CASTALIA
Strategic advisors

Securing SMEs in Australia's Low Carbon Future:

The Cost of the Carbon Pollution Reduction Scheme for Australia's Small and Medium Sized Businesses

Report to

The Australian Chamber of Commerce and Industry

June 2009

Table of Contents

Appendices

Tables

Figures

Boxes

Executive Summary

This study examines the effects on small and medium sized enterprises of the Australian Government's proposals to introduce an emissions trading scheme, known as the Carbon Pollution Reduction Scheme (CPRS).

The proposed design of the CPRS has evolved substantially from the release of the Green Paper in July 2008 to May 2009, when the Government announced the latest revisions, including a one-year delay to the commencement of the scheme. The evolution of the CPRS reflects the growing recognition of the scheme's unintended consequences, caused by the introduction of carbon pricing in Australia while no such pricing occurs in its competitors. The Government's willingness to make adjustments to the transitional assistance package has been driven by the growing understanding of the economic effects of the CPRS as the debate on Australia's climate policy framework progressed.

However, the focus of the assistance measures has remained relatively narrow, dealing with the effects of the scheme on the emission-intensive trade-exposed industries (EITE), as well as on consumers, and on the coal-fired electricity generators. Limited attention has been given to how the CPRS will affect other trade-exposed sectors within our economy, or what measures need to be taken to deal with the loss of competitiveness in those sectors.

This report seeks to fill that gap. We measure the likely effects of the proposed scheme on trade-exposed small and medium sized businesses. Our approach is based on developing a thorough understanding of the cost structures of small and medium manufacturing businesses. This study surveys a sample of firms to create representative financial models for three key sectors of Australia's economy:

- Food processing
- Plastics and chemicals manufacturing, and
- Machinery and equipment manufacturing.

The cost of all non-tradable goods and services with embedded emissions covered by the CPRS will increase once the scheme is imposed. Our modelling enables us to consider exactly how the CPRS effects will feed into the balance sheets of trade-exposed small and medium sized businesses.

Key Results

Our findings show that the CPRS will generate additional costs that would erode firm profitability at marked levels of between 4 to 7 percent on average. In some cases, we found that the impact of additional carbon costs could erode firm profitability entirely. Erosion of firm profitability at these average levels could be significant enough to change investment incentives.

The inclusion of transport fuels in the CPRS is an important part of the overall impact, adding significantly to total costs for businesses. When considering the effects of the CPRS on investment and employment, we believe it is essential to see through the short-term effects of the fuel excise credit. If the Government implements a scheme that covers transport fuels, then it is reasonable to expect the full carbon costs to be eventually priced into freight. Failure to do so would be fiscally unsustainable and would not be effective climate change policy. Businesses will recognise the eventual impact of extending the CPRS to transport fuels, and will respond accordingly.

Our analysis particularly highlights the following conclusions:

- Domestic businesses are likely to be disadvantaged relative to international rivals, which have lower exposure to domestic freight costs, and a greater reliance on international freight, which will not be affected by the CPRS. The additional relative freight costs paid by domestic producers will contribute to the competitiveness risk of unilateral carbon pricing
- Network effects, particularly in air transport, may cause the total economic cost of pricing transport fuels to be significantly higher. As demand for domestic air transport falls, some routes may become unviable, depriving even those willing to pay of access to the service
- The fuel assistance package distorts the market in the short-run by providing road transport with an advantage over less emissions-intensive modes, such as rail and coastal shipping
- Over time, relatively higher domestic transport and freight costs will stimulate a geographic realignment towards increased urbanisation and reduced rural and regional economic activity
- The differential impact of higher costs on various transport modes with different levels of emissions intensity will change the merit order of freight, adding further to a geographic realignment and a shift in competitiveness
- The anticipated geographic realignment may create second- and third-order effects that increase the economic impact from covering transport fuels in the CPRS. For instance, structural unemployment is likely to rise due to a draining of economic activity from more remote regions.

The economic effects

The key concept which underpins our analysis is that of import price parity: that trade-exposed SMEs face prices set in the international markets, and hence will have no opportunity to pass the costs of the CPRS to their customers. It is obvious that SMEs that sell internationally will not be able to increase their prices once the scheme is introduced. However, SMEs that sell tradable goods domestically will be equally constrained by the prices of imported goods. The introduction of the CPRS will have no effect on the price of imported goods. The reason why import parity is an important concept is because the level of trade exposure faced by manufacturing SMEs is often not recognised in broader analysis.

Figure 0.1: Trade to GDP Ratios for European Union, United States, New Zealand and Australia

Source: World Trade Organization "2007 Country Trade Profiles"[1] and Castalia.

Australia's manufacturing sector already faces strong incentives to be as efficient as possible. Hence, it is reasonable to expect that most profitable cost-saving measures have already been implemented. It is likely, therefore, that trade-exposed SMEs would be forced to address the effects of the CPRS on their profitability by reducing the number people they employ.

This study assesses the potential employment impact associated with implementing the CPRS in its current form through a costing analysis of a sample of eleven SMEs. Using the Commonwealth Treasury's modelling of the "Low CPRS"[2] and the "High CPRS"[3] scenarios, we present estimates of the reduction in employment that SMEs in the sectors assessed would be forced to pursue in order to compensate for the impact of the CPRS:

- Food processing SMEs would need to reduce labour costs by 4.4 percent (Low CPRS) to 8.1 percent (High CPRS), on average
- Plastics manufacturing SMEs would need to reduce labour costs by 7.4 percent (Low CPRS) to 12.9 percent (High CPRS), on average
- Chemicals manufacturing SMEs would need to reduce labour costs by 1.8 percent (Low CPRS) to 3.2 percent (High CPRS), on average
- Machinery and equipment manufacturing SMEs would need to reduce labour costs by 1.8 percent (Low CPRS) to 3.0 percent (High CPRS), on average.

[1] World Trade Organization. "Country Trade Profiles 2007" http://stat.wto.org/CountryProfile/WSDBCountryPFHome.aspx?Language=E (accessed 19 May 2009)

[2] The "Low CPRS" scenario models the impact of the additional costs generated if the CPRS achieves the less ambitious target of a 5 percent reduction in greenhouse gas emissions by 2020.

[3] The "High CPRS" scenario models the impact of the additional costs generated if the CPRS achieves the more ambitious target of a 15 to 25 percent reduction in greenhouse gas emissions by 2020.

Experience shows that wages are relatively inflexible, and firms tend to adjust by cutting employment. Similarly, experience with past episodes of economic adjustment—such as the response to the oil shocks—shows that re-employment in new sectors (such as the much touted "green industries") takes a long time to occur.

What to do

Despite efforts by the Government to ease the transition to an economy-wide emissions trading scheme, the existing coverage of the CPRS transitional assistance package does not adequately protect the SME sector from the unintended consequences of the CPRS. Introducing the CPRS in its current form will concentrate the costs of economic adjustment on the SME sector.

This is very risky for Australia. SMEs employ approximately 64 percent of Australia's private sector labour force and produce nearly 50 percent of Australia's domestic output. This means that the impact of the CPRS on the SME sector is no less consequential, in aggregate, than the costs the scheme will impose on Emissions-Intensive Trade-Exposed sectors that have already successfully secured CPRS assistance.

Table 0.1: SMEs Will Not Qualify for Most Assistance in the CPRS

CPRS assistance measure	Description of assistance	Do SMEs qualify?
	Businesses that emit above 1,000 tCO2e/$1m revenue will receive 66% free permits. Businesses that emit above 2,000 tCO2e/$1m revenue will receive 95% free permits. This includes the Global Recession Buffer.	
Free allocation to EITE business	Assistance rates will decrease at 1.3 percent per year.	No
Free allocation to EITE electricity users	Emissions intensive businesses will receive one free permit per MWh of electricity use.	No
Electricity sector adjustment	Coal-fired generators with emissions above 0.86 tCO2e/MWh will receive a fixed allocation of permits.	No
Climate Change Action Fund information campaign	The information campaign aims to help community organization and businesses comply with and minimize the impact of the CPRS.	No
Climate Change Action Fund investment in energy efficiency and low-emissions technologies	Non-EITE businesses are eligible for capital allowances and competitive grants for investment in energy efficiency and low-emissions technology.	Yes
Climate Change Action Fund structural adjustment	Workers and communities in regions impacted by the CPRS are eligible for assistance to ease the cost of displacement and structural adjustment.	No
Climate Change Action Fund coal sector adjustment	Funds will promote abatement activity and reduce transitional costs in the coal sector.	No

Source: Carbon Pollution Reduction Scheme Bill 2009, Explanatory Memorandum, CPRS White Paper 2009, and Castalia

Australia's higher dependence on trade than most countries, and the greater relative exposure of our most productive industries to international competition, makes the challenge of introducing a viable emissions trading scheme particularly acute. The Government should recognise that the economic effects of the scheme remain poorly understood. The politics of climate change debate have created an unfortunate duality, where governments trying to introduce emissions trading schemes deliberately understate the likely economic impacts to get the scheme past the voters, while the affected interests may often overstate the effects. We believe it would be dangerous for Australia to remain stuck in that mind-set.

It is unhelpful that the desire to minimise the unintended consequences of emissions trading is often characterised as rent seeking. While, of course, firms seeking protection are looking after their own interests, it is in the national and even global interest to avoid leakage.

The results of this study show that there is much work yet to be done on the design of the CPRS to achieve the right balance between the intended environmental benefits, and the unintended economic consequences.

1 Introduction

This study examines the effects on small and medium sized enterprises of the Australian Government's proposals to introduce an emissions trading scheme, known as the Carbon Pollution Reduction Scheme (CPRS).

The proposed design of the CPRS has evolved substantially from the release of the Green Paper in July 2008 to May 2009, when the Government announced the latest revisions, including a one-year delay to the commencement of the scheme. The evolution of the CPRS reflects the growing recognition of the scheme's unintended consequences, caused by the introduction of carbon pricing in Australia while no such pricing occurs in its competitors. The Government's willingness to make adjustments to the transitional assistance package has been driven by the growing understanding of the economic effects of the CPRS as the debate on Australia's climate policy framework progressed.

However, the focus of the assistance measures has remained relatively narrow, dealing with the effects of the scheme on the emissions-intensive trade-exposed industries (EITE), as well as on consumers and on the coal-fired electricity generators. Limited attention has been given to how the CPRS will affect other trade-exposed sectors within our economy, or what measures need to be taken to deal with the loss of competitiveness in those sectors.

This report seeks to fill that gap. We measure the likely effects of the proposed scheme on trade-exposed small and medium sized businesses, and show that these effects cannot be ignored. While small and medium sized businesses will not face the direct emissions costs incurred by the EITEs, they will face significant costs indirectly through the effects of the scheme on energy, transport, and other domestic inputs. We quantify those costs, and consider what they would mean for the adjustment faced by the SME sector.

SMEs employ approximately 64 percent of Australia's private sector labour force, and generated nearly 50 percent of Australia's domestic production in 2007-08.[4] SME play a particularly important role in regional and rural areas. The geographic spread of SMEs makes them particularly vulnerable to the effects of the CPRS on in-land transport costs.

Box 1.1: Defining Small and Medium enterprise (SME)

The Australian Bureau of Statistics uses the following categories in compiling business counts:

- **Small businesses** are those employing fewer than 20 workers
- **Medium size businesses** are those employing 20 to 199 workers
- **Large businesses** are those employing 200 or more workers.

For the purposes of this study we have therefore defined a small and medium enterprise (SME) as any business employing fewer than 200 workers.

Source: Australian Bureau of Statistics (2002, 2005) and Castalia

[4] . Australian Bureau of Statistics. "Australian Industry 2007-2008." ABS Catalogue Number 8155. May 2009.

