source: AME (Historical); Analyst Consensus (Deutsche Bank, Macquarie Equities, UBS and CitiGroup)

It is unlikely, however, that coal plants could avoid a decrease in their gross margins without compromising the emissions target (unless any target is met by buying international permits). Exhibit A2.5 demonstrates how carbon prices would need to increase to offset higher input costs to ensure that the merit order shifts to favour gas generation. Otherwise, the emissions reduction target may not be achieved:

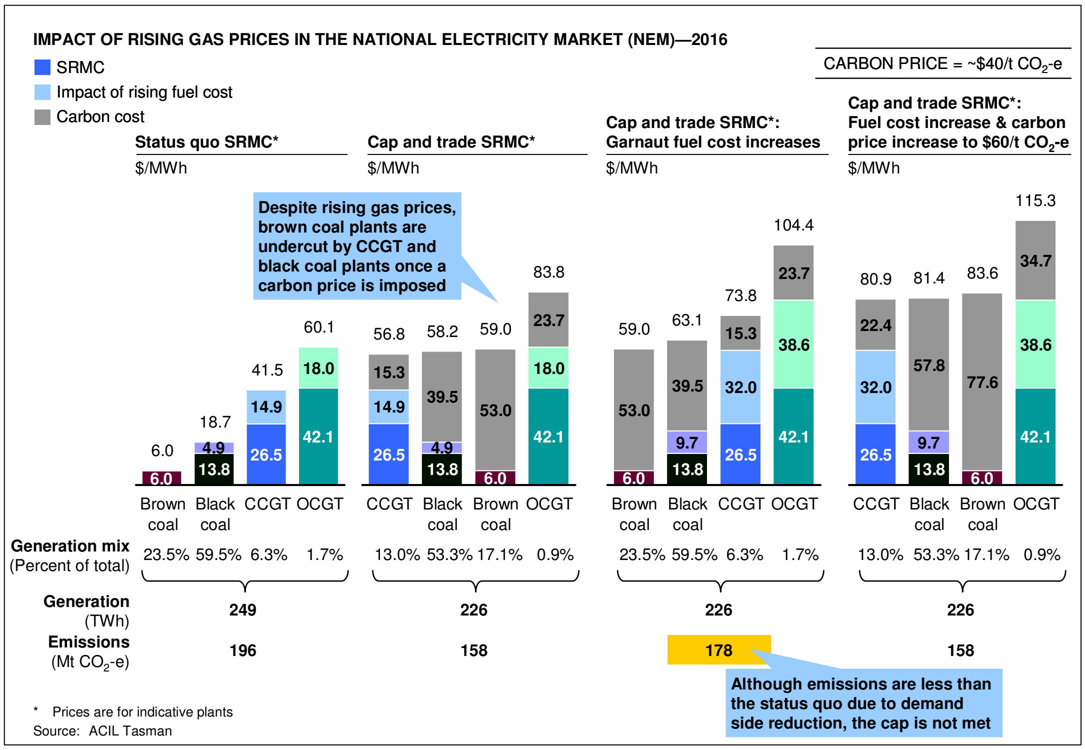
- **Under the status quo:** With fuel price rises as modelled by ACIL Tasman, brown and black coal generators remain the lowest-cost option.

- **In the ACIL Tasman cap and trade case:** Abatement is achieved by imposing a carbon price, which shifts the merit order so that gas plants undercut coal generators. Emissions are reduced as low-emission gas volumes are substituted for high-emission coal.

- **With higher fuel cost increases:** As input costs rise, the merit order could switch back so that gas is no longer undercutting the coal plants. This implies that volume substitution of gas for coal does not occur, and the emissions target is not reached.

- **Meeting the emissions target with higher fuel cost increases:** As a result, carbon prices will need to rise to ensure that fuel substitution does occur between gas and coal-fired generation. In effect, the carbon price will "shadow" an increase in gas prices. Therefore, a recovery in gross margin loss for coal generators due to rising gas prices will be offset somewhat by an increase in the carbon price. In practice, the outcomes of the interplay between gas prices and the carbon cost is difficult to predict in this complex sector without detailed modelling; however, this second-order effect is likely to limit the potential for rising gas prices to ameliorate the asset impairment of coal plant.