Our research indicates that the likely costs to SMEs from introducing the CPRS in its current design will lead to additional unintended economic consequences, which the Government has not anticipated, and which must be addressed. To this end, the study addresses the following questions:

- How will the transport sector be reshaped as a result of the CPRS, and what are the implications for SMEs
- How will the CPRS affect the operating costs and profitability of SMEs in Australia
- What are the economic risks of exposing SMEs to uncompensated costs from the CPRS?

Structure of this Study

The remainder of this paper is organised as follows:

- Section 2 focuses specifically on the impact the CPRS will have on transport and freight costs. We explain why pricing the carbon intensity of freight will lead to a geographic realignment as a result of increased relative cost of domestic transport compared to international transport, and a change in the merit order of various domestic modes of transportation
- Section 3 presents the impact of the CPRS on SMEs in Australia and provides evidence in the form of generic financial costing models for three sectors:
  - Food processing
  - Plastic and chemicals manufacturing
  - Machinery and equipment manufacturing.

  We show why the current transitional assistance package in the CPRS is inadequate to compensate SMEs from the increase in non-tradable input costs, including energy and freight costs
- Section 4 follows with a discussion of the biggest challenges the Government faces in designing an effective emissions trading scheme that accomplishes environmental benefits at minimal economic cost and competitiveness risk
- Section 5 presents recommendations for adjusting the existing design of the CPRS to mitigate the unintended consequences from generating uncompensated costs for SMEs. We also present additional policy recommendations to create targeted incentives and investments aimed at transitioning Australia toward a low-carbon economy
- Section 6 provides references for sources cited in the study
- The appendices contain a list of contributors (Appendix A), and the questionnaire used to gather data for the analysis of the costing structure of SMEs (Appendix B).

2 Impact of the CPRS on Transport and Freight

Australia's geography means the country's economy is especially reliant on transport and freight. This fact has two implications for Australia's climate change policy. First, it means transport is a major contributor to Australia's emissions profile. Second, it means covering transport in a carbon pricing scheme, such as the CPRS, could have an effect on Australia's economic geography, influencing the decision of where people and businesses choose to locate, and the economic viability of more isolated regions.

In this section, we focus on how the CPRS could re-shape freight costs. This analysis is a key input into our analysis of the effects of the scheme on the SME costs, which is presented in Section 3.

This section is organised as follows:

- Section 2.1 starts by discussing how the CPRS will likely reshape domestic transport by making domestic freight more expensive relative to international freight, and changing the merit order of various transport modes. We lay out the argument for why the eventual impact of the CPRS on the transport sector cannot be initially ignored, and why the effect of adding additional carbon costs to transport and freight will be economically significant
- Section 2.2 presents evidence from the transport sector supporting the discussion laid out in Section 2.1. We focus on the existing cost structure and the additional carbon costs for air, rail and shipping, and road freight
- Section 2.3 interprets the evidence and discusses what the economic consequence will be if transport is covered in the CPRS. This discussion provides a foundation for policymakers to think about the economic costs of a geographic realignment stimulated by pricing transport carbon emissions. Our findings here support our analysis in Section 3 of the costs that the carbon pricing will impose on SMEs in Australia.

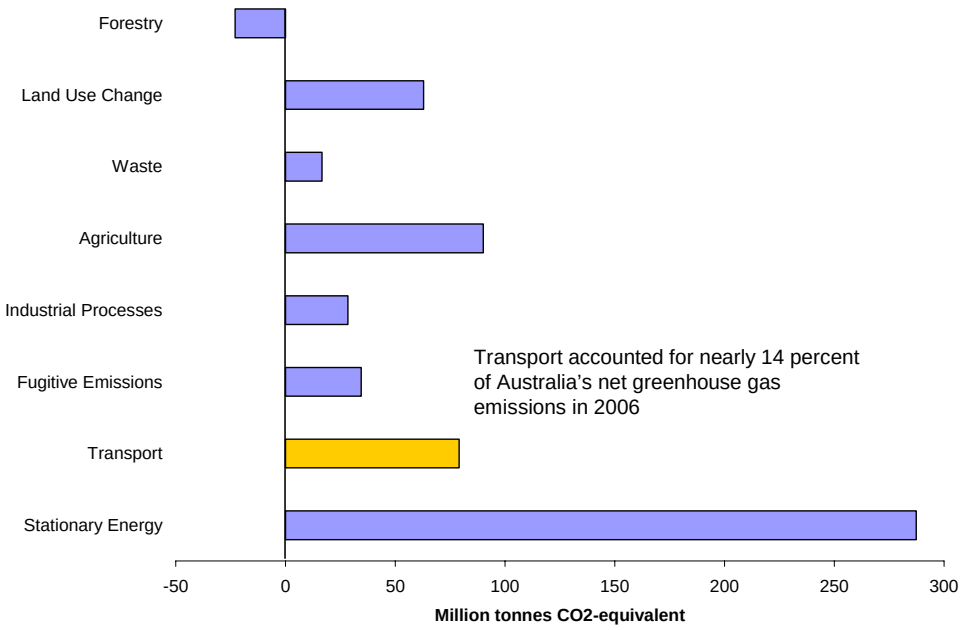
2.1 The CPRS will Reshape Domestic Transport

Here we discuss how an emissions trading scheme like the CPRS can lead to a restructuring of domestic transport, and the economic and demographic consequences that can result. Despite efforts to exempt transport fuels in initial years and ease the transition to a transport sector that includes the cost of emissions, the eventual impact of the CPRS should not be ignored. The additional freight costs are likely to have a significant effect on the economic landscape of the country and the viability of rural and regional economic activity.

2.1.1 The Eventual Impact on Transport Cannot be Ignored

Given Australia's geography, it is not surprising that transport is a major contributor to domestic emissions. In 2006, transport accounted for 79.1 million tonnes of Australia's total 576 million tonnes CO2-e net greenhouse gas emissions. Figure 2.1 below shows the distribution of emissions by sector, highlighting the contribution from transport.

Figure 2.1: Australia's Greenhouse Gas Emissions by Sector, 2006



Source: Department of Climate Change "National Greenhouse Gas Inventory 2006".

Because transport is such a large contributor to domestic emissions, it seems sensible to cover the sector in a cap-and-trade scheme. Doing so would increase the opportunities for least cost emissions abatement.

In choosing to cover liquid fuels in the CPRS, the Government has also acknowledged Australia's economic dependence on transport. Box 2.1 below provides a description of the fuel tax reduction and the tax credit for heavy on-road transport that accompany the CPRS assistance package.

Box 2.1: CPRS Assistance for Transport

Accompanying the proposed CPRS assistance package are the following measures aimed at protecting transport from the additional costs:

- A cent-for-cent reduction in the tax on liquid fuels subject to the $0.38143/litre rate, including petrol and diesel. For every cent increase in the price resulting from the scheme covering motorist fuel, there will be a cent reduction in the fuel tax
- An offsetting fuel tax credit for heavy road transport. Because on-road transport is effectively exempt from the fuel tax, businesses will receive a credit equal the amount of the tax reduction.

The fuel tax reduction would go into affect immediately and will be reassessed every six months for the first three years of the scheme. The credit will be available to heavy on-road transport for one year.

Source: Carbon Pollution Reduction Scheme Bill 2009, and Castalia

Despite the effort to design a scheme aimed at easing transition, it is likely that the Government's proposal will be less effective and more costly—both initially and its long-run impact—than most analyses suggest. The primary costs and unintended consequences include:

- A tax credit for on-road transport businesses will not lessen the pass-through of carbon costs to the cost of freight. Freight businesses will benefit in the short run, but freight users will still pay the carbon cost embodied in transport and freight
- If the Government covers transport in the CPRS, and if it hopes to achieve meaningful emissions reductions, the eventual costs to consumers and transport business will be larger than anticipated
- Despite the initial assistance, businesses will begin responding immediately to the eventual cost.

The Government's transition package appears to be based on the mistaken view that a tax credit for on-road transport businesses will have an equivalent economic effect to the reduction in the fuel tax. This is wrong because a credit will not change the marginal cost that transport businesses pay for fuel, and therefore will not be passed through to consumers. The tax credit will act as a direct lump-sum subsidy, and should have no effect on the downstream cost of road freight. The credit will help transport businesses by putting money in their pocket to compensate for higher fuel prices, but it will not reduce costs for transport and freight users, like the SMEs highlighted in this study.

Similarly, while the temporary reduction in the tax on liquid fuels will delay the increase in some domestic transport costs, it is likely that businesses making investment and employment decisions will immediately behave as if no such reduction exists. If transport is covered in the CPRS, it is reasonable to expect that it will eventually be subject to carbon costs that reflect the full emissions intensity of transport fuel. Failing to do so would mean that generate none of the desired benefits expected of the CPRS would be generated, and increasing regulatory uncertainty in the transport sector would be created. Operators and users will understand that any tax rebate is temporary, and will begin to plan for the expectation of increased costs immediately through pricing and investment that will drive a restructuring of the transport sector.

2.1.2 The Impact on Australian Transport and Freight Costs

In this section, we look through the temporary effect of the excise tax rebate and consider the economic consequences of including transport fuels in the CPRS:

- By covering transport, the CPRS will increase cost for domestic producers relative to their competitors. Australian exporters will pay more for the domestic portion of the export logistic chain. Australian manufacturers located in the interior will face higher relative costs of getting goods to the markets in the coastal capital cities compared to foreign competitors. This is because CPRS will not affect international freight
- Because different modes of transport have varying emissions intensities, there will be a differential increase in costs for competing modes of transport. This will change the merit order of domestic freight. This will increase the competitive advantage of coastal cities and of towns along the main rail corridors, but will disadvantage communities reliant on road and air transport.

In the remainder of this section we provide evidence to quantify the costs of covering the transport sector in the CPRS.

2.2 Evidence from the Transport Industry

This section presents evidence showing the cost of covering the transport sector in the CPRS. We focus on the existing structure and the additional carbon costs for air, rail and

shipping, and road freight. Two clear conclusions can be drawn from the evidence we present:

- The additional freight cost when transport is covered by emissions trading is significant, even under moderate emissions reductions scenarios
- The additional freight cost falls differentially on various modes of transport and is largest for air and road transport.

2.2.1 Calculating the Carbon Cost of Freight Under the CPRS

Figure 2.2 below shows the additional freight cost per 1,000 tonne-km for various modes of domestic transport. The following points will help interpret the values in the figure:

- Values are calculated based on the average emissions intensity of each mode of freight.[5] The values can be interpreted as the actual average carbon cost of each mode of freight. As we argued above, prices in an effective emissions trading scheme will accurately reflect carbon costs and CPRS assistance package will do little to protect freight from additional costs. For these reasons, the values presented in Figure 2.2 are the most informative for policymakers to consider
- The carbon costs reported on the vertical axis represent various scenarios modelled by the Treasury and other parties. The values the Treasury modelled were in 2010 nominal terms.[6]
  - $10 is the carbon price cap for the first year of the scheme announced in the 4 May CPRS revisions
  - $25 is approximately the carbon price Treasury modelled for the first year of the scheme in the 5 percent emissions reduction scenario
  - $35 is approximately the carbon price Treasury modelled for the first year of the scheme in the 15 percent emissions reduction scenario
  - $50 is approximately the carbon price modelled for the first year of the scheme in the 25 percent emissions reduction scenario presented in the Garnaut Climate Change Review—which is also the upper commitment announced in the Government's May 2009 revisions
  - $100 is the value the carbon price would reach in the years prior to 2050 (assuming 4 percent annual growth) under the 5 percent emissions reduction scenario. Obviously that price would be reached more rapidly in the scenarios with more aggressive emissions reductions.

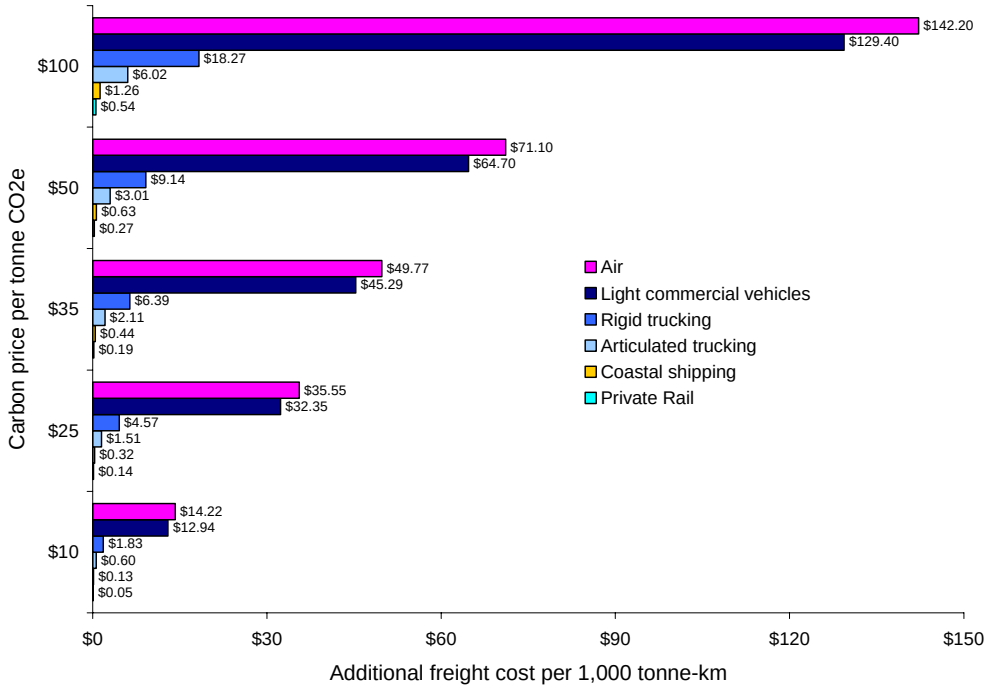
We note that the emission reduction targets associated with carbon prices in the $25 to $50 range are generally not expected to be sufficient to make much difference to the progress of climate change. Hence, any credible commitment to addressing the challenges of climate change must assume relatively high carbon prices. For this reason, if businesses believe that the Government's policy commitment is credible, they are likely to immediately start making medium to long-term investment decisions that anticipate relatively high emission prices.

---

[5] The emissions-intensity of freight is derived from emission per tonne-km reported in: Australian Greenhouse Office "National Greenhouse Gas Inventory: Analysis of Recent Trends and Greenhouse Indicators 1990 to 2005.". Department of the Environment and Water Resources. September 2007.

[6] The Treasury model uses estimates that the stabilization at 550ppm requires an initial emission price of $23 per tonne CO2e. See: Australian Government. "Australia's Low Pollution Future: The Economics of Climate Change Mitigation. (Summary)." ISBN: 978-0-642-74483-8, 2008..

Figure 2.2: Additional Freight Cost at Various Carbon Prices



Source: Castalia

Table 2.1: Percentage Increase in Freight Cost at Various Carbon Prices[7]

	Carbon Price per tonne CO2e				
	$10	$25	$35	$50	$100
Air[8]	1.05%	2.62%	3.67%	5.24%	10.49%
LCV[9]	n/a	n/a	n/a	n/a	n/a
Rigid trucking[10]	2.62%	6.54%	9.16%	13.09%	26.17%
Articulated trucking[10]	0.86%	2.16%	3.02%	4.31%	8.62%
Coastal shipping[11]	0.57%	1.42%	1.99%	2.84%	5.68%
Private Rail[12]	0.17%	0.42%	0.58%	0.83%	1.67%

Source: Castalia

[7] Calculated based on freight costs reported in: The Bureau of Infrastructure, Transport and Regional Economics (BITRE). "Freight Rates in Australia 1964-65 to 2007-08." Information Sheet 28 Department of Infrastructure, Transport, Regional Development and Local Government, October 2008.

[8] The basis of airfreight is door-to-door, including local delivery.

[9] Not available for light commercial vehicles. Average cost of road freight is reported for long distance trucking only.

[10] Percentages are calculated based on cost of long distance road freight on the basis of full container loads from door-to-door. Because of the differential cost of rigid versus articulated trucking percentages can be interpreted as upper- and lower-bounds of the percentage increase in road freight cost.

[11] Coastal shipping costs calculated based on east-west coastal rates from wharf-to-wharf. Tasmanian rates are significantly higher due to port charges.

[12] The basis of rail freight rates are full container loads from terminal-to-terminal.

Table 2.1 reports the values in Figure 2.2 as a percentage of total freight costs for each mode. Each value in Table 2.1 represents the percentage increase in freight costs resulting from embedded carbon costs under different CPRS carbon price scenarios. Carbon prices and the emissions intensity of freight are calculated as described above. The most striking conclusion these figures reveal is that the effect of carbon pricing on domestic freight costs is significant even under moderate emissions reductions assumptions. For example, in the absence of an artificial $10 price cap, even modest initial emission reduction targets would have noticeable effects on the costs of trucking.[13] The percentage increase in freight costs presented here are key inputs in the next section of this study when we evaluate the impact of higher transport costs on SMEs.

In the remainder of Section 2.2 we turn to a discussion of the costs to individual transport modes and the likely response to carbon pricing. We end with a discussion of the change in the merit order of competing modes of freight, including a geographic realignment and a change in the structure of the transport sector. Section 2.3 then discusses the economic implications of that restructuring.

2.2.2 How Carbon Prices will Affect Airfreight

Airfreight will face the largest increase in freight costs per tonne-km in absolute dollar terms as a result of carbon pricing, which will translate to an approximate 1.1 to 10.5 percent increase in total airfreight costs depending on the carbon price. The range of estimates reflects the uncertainty of the eventual carbon price that will emerge under various emissions reductions goals. Moreover, these figures likely understate the total impact of the CPRS on air transport and freight due to the network effects of air transport.

The additional carbon cost for airfreight is largest because of the higher emissions intensity of air transport. At a low carbon price of just $25, the emissions cost of airfreight would be about $36 per 1,000 tonne-km. The additional cost would increase the cost of airfreight by about 2.6 percent, on average.

The likely direct economic response includes:

- Many users of airfreight have few alternatives to the fast and reliable service air transport offers. Businesses and consumers that cannot respond to increases in the cost of airfreight—those who literally need the service to continue operating—will face a direct increase in transport and freight costs due to carbon pricing
- To the degree that consumers and businesses are responsive to increases in the cost of airfreight for the transport of goods, demand for airfreight will fall as they limit their freight needs or substitute for lower cost alternatives like trucking and, in some cases, rail.[14]

However, it is likely that the costs presented here understate the actual cost carbon pricing will impose on air transport generally and airfreight specifically. More than most sectors, air transport is dependent on network effects.[15] The economic viability of a flight

[13] Treasury modelling estimates carbon prices in the first year of the scheme at roughly $25 in the five percent reduction scenario.

[14] The degree to which this substitution occurs is dependent on a number of factors that determine the elasticity of demand for airfreight. Quantifying that is beyond the scope of this study.

[15] Network effects in industries with high fixed costs become significant after demand for a good or service reaches a critical mass. At the critical mass, the value of the good or service is at least as great as the cost (or price) of the good or service. Since value is determined by the user base, after demand for the good or service reaches a certain level, additional people become willing to pay for the good or service and further reduce average cost.

corridor relies on a critical mass of demand. A fall in demand will add further to increased costs and could affect the sustainability of some flight corridors, particularly in more isolated, regional markets. Figure 2.3 below shows Australia's air transport network.

Figure 2.3: Australia's Air Transport Network

Source: Bureau of Infrastructure, Transportation and Regional Economics (2008)[16]

The following quote, explaining the impact of increased security costs after the terrorists' attacks of September 11, 2001, illustrates the economic impact that additional carbon costs could have for air transport, including the availability of affordable airfreight:

> *"The responses to the events of September 11th have […] caused substantial increases in security costs. To the extent these costs are passed forward to system users, they will increase the price of travel and impact patronage. Airlines also have substantial fixed capacity costs. The declines in traffic are often felt as an erosion of yields and fares as carriers seek to maintain traffic loads for the capacity they are going to operate. In general, the ability to pass along cost increases from providers to airlines or from airlines to passengers depends on relative supply and demand elasticities… We […] suggest that short-haul flights will be most severely impacted because the fees and taxes are a larger proportion of the fare for these flights".*[17]

[16] The Bureau of Infrastructure, Transport and Regional Economics (BITRE). "Australian Transport Statistics." Department of Infrastructure, Transport, Regional Development and Local Government, June 2008

[17] R Golaszewski. "Network Industries in Collision: Aviation Infrastructure Capacity, Financing and the Exposure to Traffic Declines. ." Journal of Air Transport Management Volume 9, Issue 1 (January 2003): pp57-65. .

Quantifying the elasticities and network effects of airfreight is beyond the scope of this study, but it is useful to understand the vulnerability of air transport to increased costs, and to realise the direct cost of emissions is likely to be a conservative estimate of the net costs the CPRS will impose on airfreight.

2.2.3 How Carbon Prices will Impact Rail and Coastal Shipping Freight

The additional carbon costs will be lowest for rail and coastal shipping. In the long run, rail and coastal shipping will benefit from emissions pricing in the transport industry due to the relative efficiency of these modes.

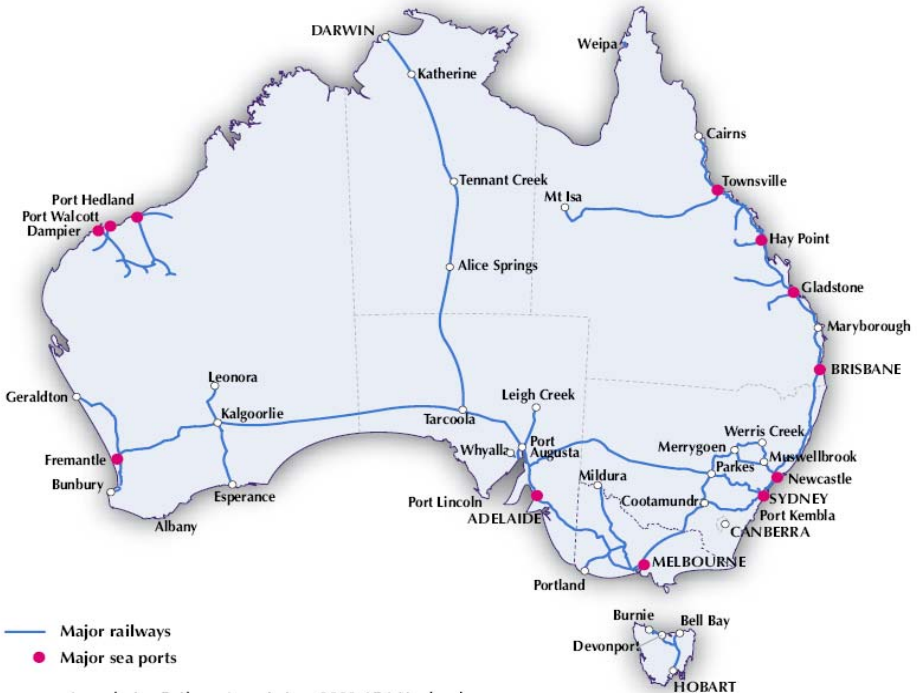
Rail and shipping have the advantage of being relatively low-carbon modes of freight. At a low carbon price of $25, costs would increase by approximately $0.30 and $0.15 per tonne-km for coastal shipping and rail freight, respectively. This amounts to about a 1.5 percent increase in coastal shipping freight and a 0.5 percent increase in rail freight. While the additional cost is low, it is not negligible. Shipping industry representatives estimate, for example, that a carbon price of about $25 per tonne CO2e would add roughly $2,500 to the costs of a ship off the coast of Australia over a 24-hour period.[18]

Even with the increased costs, coastal shipping and rail will likely benefit from the coverage of transport in the CPRS in the medium- and long-term because of their relative efficiencies. Freight users will substitute toward these modes as the cost of alternatives—such as heavy road transport—increase more rapidly due to higher emissions intensities.