Exhibit A2.5



# CHAPTER 5

## OTHER IMPORTANT DESIGN ISSUES

# 5. OTHER IMPORTANT DESIGN ISSUES

In discussions with case study companies issues surrounding TEEI industries, and the effects of the ETS on the electricity sector, were of paramount importance.

Nevertheless, a number of other issues did arise in the course of discussions.

There were four where it was felt this paper could make a contribution. They are:

- The need to design the ETS to minimise working capital
- The impact of 'flow through' inflation, especially for small exporters not covered by the scheme
- The implications of including fuel in the ETS
- ETS implementation issues in the mining sector

These issues provide examples of the range of ETS design questions which are currently exercising the minds of Boards and management teams. As such, they require careful consideration by policymakers.

## 5.1 The ETS should be designed to minimise working capital for participants

The introduction of the ETS will create new 'dead weight' transaction costs. Costs associated with compliance with current emissions reporting are already part of businesses' budgets. When emissions trading commences, additional costs will be incurred to manage permit purchase and acquittal.

In most cases, these costs simply reflect the new tasks each business must perform to stay in businesses under an ETS. It will be up to business to determine how best to minimise them.

However, the working capital cost of permit purchases is different. In this case, the design of the ETS has the potential to influence materially the amount of additional working capital participants will require.

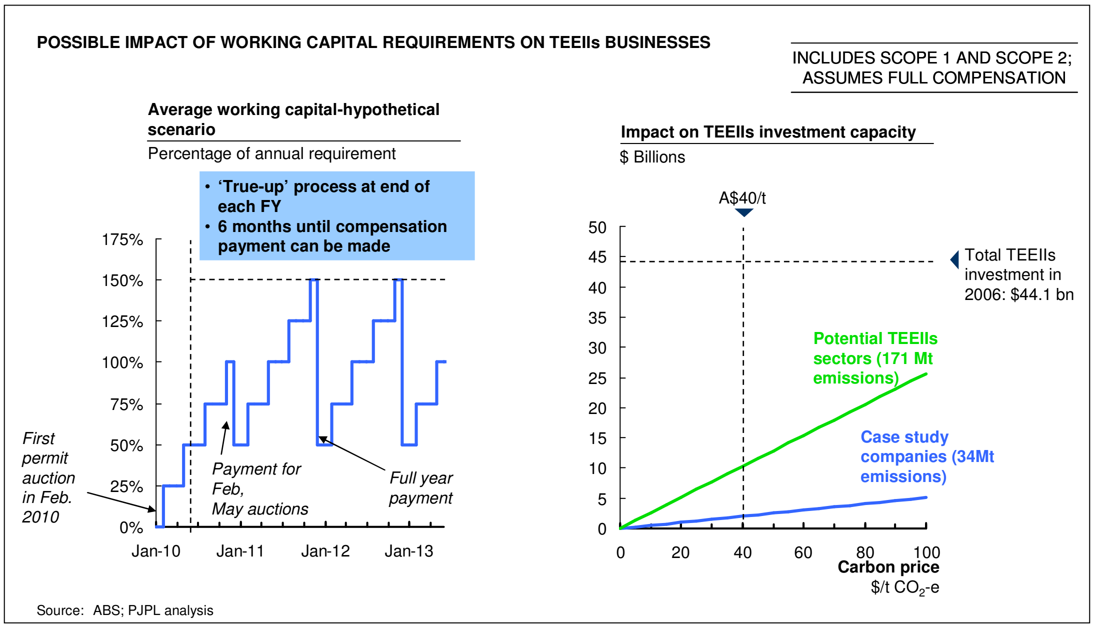
All businesses work hard to minimise their working capital requirements for two principal reasons. First in a world where capital is scarce, working capital can represent foregone investment in new growth options. Second, increases in working capital must be funded by adding to debt and equity, increasing businesses costs and diluting shareholder returns.

The potential for the design of the ETS to create unnecessary working capital requirements arises in three categories: electricity generators (this is dealt with in Chapter 4), TEEI industry businesses and petroleum marketers.

In the case of TEEI industry businesses, working capital impacts can be minimised by paying compensation up front. The Green Paper recognises this issue, and proposes that assistance be provided as free permits at the beginning of each compliance period, contingent on production[19].