However, sea and rail freight are only available to users along a limited number of freight corridors.

[18] This estimate comes from discussions with representatives of Shipping Australia and the Australian Ship-owners Association. It assumes a carbon cost of about $75 per tonne of fuel, the average fuel usage over a 24-hour period and the average volume of domestic freight per vessel. It is important to note that for coastal shipping only the emissions associated with pro-rated volume of domestic freight on a vessel carrying domestic freight would be subject to carbon costs in the CPRS. This condition is important to ensuring international freight and Australian flag vessels are not put at a competitive disadvantage.

Figure 2.4: Australia's Rail and Sea Transport Network



Source: Bureau of Infrastructure, Transportation and Regional Economics (2008)[19]

2.2.4 How Carbon Prices will Affect Trucking Freight

The increase in road freight costs will be significant once the CPRS is fully implemented. The additional carbon cost of road freight is especially relevant for the SMEs highlighted in this study because trucking is the mode SMEs most rely on to distribute goods and to deliver goods to other transport terminals; and because there is often no substitute for road freight, particularly for SMEs located away from rail and sea terminals.

At a low carbon price of just $25, the emissions cost of light commercial vehicle freight would be about $32 per 1,000 tonne-km. At the same carbon price, the respective emissions cost of rigid and articulated trucking would be about $4.50 and $1.50 per 1,000 tonne kilometre. The additional cost would increase the cost of long-distance trucking by roughly 2.2 percent to 6.5 percent.[20]

Road freight is carried using three different trucking modes based on the type of freight, distance carried, and location. Most short-distance, urban freight is carried by light commercial vehicles (LCV) with an average load of 0.22 tonnes, travelling a total of 35,097 million vehicle kilometres in 2005-06. Longer distance freight service uses rigid trucks with an average load of 4.58 tonnes, travelling a total of 7,233 million kilometres in 2005-06. The majority of long-distance, heavy road freight is carried by articulated truck with an average load of 19.64 tonnes, travelling a total of 6,556 million kilometres in 2005-06. Table 2.2 below provides a summary of road freight statistics, by trucking

[19] The Bureau of Infrastructure, Transport and Regional Economics (BITRE). "Australian Transport Statistics." Department of Infrastructure, Transport, Regional Development and Local Government, June 2008

[20] Percentages here are calculated based on the average cost of door-to-door long-distance trucking rates (BITRE, 2008).

mode, for 2005-06. In some cases rigid trucks may be a reasonable substitute for light commercial vehicles, and articulated trucks may be a substitute for rigid trucking. However, it is rarely the case that light commercial vehicles and articulated trucking are substitutes for freight service.

Table 2.2: Summary of Road Freight Statistics, 2005-06

	Light commercial vehicle	Articulated trucks	Rigid trucks
Vehicles (thousands)	2114	72	445
Vehicle kms (millions)	35097	6556	7233
Freight carried (million tonnes)	151	812	881
Freight carried (million tonne-km)	7878	128759	31682
Average load per km (tonne)	0.22	19.64	4.38
Average distance per vehicle (thousand km)	16.60	91.06	16.25

Source: Bureau of Infrastructure, Transportation and Regional Economics (2008)[21]

2.2.5 The Changing Merit Order of Freight

The largest impact the CPRS may have on the transport sector is not the partial equilibrium effects of an increase in costs, but rather how differential increases to various modes will affect the merit order of freight, potentially driving a restructuring of the transport sector and a geographic realignment of Australia's economy. Figure 2.5 below shows the relative increase in freight costs per 1,000 tonne kilometres, based on the emissions intensity of each mode of freight, for various emissions reductions scenarios.

The following points will help interpret Figure 2.5:

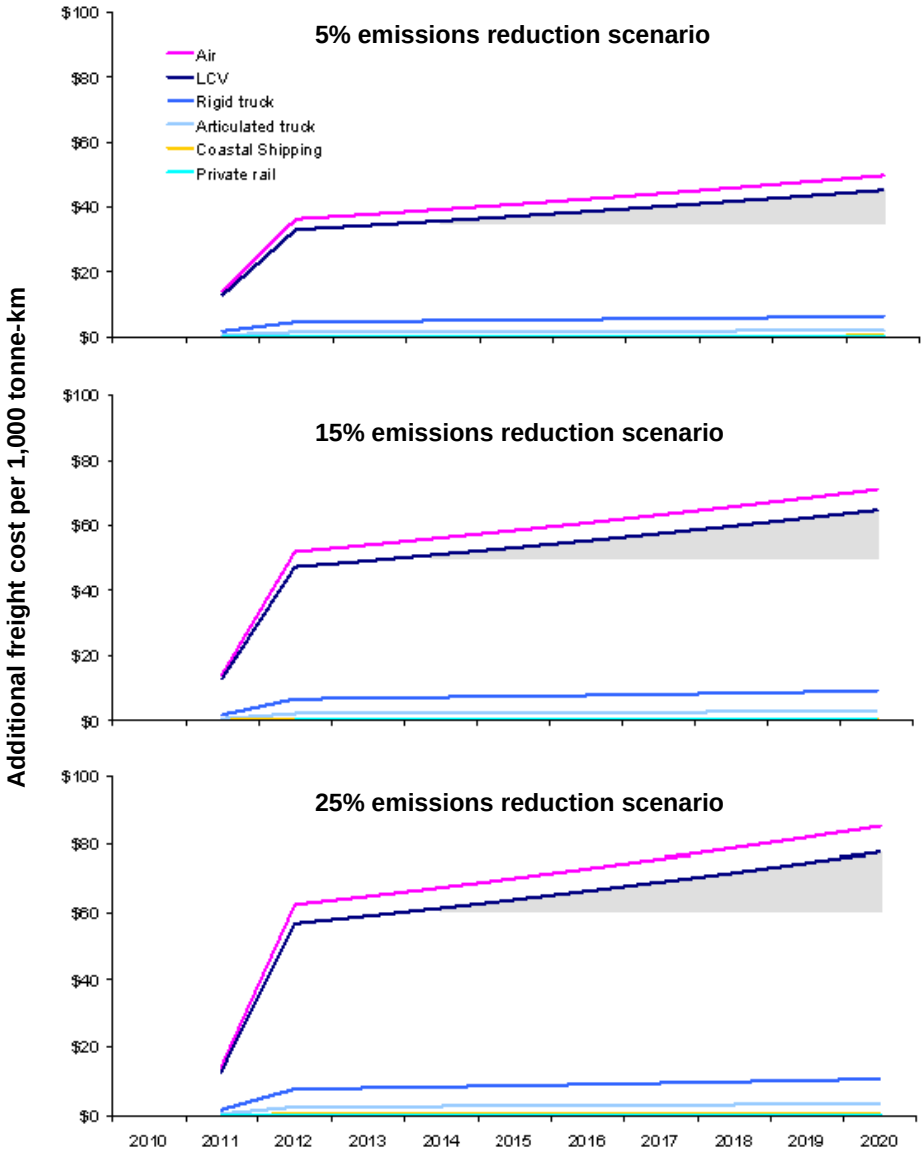
- As throughout this study, carbon prices under various emissions reduction scenarios use the same price estimates obtained by Treasury modelling, and assume a real annual increase of 4 percent
- The figure below does not include fuel efficiency improvements. However, because of relatively low turnover in vehicle fleet during the length of the period shown, efficiency gains will be small
- The figure shows relative carbon costs through 2020. Estimates of cost trajectories beyond that period are unreliable and misleading due to the inability to estimate future technology gains, investment, and demand
- The shaded region represents the increase for light commercial vehicles (LCVs) if they receive the fuel tax offset in the initial three years of the scheme, and carbon costs are not corrected for the offset after the initial transition period
- Alternatively, the area below the shaded region can be interpreted as the foregone revenue per 1,000 tonne-km from the fuel tax offset for light

[21] The Bureau of Infrastructure, Transport and Regional Economics (BITRE). "Australian Transport Statistics." Department of Infrastructure, Transport, Regional Development and Local Government, June 2008

commercial vehicle use, or the relative distortion in terms of carbon pricing that the fuel tax offset generates for more emissions-intensive road fuels.

Clearly, the figure below shows that cost will increase the most for air and road freight, and carbon costs for shipping and rail freight will remain relatively low. Once the CPRS is implemented and scaled up, the incentives for business will be to reduce trucking costs by locating near major rail and shipping terminals, thereby increasing their ability to access alternative modes. The largest inter-modal substitution will likely occur from trucking to container rail, where this is feasible. The figure also shows that the persistence of the fuel tax offset will represent a significant distortion of the carbon price signal from the initial assistance provided to road fuels.

Figure 2.5: Additional Freight Cost of Emissions by Transport Mode



Source: Castalia

2.3 The Economic Cost of Covering Transport in the CPRS

While inter-modal substitution towards less emission intensive modes of transport is seen as a desirable part of the response to the CPRS, little attention has been given to the second and third order impacts of such substitution. In essence, the CPRS would redraw Australia's economic geography by:

- Making all inland locations less competitive than the coastal capital cities. This is because most consumption in Australia occurs in the capital cities, and this is where Australian domestic producers compete with imported products. The CPRS will make domestic producers less competitive than importers, since there will be no carbon price on international freight
- Exporters will similarly be more disadvantaged if they are based away from major seaports, since they will face higher domestic transport costs. Hence, there will be an increased incentive to relocate production from regional Australia to the main cities
- Since there are few credible plans to expand the rail network, regional locations away from the main rail terminals will become relatively disadvantaged. Hence, even if production remains within regional Australia, it is likely to become more concentrated around regional centres.

The CPRS will generate economic, geographic, and environmental costs that are generally not acknowledged in the debate over the CPRS design, and not accurately accounted for in modelling. Covering transport in the CPRS is likely to reduce economic activity, depress rural and regional incomes, change Australia's economic landscape, and create smaller environmental benefits than predicted.

The following main conclusions can be drawn from the evidence on the carbon cost of transport presented above:

- In the short-term, business that rely on low capital and labour costs outside of major coastal distribution and demand centres that are unable to immediately relocate, will be forced to find savings in other costs centres (such as labour costs) or face reduced profitability. This effect will contribute to unemployment and reduced remuneration (or reduced wage growth) as a result of the CPRS
- Over a longer horizon, the additional costs will increase the incentive for businesses to reduce transport and freight costs by locating near major ports, distribution hubs and demand centres. The geographic impact will be an incremental draining of economic activity from relatively regional and rural areas of Australia
- The economies of more remote areas of Australia depend on low cost transport to complement their comparative advantage of low cost capital and labour. As transport costs rise due to the CPRS, some communities and regions will face a permanent loss—or reduction—in this comparative advantage, and experience a fall in economic activity and depressed incomes
- Finally, the resulting geographic realignment would contribute to further urbanisation and may limit the environmental benefits that can be achieved by the CPRS by increasing congestion. In other words, estimates of the emissions reductions that will result from covering transport in the CPRS are likely to overstate the benefits if they fail to account for higher congestion rates.

3 Impact of the CPRS on SMEs

The Government has recognised the need to compensate households and large industry stakeholders for introducing the CPRS ahead of Australia's major trading partners. The impact on SMEs, however, has been largely neglected, leaving this sector—which is so important to employment and productivity in Australia's economy—vulnerable to unintended consequences of the CPRS.

The cost of non-tradable carbon-intensive inputs, such as energy and transport, with embodied emissions covered by the CPRS will increase for all businesses, including SMEs. Unfortunately, many businesses—particularly manufacturing SMEs highlighted in this study—will be limited in their ability to pass additional costs on to consumers in the price of goods, since smaller producers are price-takers competing with international trading partners that are not adopting carbon pricing schemes. The effect of unilateral carbon pricing on SMEs will be felt through reduced profitability and reduced incentives to invest, with consequences for workers, communities, and regions that rely on SMEs.

In this section we present evidence of the impact the CPRS will have on SMEs, and the likely economic implications. The section is organised as follows:

- Section 3.1 includes evidence from a sample of SMEs to illustrate the impact of the CPRS. We explain our survey and modelling methodology, and our analytical approach to understanding the economic response to additional carbon costs. Then, we provide a summary of results for each sector, focusing on the impact higher energy and freight costs will have on profitability and employment in SMEs
- Section 3.2 explains why existing measures are inadequate to protect SMEs from the costs of the CPRS. The CPRS assistance package has focused on a discrete group of industries receiving emissions-intensive trade-exposed (EITE) status at the expense of sectors of the economy that are at least as vulnerable to uncompensated costs and the resulting unintended consequences
- Section 3.3 discusses the important role of SMEs in Australia's economy and the consequences of burdening SMEs with uncompensated carbon costs in the CPRS.

3.1 Evidence from a Sample of SMEs

This section presents the empirical evidence from a canvassing of small and medium businesses in three key sectors that will be affected by the CPRS:

- Food processing
- Chemicals and plastics manufacturing
- Machinery and equipment manufacturing.

In the section we explain our approach, including a description of the methodology used to survey SMEs and conduct the cost modelling we have carried out. We then present the conceptual framework necessary to understand how these businesses will be affected by uncompensated costs before presenting the empirical evidence from each of the three sectors. The evidence presented in this section shows that the uncompensated costs to SMEs' are large and, if unaddressed in the CPRS assistance package, will generate unintended consequences that put Australia's economy at a disadvantage relative to international competitors, and cause greenhouse gas emissions to leak offshore.

3.1.1 Import Price Parity

The key concept which underpins this analysis is that of import price parity: that trade-exposed SMEs face prices set in the international markets, and hence will have no opportunity to pass the costs of the CPRS to their customers.

Box 3.1 below explains why defining EITE status is problematic and will prevent some vulnerable businesses from receiving assistance.

Box 3.1: Defining Emissions-Intensive Trade-Exposed Status

The CPRS legislation aims to lower the economic costs of emissions trading and reduce carbon leakage by distributing the largest amount of assistance to Emissions-Intensive Trade-Exposed (EITE) industries. The industries that are likely to receive EITE status include:

- Aluminium smelting
- Alumina refining
- Cement clinker production
- Lime production
- Silicon production
- Iron and steel manufacturing
- Petroleum refining, and
- LNG Production.

Industries that *may* receive EITE status include:

- Pulp and paper manufacturing
- Plastics and chemical manufacturing
- Glass manufacturing
- Other non-ferrous metal manufacturing.

Targeting CPRS assistance to industries receiving EITE status is subject to bureaucratic rulemaking and will inevitably contain some degree of arbitrariness and encourage rent-seeking. All sectors of the economy will be affected by the burden of additional carbon costs created by the CPRS. Creating a rigid definition that sorts businesses according to EITE status will leave some exposed sectors vulnerable. The manufacturing SMEs highlighted in this study are the clearest example of neglected businesses. Continuing to neglect SMEs in the CPRS assistance package poses the greatest remaining risk of carbon leakage and economic harm.

Source: CPRS White Paper 2009 and Castalia

The success of a cap-and-trade scheme, like the CPRS, is dependent on carbon prices:

- Generating the price signal and incentives necessary to pursue the most efficient carbon abatement opportunities available to achieve the scheme's emissions cap, but
- Not suppressing efficient economic activity in Australia relative to other parts of the world.

To be effective, carbon prices must reflect the actual environmental cost of emitting greenhouse gases. However, carbon prices that are high enough to accomplish their purpose will significantly increase the costs of Australian businesses relative to their foreign competitors. (We discuss the difficult challenge of getting the carbon price right without unduly impacting individual sectors of the economy at length in Section 4.3 below.)

Standard economics tells us that the price of a product in a competitive market will generally be equal to the marginal cost of producing that product. When businesses compete internationally, the price will be equal to the marginal cost of international production. Adding the cost of carbon emissions by unilaterally implementing a cap-and-trade scheme increases the domestic cost of production, but it does not affect costs internationally. Because consumers will be able to import goods at the same price as before, domestic manufacturers are unable to pay for additional costs by raising the price of their goods. In economic terms, this concept is referred to as "import parity" and is discussed in more detail in Box 3.2 below.

Box 3.2: Defining Import Parity and Carbon Price Pass-Through

Import parity is defined as the price for a domestically produced good that is set equal to the price for an equivalent imported substitute good. Import parity is calculated based on the world price plus additional transport costs and tariffs.

In markets for goods that can be produced in other countries (using the same or alternative production processes) and traded internationally, price is generally characterized by import parity. This is the case with most manufactured goods—such as processed food, plastics and chemicals, and equipment, machinery, and auto components highlighted throughout this study. Since price parity limits the upward flexibility in price, producers are unable to pass-through additional costs created by carbon pricing to consumers.

Alternatively, the prices of goods like electricity are set locally when imported substitutes are not available or feasible. This is why we anticipate high amounts of carbon price pass-through for energy and for transport fuels when emissions are taxed or capped, allowing an implicit carbon price to emerge.

Source: Castalia

The conclusions above are, of course, subject to qualifications. Even when producers can pass the full cost the cap-and-trade scheme creates for their business on to consumers, they would still be harmed. Demand for their product would fall as prices increase, even if lower-priced substitutes were not available. The straightforward economic observation is that when something gets more expensive, consumers buy less—assuming consumers' budgets remain the same. Reduced demand for a product reduces revenues for domestic manufacturers. Therefore, even with some carbon price pass-through, current businesses will face a negative economic impact with costly implications for owners, investors and the workers. The degree to which they are harmed depends on the elasticity of demand for the goods they produce. The elasticity of demand—the change in demand of a product relative to the change in price—depends on a number of factors, including access to competitively priced imports, the availability of substitute products, and how important the product is to consumers.[22]

However, the key point—that all exporting and import-competing businesses in Australia will become less competitive as a result of the CPRS—is not controversial. What is less certain is the degree of impact. So far, policy-making has proceeded on the assumption that most SMEs manufacturing tradable goods will not face much of a hardship. This

[22] The price elasticity of demand is defined as the percentage change in quantity purchased as a result of a one percent change in the price of a good. Recent estimates of the price elasticity of Australian merchandise exports report values up to -2.2 (Norman, David. Modelling Manufactured Exports: Evidence from Australian States: Economic Research Department. Reserve Bank of Australia, April 2006). However, price elasticity is often calculated from changes in a price index. As such, reported values may seriously underestimate the responsiveness of consumer behavior and trade flows to increases in the price of a single good. In other words, the price elasticity of particular goods may be significantly higher than the average price elasticity of a bundle of goods.

study examines this assumption by directly scrutinizing the cost structures of a sample of manufacturing SMEs.

3.1.2 A Description of Our Methodology

Our evaluation of the impact of the CPRS on SMEs uses information gathered from a representative sample of firms to model the firm-level effects of an increase in non-tradable input costs, focusing on energy and freight costs, due to carbon prices created by the CPRS.

The following steps were taken to conduct the costing analysis of SMEs:

- The Australian Chamber of Commerce and Industry—with the help of other industry organisations—identified businesses in the selected sectors that were willing to provide the survey information and financial data necessary to conduct our analysis. The sample of SMEs[23] we use is constrained by participation and the provision of the detailed information required
- Participating SMEs were surveyed using the questionnaire provided in the Appendix to this study. Businesses were also asked to provide standard profit/loss statements and balance sheets
- We used information supplied by the firms in the sample to construct a representative profit/loss statement for an "average" firm in the sector. We used an industry consultation to check that the "average" cost structure sensibly describes the prevalent situation in the industry. We are not aware of any reasons why the result would be biased
- From the information gathered, we tested the impact the CPRS would have on non-tradable input costs, focusing on energy and transportation costs. A number of assumptions are required to test the impact. Wherever possible we used the same assumptions used in the Commonwealth Treasury's modelling of the CPRS, or other government reports, or we based assumptions on publicly available government sources. The results for each sector presented in this section are revenue-weighted averages for all of the firms in the sample.

We took the following approach to testing the impact of costs created by the CPRS for the SMEs in each selected manufacturing sector:

- **Import price parity for tradable goods.** As we outlined above, markets for tradable manufactured products are characterized by import price parity that prevents upward price flexibility necessary to pass carbon costs onto consumers. This provides the key theoretical basis for why additional carbon costs in non-tradable goods of interest (energy and freight) will erode SME profitability, employment levels and labour income. See Box 3.2 for a detailed definition of import price parity
- **The cost of tradable direct inputs and raw materials.** We assume import parity will keep the cost of tradable inputs constant under the CPRS. Raw materials and other direct inputs were evaluated to confirm that they are tradable products. Keeping the real cost of tradable inputs constant is a conservative assumption that, if anything, would reduce the size of the impact we show, since there is no basis for why costs of inputs—regardless of

[23] We limited the sample of SMEs we surveyed to those with fewer than 200 employees to conform to the Australian Bureau of Statistics definition.

emissions-intensity—would fall after the implementation of any emissions trading scheme

- **The cost of energy.** Although the energy consumption of the SMEs surveyed falls below the threshold for compensation under the CPRS, many SMEs have significant energy costs—primarily electricity—relative to their total costs. These will increase under the CPRS. To show the impact of the increase, we used estimates for energy prices under the CPRS that were modelled for the Treasury[24]
- **The cost of transport.** Transport and freight costs will increase due to the direct costs created by covering the emissions from transport fuels in the CPRS, and the indirect costs generated by a realignment of Australia's transport sector. To show the impact of the increase, we used estimates based on data obtained from reports by BITRE and the Australian Greenhouse Office.[25] The estimates likely understate the impact on transport costs created by the CPRS as business will be forced to cope with the effects of a transport restructuring as discussed in Section 2.

3.1.3 Understanding the Economic Response of SMEs to Carbon Costs

To interpret the evidence from the cost analysis presented in this study, it is important to understand the theory that supports our analysis of impact of the CPRS and the economic response of SMEs.

The manufacturing sectors that we have surveyed and analysed are especially vulnerable to international competition and, therefore, characterized by import parity (as described in Section 3.1.1 above). Import parity, and the availability of competitive international product substitutes, means any cost imposed by the CPRS cannot be passed on to consumers. This creates the following burden and economic response from SMEs:

- **Additional costs diminish the already thin profit margin.** Many Australian SMEs operate in highly competitive markets and do not benefit from the economies of scale that are available to larger international firms. This means they generally have thin profit margins. When SMEs are burdened with carbon costs they cannot pass on to consumers, they must either identify other cost-saving measures or face reduced profits
- **Diminished profits will reduce the return on capital.** Reducing the marginal product of capital will discourage investment in SMEs. This is harmful to the sectors but, importantly, will reduce incentives to invest in a sector that is a major driver of employment and economic growth in Australia
- **SMEs are generally thinly capitalised and unable to cope with even incremental cost increases.** For a given increase in costs, businesses with lower levels of capital will feel greater pain from cost increases. That is, comparable increases in costs will have a greater impact on investment returns

---

[24] McLennan Magasanik Associates. "Impacts of the Carbon Pollution Reduction Scheme on Australia's Electricity Markets." Ref: J1565: Report to Federal Treasury, 11 December 2008.

[25] Australian Greenhouse Office. "National Greenhouse Gas Inventory Analysis of Recent Trends and Greenhouse Indicators 1990-2005." Department of Environment and Water Resources, September 2007.