If payment of compensation is delayed, the one-off impact of the increase in working capital upon the introduction of the ETS is material. This is illustrated in Exhibit 5.1, which shows the working capital impacts of a hypothetical scenario of assessment and payment. If funded by TEEI industry businesses themselves, increased working capital requirements at \$40/t $CO_2$-e could delay investment equivalent to around one eighth of all new business investment by TEEI industry sectors.

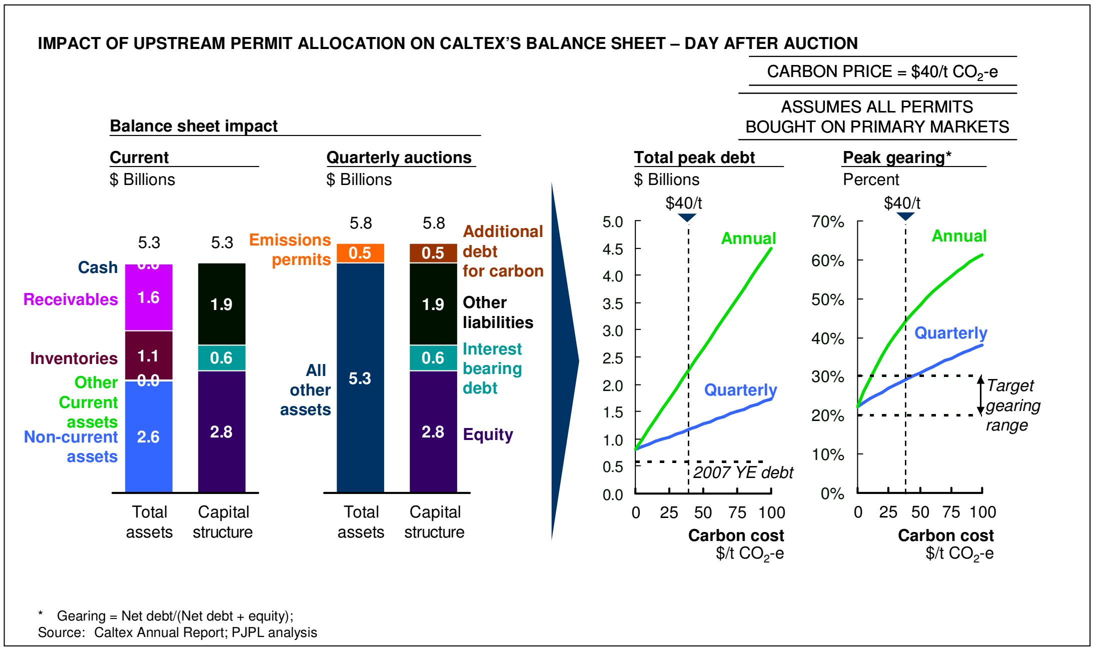
Exhibit 5.1




Working capital impacts on petroleum marketers could be minimised by holding frequent permit auctions. Petroleum marketers will have to fund permit purchases for their own use, plus the use of their customers. These businesses are therefore especially sensitive to working capital impacts. Exhibit 5.2 illustrates this for Caltex Australia Ltd, the only Australian petroleum marketer for whom balance sheet data is readily available. As the Exhibit shows, changes in working capital could cause material balance sheet impacts. Gearing increases, and new debt may be required. Using quarterly (or more frequent) auctions reduces the size of these impacts, although they still impose an important burden on the companies concerned.

[19] Dept of Climate Change, 'Carbon Pollution Reduction Scheme Green Paper', July 2008, page 302

Exhibit 5.2




It can be argued that a deep, sophisticated secondary market could eliminate working capital issues. Such a secondary market would be a welcome development. However, there are two reasons why the design of the ETS should attempt to solve working capital issues independent of the secondary market.

The first is that the time required to establish such a secondary market is unclear. It is possible to assert that the market will begin 'soon enough' if ETS participants require it. But in the initial stages of the ETS, there is likely to be considerable uncertainty about the level and volatility of permit pricing, especially for future vintages that may be available in early auctions. In this environment, the risk of adverse price movements may restrict the participation of banks and other investors who do not have a physical need for permits. This restriction may soon disappear, but the ETS design should not assume it will never occur. The inclusion of any price cap in the first years of the scheme may also limit the range and availability of secondary market products.