The Bureau of Infrastructure, Transport and Regional Economics (BITRE). "Freight Rates in Australia 1964-65 to 2007-08." Information Sheet 28. Department of Infrastructure, Transport, Regional Development and Local Government, October 2008.

for less capital-intensive SMEs—those whose manufacturing process is more dependent on variable inputs. Therefore, the affect of the CPRS on investment incentives will be greatest for SMEs with additional carbon costs that are large relative to their capital-intensity. In this context, we would like to highlight the fact that economic general equilibrium modelling of the kind undertaken by the Treasury completely ignores the liquidity and cash-flow impacts of the CPRS. The current global economic crisis makes plain the danger of ignoring such effects

- **Diminished profits also reduce the return on labour.** The economic response to a reduction in the marginal product of labour will be either to reduce compensation to align with the lower returns, or to reduce the total amount of labour to increase marginal productivity in line with compensation. In either case, workers will be the ones who are harmed—through either lower wages or dislocation, and higher unemployment
- **SMEs have few, if any, opportunities to cut costs.** Australia's manufacturing sector already has strong incentives to be as efficient as practicable. It is reasonable to expect that most profitable investments and cost-savings measures have already been implemented. If there are limited opportunities to improve efficiency, and input costs cannot fall, then the only remaining cost centre with flexibility is labour. Therefore, if SMEs hope to offset the additional costs created by the CPRS, their only recourse is through a reduction in labour costs—through either lower wages or redundancies, adding to unemployment

The points above draw attention to an important relationship between employment and investment. If the Government hopes to implement a policy with minimal impact on investment—and therefore minimal long-term impact on the economic performance of sectors such as manufacturing SMEs—then businesses need to maintain profitability. For businesses to remain profitable, they will be forced to offset carbon cost increases with the primary mechanism available: reductions in labour costs.

The two ways to achieve that offset is through lower wages or reducing the number of employees. Both outcomes ultimately harm workers. To emphasize this economic relationship in the evidence we present, we identify the size of the labour tradeoffs in each of the costing analyses we conduct.

A further point is that all of the costs created by the CPRS, and modelled here, will be *additional*. That is, the CPRS will generate persistent increases in the cost structure for businesses. We make this point to contrast the impact of new carbon costs with the costs of exchange rate fluctuation that—although it may be comparatively larger—is already captured in the price of tradable goods. We discuss this point again in Section 4.1.3.

3.1.4 Summary of Results from a Sample of Manufacturing SMEs

This section presents a summary of the impact the CPRS will have on the profitability of SMEs through higher energy and freight costs. We show the results from modelling two scenarios:

- The "Low CPRS" scenario models the impact of the additional costs generated if the CPRS achieves the less ambitious target of a 5 percent reduction in greenhouse gas emissions by 2020
- The "High CPRS" scenario models the impact of the additional costs generated if the CPRS achieves the more ambitious target of a 15 to 25 percent reduction in greenhouse gas emissions by 2020.

In the May 2009 revisions to the CPRS, the Government raised the upper target to a 25 percent emissions reduction, contingent on a strong international agreement being reached during the UNFCCC meeting in Copenhagen later this year. We don't present a separate model of this scenario for two reasons. First, while we are hopeful that a global agreement can be made in Copenhagen, we think it is unlikely that an agreement that is strong enough or compatible enough with the CPRS will be reached to justify increasing Australia's target by 10 percent. Secondly, if a global agreement is reached and other countries adopt compatible carbon pricing schemes, our assumption of import parity on domestically manufactured goods—the assumption that limits carbon costs pass-through—will be partially invalidated. Because of the uncertainty over what countries would adopt what level of carbon pricing under a future global agreement, we believe estimates of this scenario are simply untenable. The validity of the results from the Treasury's modelling depends on the assumption of global emissions trading, despite the fact that the CPRS would implement 5 percent reductions below 2000 levels by 2020 regardless of what is happening in other countries. This seems to be a contradiction, which we attempt to avoid in our analysis.

Impact on SMEs in the Low CPRS Scenario

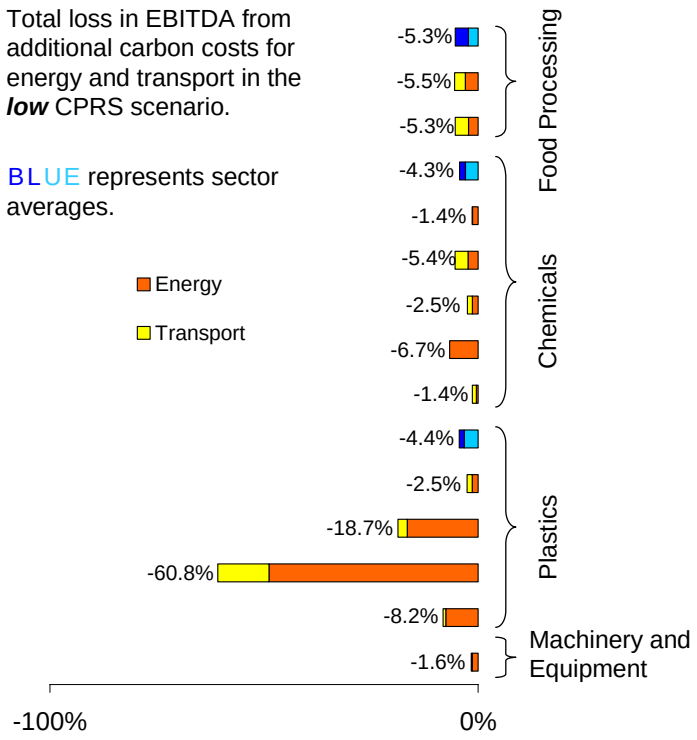
Figure 3.1 below presents the impact of the CPRS under the scenario where the cap is set to reduce greenhouse gas emissions by 5 percent below 2000 levels by 2020. This includes higher energy costs of 23 percent[26] and higher freight costs of 4 percent[27] due to the carbon costs embedded in transport fuels and electricity. The results here show how these costs will erode earnings before interest, taxes, depreciation, and amortization (EBITDA) to illustrate the impact on the profitability of these SMEs.[28] We disaggregate additional energy and transport costs, and show the impact on the representative firm in each sector.

[26] The estimate of energy cost increases is based on modelling of retail electricity pricing under the -5 CPRS scenario in McLennan Magasanik Associates. "Impacts of the Carbon Pollution Reduction Scheme on Australia's Electricity Markets." Ref: J1565: Report to Federal Treasury, 11 December 2008.

[27] See Section 2 of this study for an explanation of this increase. All SMEs surveyed used a combination of heavy trucking and light commercial vehicle freight. It is not possible to determine from survey data what fraction of freight is additional—above what would be necessary for distribution of imported goods—therefore we have chosen this more conservative estimate of freight cost increases.

[28] EBITDA is an effective measure of the operating performance of firms

Figure 3.1: Summary of EBITDA Loss in the Low CPRS Scenario



Source: Castalia

Figure 3.1 above shows that average loss in EBITDA in the low carbon price scenario is between 1.6 percent and 5.3 percent for the various sectors. Equipment and machinery manufacturers experience the lowest loss in profitability, while the loss for the other sectors is a relatively consistent 4.4 percent to 5.3 percent. Of the SMEs we surveyed, only plastics manufacturing had a large range in profit loss, attributed primarily to higher energy-intensity among some firms.

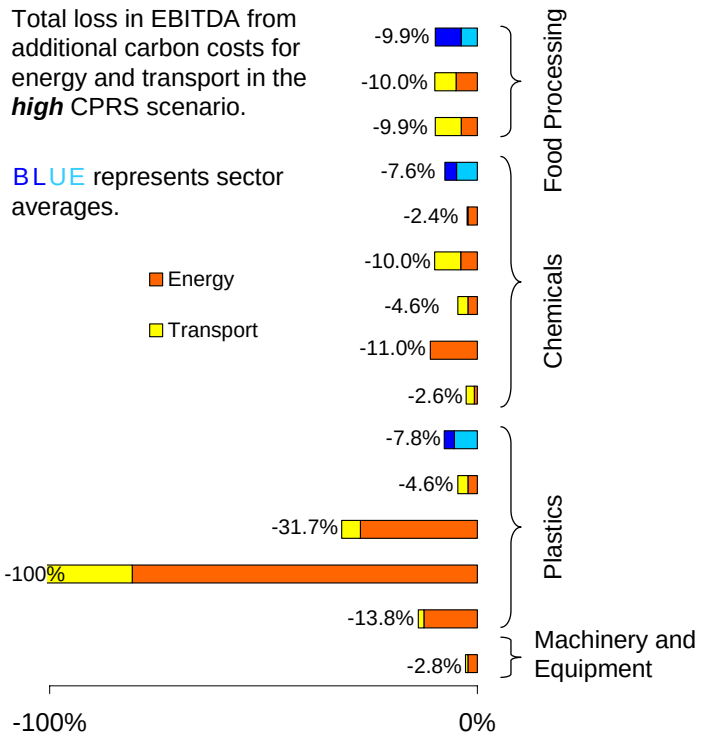
Impact on SMEs in the High CPRS Scenario

Figure 3.2 below presents the impact of the CPRS under the scenario where the cap is set to reduce greenhouse gas emissions 15 to 25 percent by 2020. This includes higher energy costs of 38 percent[29] and higher freight costs of 8 percent[30] due to the carbon costs embedded in transport fuels and electricity. The results here show how these costs will erode EBITDA to illustrate the impact on the profitability of these SMEs.

[29] This estimate of energy cost increases is based on modelling of retail electricity pricing under the -15 CPRS and -25 Garnaut scenarios in McLennan Magasanik Associates. "Impacts of the Carbon Pollution Reduction Scheme on Australia's Electricity Markets." Ref: J1565: Report to Federal Treasury, 11 December 2008..

[30] See Section 2 of this study for an explanation of this increase. All SMEs surveyed used a combination of heavy trucking and light commercial vehicle freight. It is not possible to determine from survey data what fraction of freight is additional—above what would be necessary for distribution of imported goods—therefore we have chosen this more conservative estimate of freight cost increases.

Figure 3.2: Summary of EBITDA Loss in the High CPRS Scenario



Source: Castalia

The figure above shows that average loss in EBITDA in the high carbon price scenario is between 2.8 percent and 10.0 percent for the various sectors. Equipment and machinery manufacturers experience the lowest loss in profitability, while the loss for the other sectors is a relatively consistent 7.8 percent to 9.9 percent. Of the SMEs we surveyed, only plastics manufacturing had a large range in profit loss, attributed primarily to higher energy-intensity among some firms.

In the following sub-sections, we consider changes in cost structure and profitability for generic firms in each key sector. The cost profiles for these firms are generated using revenue-weighted averages for the sample of SMEs surveyed. In addition to showing the erosion of EBITDA to demonstrate the impact on profitability, we present the labour cost tradeoffs that would be necessary to offset the additional costs for energy and freight. We present labour effects in two ways:

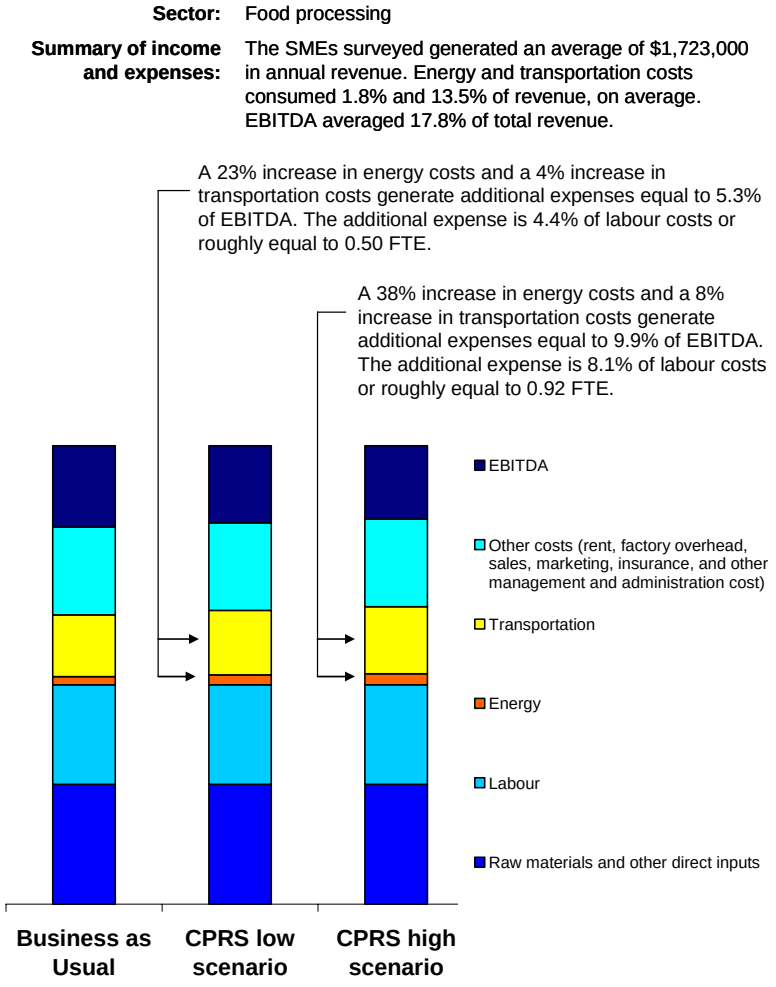
- As the percent reduction in labour cost necessary to offset the increased costs—one way to interpret this is the reduction in employee compensation necessary to account for loss of profitability
- As amount of full-time equivalent (FTE)[31] labour necessary to offset the increased costs—one way to interpret this is the amount of unemployed labour necessary to account for loss in profitability.