The second is that participation in the secondary market will come at a cost. This cost should be less than the cost of funding working capital through businesses' own balance sheets. Businesses may choose to participate in the secondary market, however the ETS should not be designed so that secondary market costs are another inevitable 'dead weight' loss onto businesses.

The Green Paper recognises the benefit of more frequent auctions to manage working capital impacts[20], but weighs this benefit against other disadvantages including, for example, less accurate price discovery. If quarterly auctions are used, then Government will need to work with derivative market operators to provide low cost ways to limit working capital commitments.

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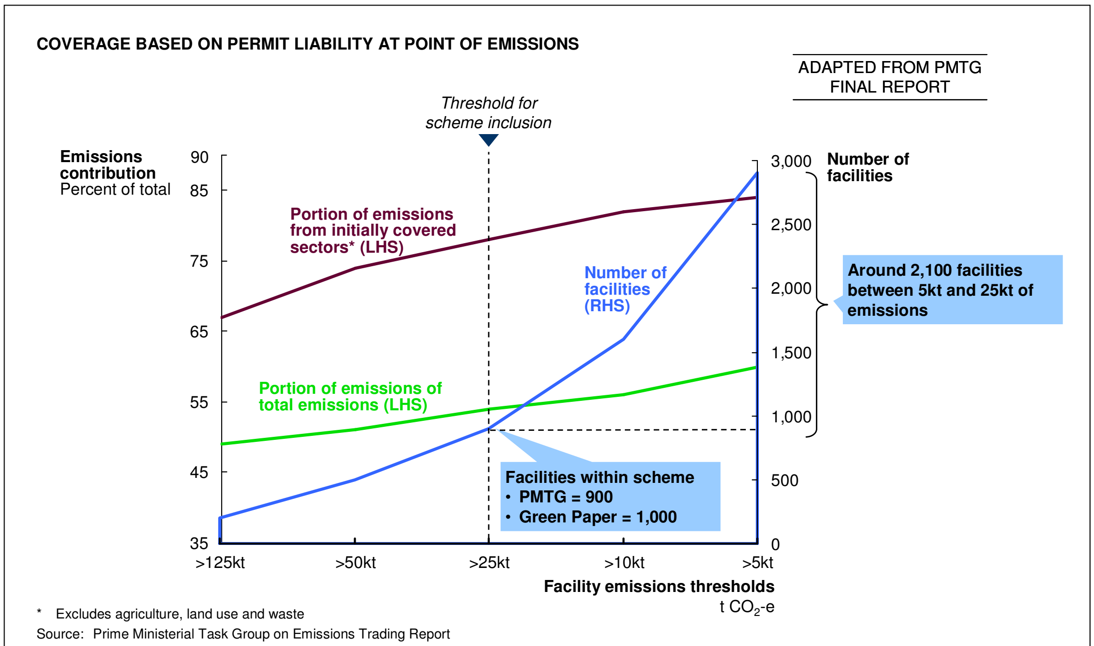
[20] Dept of Climate Change, 'Carbon Pollution Reduction Scheme Green Paper', July 2008, page 263

## 5.2 How best to address ‘flow through’ inflation for small exporters not covered by the scheme

The ETS will not only impact the economics of direct participants. Assuming a threshold of 25,000 tonnes of carbon emissions are required for inclusion in the ETS, as Exhibit 5.3 shows, there will still be around 2,100 facilities whose direct or indirect emissions exceed 5,000 tonnes but who will be outside the scheme.

Under the ETS, these businesses could suffer substantial ‘flow through’ inflation. Increased electricity prices are the most obvious cause of this, but equally costs in other areas could also increase.

Exhibit 5.3




Policymakers should consider how best to manage these impacts for two reasons. First, some of these businesses will effectively be ‘small TEEI businesses’. For example, small manufacturers with export markets in Asia could fall into this category. Without care, these businesses could suffer the same impacts as the larger TEEI industries described above. Second, small manufacturers who chiefly supply large exporters could also find price increases place at risk the viability of their customers. Car manufacturing is one example of a sector where this effect may be material. In this circumstance, flow through inflation threatens the viability of both the small supplier and the large customer.

The appropriate policy response to this issue must be a pragmatic one. Designing an approach is complicated by the number of businesses potentially affected, the low level of knowledge currently possessed by Government about the impacts on businesses below the ETS threshold, and the multiple causes of the ‘flow through’ inflation itself.

In these circumstances, a compensation scheme with a relatively high hurdle, coupled with an appeals mechanism, may be appropriate. Strict tests for trade exposure and the impact of ‘flow through’ inflation would be required to reduce the scheme's complexity. A further simplification could be to provide compensation only for the impact of increased electricity costs, rather than flow through inflation in general.

### 5.3 The implications of including fuel in the ETS

It is understandable that the impact of emissions trading on fuel prices has attracted attention. Fuel costs are key to many business and household budgets.

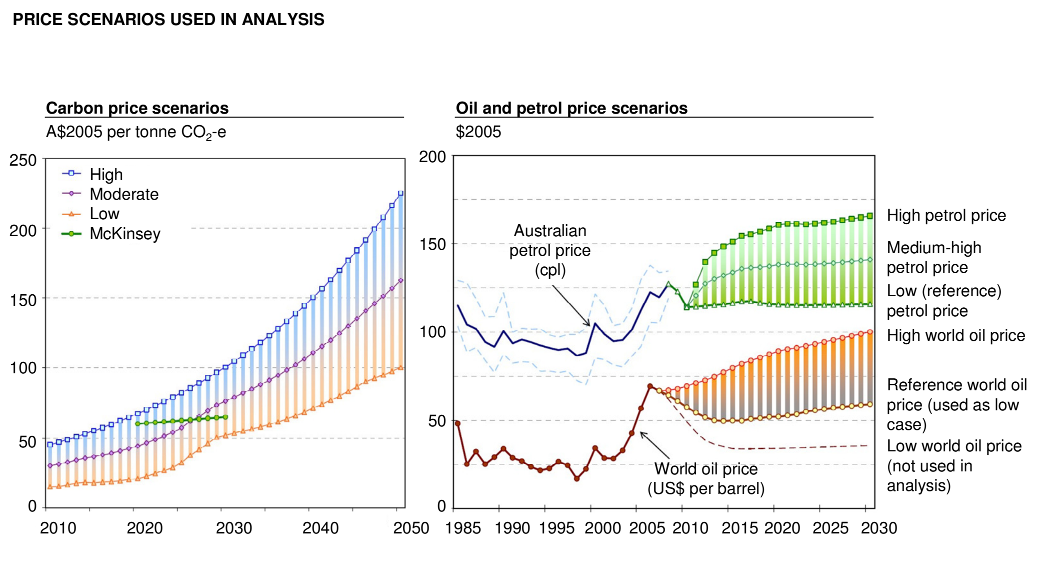
The Green Paper proposes to include fuel in the scheme, but excise reductions will eliminate any potential price impact for motorists. The Green Paper suggests this mechanism will be reviewed after the first three years of the scheme for petrol, and after one year for heavy vehicle road users' diesel excise.

Including fuel in the scheme is the right decision and, on balance, the excise adjustment mechanism is inappropriate.

The primary reason for this is that an excise adjustment will not make a material difference if oil prices rise, and will unnecessarily dilute an important price signal if oil prices fall.

Exhibits 5.4 and 5.5 illustrate this point for petrol. Exhibit 5.4 shows a range of scenarios for future oil, petrol and carbon prices, quoted by the CSIRO in a recent report. The range of variation between scenarios is stark. Exhibit 5.5 shows the outcome of these scenarios for petrol prices, both 'today' and in 2025. The prices shown are in real terms; note also that the 'today' prices assume an oil price of US$76 per barrel. The relative impact of oil and carbon prices, for each combination of scenarios, is shown as a percentage of the price 'today'.