[31] Full-time equivalent (FTE) is a measure of labour inputs where 1.0 is equal to one full-time employee and, for example, 0.5 is equal to one half-time employee.

3.1.5 Impact of the CPRS on Food Processing

Figure 3.3 below illustrates the impact of higher energy and freight costs on the profitability for a representative food processing firm derived from a revenue-weighted average of the cost structure of the four firms we surveyed in the sector. Average loss of EBITDA in the low and high CPRS scenario was 5.3 percent and 9.9 percent respectively. Offsetting the additional carbon costs through labour cost cuts would generate a reduction in employment between 4.4 percent and 8.1 percent. This translates to 0.50 and 0.92 full-time equivalent employees, on average, for the SMEs surveyed.

Figure 3.3: Impact of the CPRS on the Costs to Food Processing



Source: Castalia

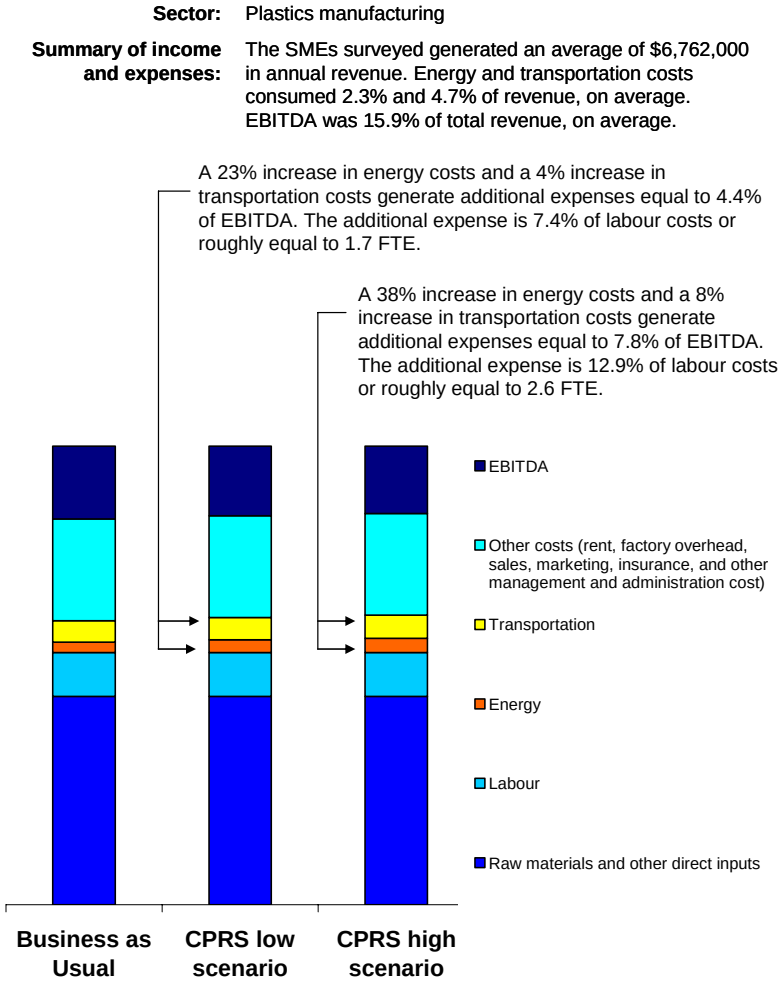
3.1.6 Impact of the CPRS on Plastics and Chemicals Manufacturing

Because of the apparent dissimilarities between the cost structure of plastics manufacturing and chemicals manufacturing, we show separate results for each.

Plastics Manufacturing

Figure 3.4 below illustrates the impact of higher energy and freight costs on the profitability for a representative plastics manufacturing firm derived from a revenue-weighted average of the cost structure the four firms we surveyed in the sector. Average loss of EBITDA in the low and high CPRS scenario was 4.4 percent and 7.8 percent respectively. Offsetting the additional carbon costs through labour cost cuts would generate a reduction in employment between 7.4 percent and 12.9 percent. The larger negative employment impact is due to the relatively more efficient, low labour intensity of the plastics manufacturers we surveyed. This translates to 1.7 and 2.6 full-time equivalent employees, on average, for the SMEs surveyed.

Figure 3.4: Impact of the CPRS on the Costs to Plastics Manufacturing

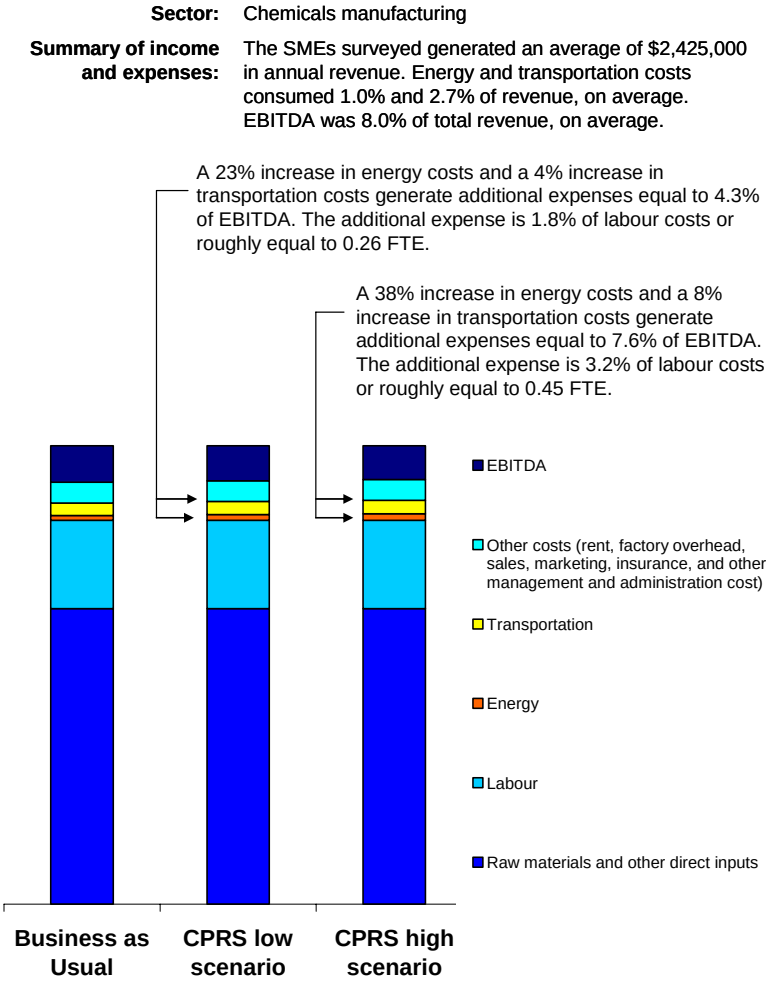


Source: Castalia

Chemicals Manufacturing

Figure 3.5 below illustrates the impact of higher energy and freight costs on the profitability for a representative chemicals manufacturing firm derived from a revenue-weighted average of the cost structure the four firms we surveyed in the sector. Average loss of EBITDA in the low and high CPRS scenario was 4.3 percent and 7.6 percent respectively. Offsetting the additional carbon costs through labour cost cuts would generate a reduction in employment between 1.8 percent and 3.2 percent. This translates to 0.26 and 0.45 full-time equivalent employees, on average, for the SMEs surveyed.

Figure 3.5: Impact of the CPRS on the Costs to Chemicals Manufacturing

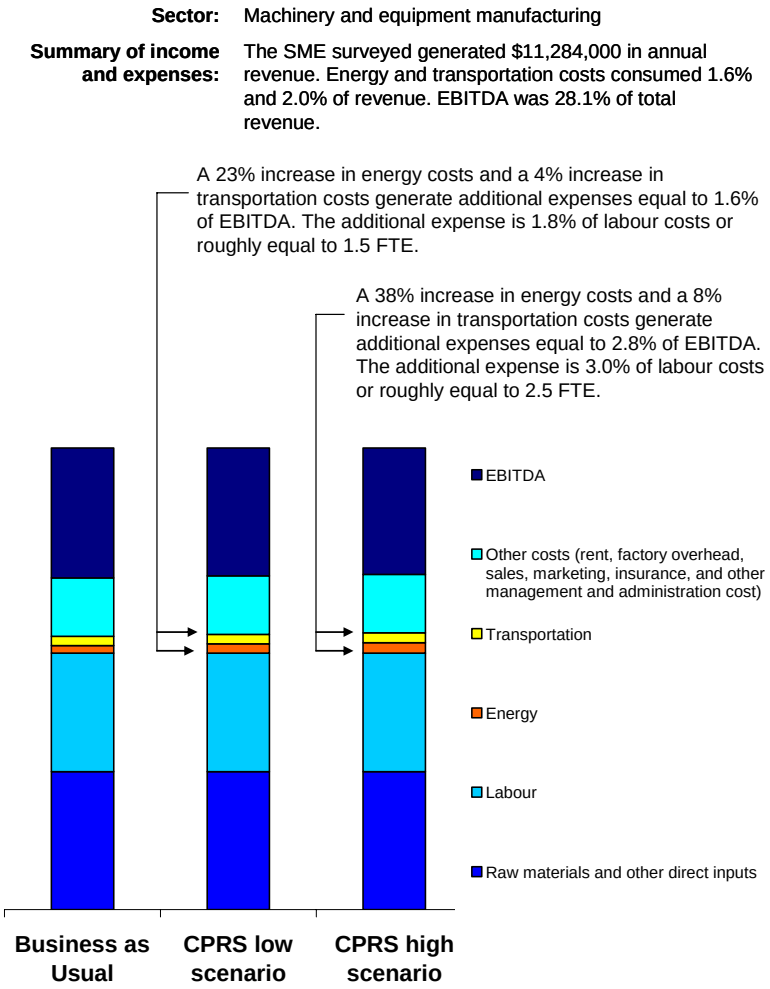


Source: Castalia

3.1.7 Impact of the CPRS Machinery and Equipment Manufacturing

Figure 3.5 below illustrates the impact of higher energy and freight costs on the profitability for a machinery and equipment manufacturing firm. For this sector, only one firm was able to participate in this study. However, based on a review of the firm's characteristics, we believe it is generally representative of the sector. Average loss of EBITDA in the low and high CPRS scenario was 1.6 percent and 2.8 percent respectively. Offsetting the additional carbon costs through labour cost cuts would generate a reduction in employment between 1.8 percent and 3.0 percent. This translates to 1.5 and 2.5 full-time equivalent employees. The relatively low impact on EBITDA is due to the higher overall profitability of this equipment manufacturer compared to SMEs in the other sectors we surveyed. However, the impact on labour costs is of a similar magnitude, with a considerably larger reduction in full-time equivalent labour due to the larger size of the firm.