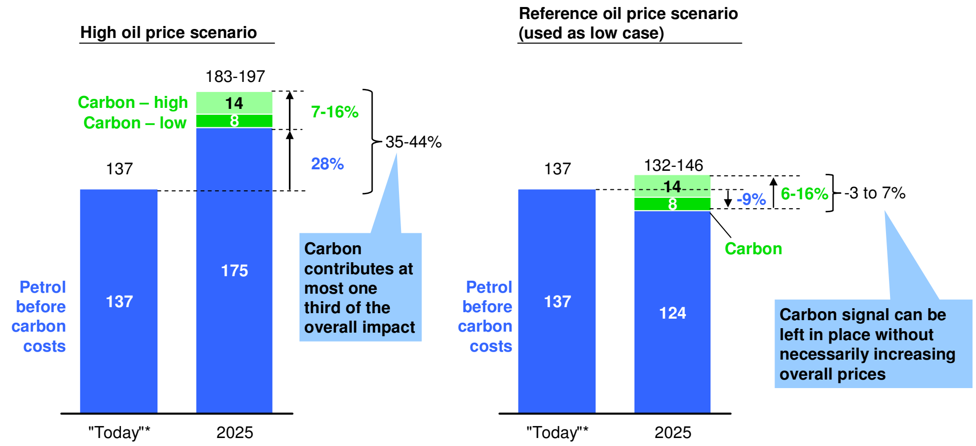
Exhibit 5.4




Source: CSIRO Report to the Climate Institute: Energy Affordability, Living Standards and Emissions Trading

Exhibit 5.5

**IMPACT OF OIL PRICE AND CARBON COST ON FUEL PRICE—2025**
Australian cents per litre (Real 2008$)




* Assumes oil price of US$76/bbl
Source: Caltex Annual Reports; CSIRO Report to the Climate Institute: Energy Affordability, Living Standards and Emissions Trading; Green Vehicle Guide; PJPL analysis

Exhibit 5.5 makes clear the limited value of any excise reduction. In a world of sustainably higher oil prices, removing the impact of carbon pricing would make relatively little difference to the final price paid by motorists. Were oil prices to trend lower, the carbon price could be left in place without driving an overall increase in price. Given the importance of this price signal to transmit the cost of their emissions, neither scenario seems to argue for the Green Paper proposal.

## 5.4 ETS implementation issues in the mining sector

Many Australian mines rely for their operations on cooperation between the mine owner, a lead operations contractor, and a variety of subcontractors.

The exact arrangements vary substantially from site to site. In some cases, the roles of each party are clearly defined. For example, some sites effectively have an ‘absentee owner’, and a single contractor operates the mine from day to day. At other locations, operations rely on a true network of relationships between the mine owner and various contractors.

This is important as the current NGERS regulations place the responsibility for managing issues surrounding emissions reporting with the party which has “operational control”. As the description above makes clear, at many sites it is not clear where this responsibility will lie in practice.

These circumstances have the potential to create complex ETS implementation issues, particularly if parties other than the mine owner are deemed responsible for acquitting permits for fugitive methane emissions at coal mines and for emissions from black coal consumed by small users. Example issues identified by the case study companies are shown in Exhibit 5.6. These issues cover the key steps required to operate a mine under an ETS, including emissions reporting, permit purchasing and acquittal, and emissions abatement efforts.

Exhibit 5.6

**IMPLEMENTING THE EMISSIONS TRADING SCHEME**

**Current situation**

- Many Australian mines rely for their operation on co-operation between the mine owner, a lead operations contractor, and a variety of sub-contractors
- The clarity with which the responsibilities of each party is defined varies considerably from site to site
  - some sites have an 'absentee owner' and a single contractor
  - other sites have a true network of relationships between the owner, and various contractors

**Resulting implementation issues**

- Responsibilities for emissions reporting are currently unclear
  - "operational control" must be determined
  - many examples exist where this could fall to multiple partners
- There is a potential disconnect between emissions reporting and permit acquittal
  - who will bear the financial obligation?
  - who will bear the risk of over or under-reporting?
- There is likely to be difficulty co-ordinating abatement activities
  - emissions at each step in the mining process are related to decisions made elsewhere
  - reductions in emissions will require substantial co-ordination between multiple contractors and mine owner

**Possible path forward**

- **Place all responsibility for emissions management with the mine owner**
  - **in the course of our case studies two large contractors and one large miner have strongly preferred this approach**
  - **Leave some scope for commercial negotiation to get best outcome**
- **This is inconsistent with the current NGERs regulations**

Some mine sites will find these issues easier to manage than others. A site with an absentee owner and single contractor will face few difficulties. Bigger problems will occur for sites where work is shared between the owner and contractors.

A possible path forward is to place all responsibility for management of ETS issues with the mine owner. Under this arrangement, the complex coordination issues described above can be managed by the one party best able to access the required information, and best placed to effect carbon reduction strategies through mine planning. In the course of the case study discussions, two large contractors and one large miner strongly preferred this approach. Alternatively, the facility operator could be determined through commercial negotiation.

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