Figure 3.6: Impact of the CPRS on the Costs to Machinery and Equipment Manufacturing



Source: Castalia

3.2 Existing Measures to Protect SMEs are Inadequate

The transitional assistance currently in the CPRS—the protection and compensation for those paying additional carbon costs—are inadequate to prevent SMEs from being burdened with a disproportionate amount of the cost of Australia's carbon abatement goals. The resulting economic costs and carbon leakage will harm Australian businesses, investors, and workers and significantly reduce the ability of the CPRS to:

- Fulfil the Government's commitment to ensure Australia's international competitiveness is not compromised, and
- Achieve global environmental benefits.

This section evaluates the current CPRS design to reveal who the CPRS does protect, where in the CPRS assistance package SMEs have been neglected, and why SMEs remain a vulnerable sector. The major EITE industries have successfully made their case and secured protections and compensation from the costs the CPRS will create for their business operations. However, the concerns of smaller stakeholders have yet to be adequately acknowledged in the CPRS transitional assistance package. An economy-wide cap-and-trade scheme has the potential to create large costs for small and medium size businesses as consumers of energy, freight, and other non-tradable inputs. These costs, even at early stages after the CPRS is introduced, will significantly erode the profitability of SMEs. If left unaddressed, the consequences for Australia's economic performance are likely to be harmful. Given the proposed timing for the introduction of the CPRS, the announced transitional measures may do little to prevent the scheme from slowing the economy's recovery from the current downturn.

3.2.1 Who Does the CPRS Provide Transitional Assistance For?

In its current design, the CPRS provides substantial assistance to major EITE industries and households. This is not surprising given the political and economic incentives of large stakeholders. Unfortunately, the definition of EITE arbitrarily excludes smaller businesses—particularly the SMEs highlighted in this study—that will nevertheless feel the pain of additional carbon costs once the CPRS is implemented. As a result, there is limited assistance available to SMEs to compensate for additional costs and mitigate unintended consequences of the CPRS.

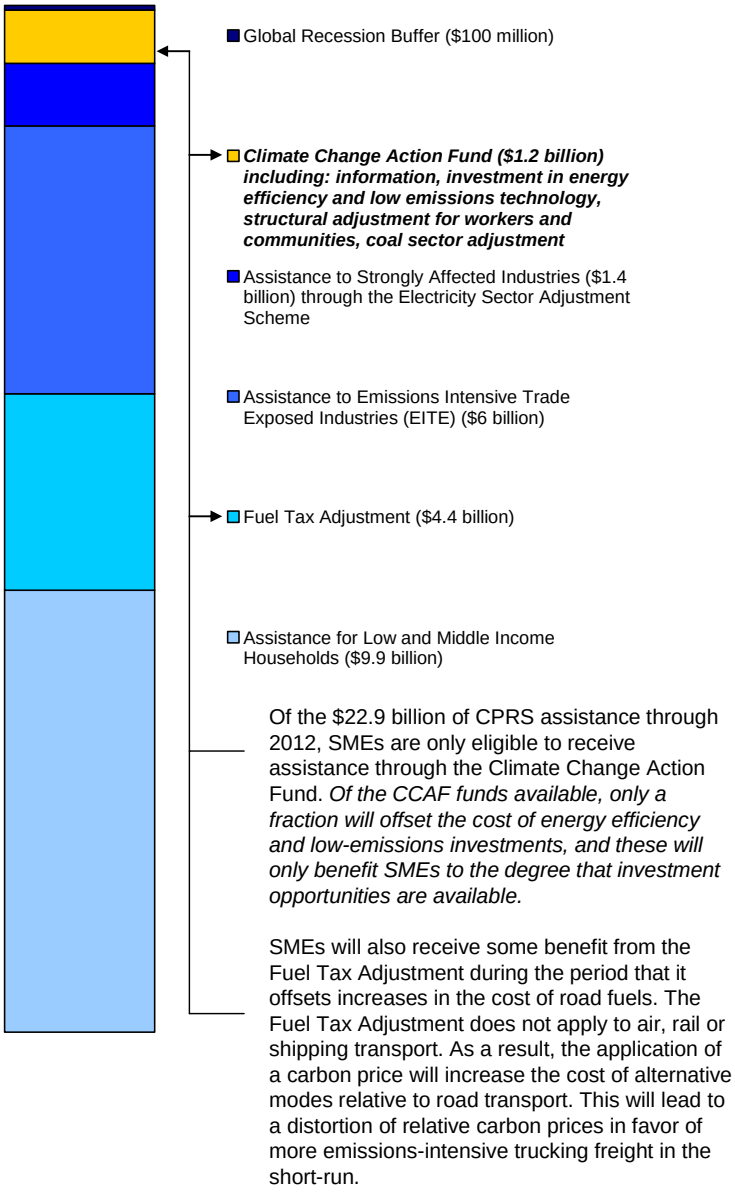
Groups for whom the costs of cap-and-trade scheme are large and obvious have been successful at securing protection and compensation in the CPRS. In contrast, smaller parties, for whom the costs of cap-and-trade are subtler, lack the individual resources and incentives to influence policy in their favour and prevent serious harm from the CPRS. This is generally the case with SMEs, and it is these dispersed, but no less important, interests that this study aims to highlight. Collectively, the aggregate costs of a cap-and trade scheme for SMEs are immense and, if unaddressed, could significantly affect the economy. These costs are also no less consequential to the survival of individual businesses.

Figure 3.7 shows the allocation of assistance in the CPRS legislation in the initial years of the scheme, with the revised 2011 start date. Only a fraction of the total assistance is distributed through the Climate Change Action Fund (CCAF). SMEs will qualify for *some* CCAF funds. The remainder of the assistance package has been allocated to EITEs, households, and toward offsetting additional fuel costs for motorists.

Of the assistance available in the CCAF, only a small amount will be available to SMEs to offset the additional costs created by carbon pricing. The majority will be distributed to an information campaign aimed at educating households, businesses and community organisation about the CPRS; structural adjustment funds for workers and communities;

and coal sector adjustment funds. The only *direct* assistance available to SMEs in the CPRS assistance package is through capital allowances and competitive grants for investments in energy efficiency and low-emissions technology. These funds will only benefit SMEs to the degree that those investment opportunities are available.

Figure 3.7: Allocation of CPRS Assistance through 2012[32]



Source: Explanatory Memorandum for the Carbon Pollution Reduction Scheme Bill (2009), and Castalia

[32] Note that the figures presented here represent the amount of assistance that has been announced the time of this study and covers pre-implementation assistance starting in 2009 through end of 2012.

3.2.2 Where Have SMEs Been Neglected?

Throughout the climate change policy debate the impact carbon pricing will have on Australia's SMEs has been neglected. The neglect of SMEs is reflected in the CPRS design. The Government's White Paper emphasises that only about 1,000 businesses—of the roughly 7.6 million registered businesses in Australia—will be subject to regulatory requirements under the CPRS. Emphasising the fact that the regulatory coverage of the scheme is narrow in this way ignores the reality that the CPRS is an economy-wide scheme that will affect the cost for all consumers and businesses, including SMEs. The current CPRS design and assistance package falls far short of providing adequate protection and compensation for exposed SMEs.

Table 3.1 below describes the major assistance measures available in the CPRS to highlight the fact that SMEs will qualify for very little of the total assistance. The majority of assistance available to business will be allocated to EITEs, primarily through the issuance of free permits.

Table 3.1: SMEs Will Not Qualify for Most Assistance in the CPRS

CPRS assistance measure	Description of assistance	Do SMEs qualify?
	Businesses that emit above 1,000 tCO2e/$1m revenue will receive 66% free permits. Businesses that emit above 2,000 tCO2e/$1m revenue will receive 95% free permits. This includes the Global Recession Buffer.	
Free allocation to EITE business	Assistance rates will decrease at 1.3 percent per year.	No
Free allocation to EITE electricity users	Emissions intensive businesses will receive one free permit per MWh of electricity use.	No
Electricity sector adjustment	Coal-fired generators with emissions above 0.86 tCO2e/MWh will receive a fixed allocation of permits.	No
Climate Change Action Fund information campaign	The information campaign aims to help community organization and businesses comply with and minimize the impact of the CPRS.	No
Climate Change Action Fund investment in energy efficiency and low-emissions technologies	Non-EITE businesses are eligible for capital allowances and competitive grants for investment in energy efficiency and low-emissions technology.	Yes
Climate Change Action Fund structural adjustment	Workers and communities in regions impacted by the CPRS are eligible for assistance to ease the cost of displacement and structural adjustment.	No
Climate Change Action Fund coal sector adjustment	Funds will promote abatement activity and reduce transitional costs in the coal sector.	No

Source: Carbon Pollution Reduction Scheme Bill 2009, Explanatory Memorandum[33],CPRS White Paper 2009, and Castalia

As discussed above, of the assistance that is available to SMEs, none will directly compensate for the additional costs of carbon pricing. As a result, SMEs will be severely limited in their ability to offset cost increases that are generated by the CPRS. Investment in energy efficiency and low-carbon technology, available through the Climate Change Action Fund (CCAF), will only compensate business to the degree that energy efficiency investment opportunities are available. Firms without these opportunities would not be helped by the measures.

It's unclear how some other assistance, such as structural adjustment funds available to communities and households in the CCAF, would be allocated. If the government intends some of these funds to directly compensate SMEs for additional costs created by carbon pricing, then it must forecast the allocation to ensure certainty and transparency in the way funds will be administered.

Other measures such as fuel tax adjustment (which is expected to cost $4.4 billion through 2012) may be relatively ineffective. While the fuel tax credit for road freight will provide some relief to freight operators, it is unlikely to delay the increase in the cost of road freight to users.

3.3 The Role of SMEs and the Impact on Australia's Economy

While the effect of each individual SME losing competitiveness and profitability on the overall economy is small, the importance of the SME sector in the Australian economy suggests that the aggregate impact could be significant. This is important to consider in any economic environment, but particularly in the middle of a global recession.

This section describes the contribution of SMEs and the manufacturing sector to Australia's Economy and the potential economic impact of exposing SMEs that produce tradable goods and services to uncompensated costs from carbon pricing.

3.3.1 The Contribution of SMEs to Australia's Economy

The following key statistics characterise the important contribution of SMEs to Australia's economy[34]

- Over 99 percent of Australia's employing businesses are SMEs
- Roughly 64 percent of Australia's private sector labour force are employed by SMEs
- SMEs contribute roughly 47 percent of value added for industries surveyed by the Australian Bureau of Statistics.

[33] Parliament of the Commonwealth of Australia, House of Representatives. " Carbon Pollution Reduction Scheme Bill 2009: Explanatory Memorandum" http://parlinfo.aph.gov.au/parlInfo/download/legislation/ems/r4127_ems_9f8adb44-3606-4c86-8352-31a761dab7e7/upload_pdf/329357.pdf;fileType=application%2Fpdf (accessed 20 June, 2009)

[34] Australian Bureau of Statistics. "Australian Business Register 2004".. ABS Catalogue Number 8161.0.55.001. October 2005.

Australian Bureau of Statistics. "Australian Industry 2005-2006.". ABS Catalogue Number 8155. November 2007.

Australian Bureau of Statistics. "Australian Industry 2007-2008.". ABS Catalogue Number 8155. May 2009.

Australian Bureau of Statistics. "Counts of Australian Businesses, Including Entries and Exits.". ABS Catalogue Number 8165. December 2007.

Compounding the reliance on SMEs, the performance of Australia's economy and the employment of Australia's labour force depend on a healthy manufacturing sector:

- There are over 100,000 manufacturing business in Australia
- Australia's manufacturing sector employed 1,039,000 workers in 2007-08
- Australia's manufacturing sector contributes roughly $105 billion value added
- Manufacturing accounts for 16.5 percent of income and 13.9 percent of wages and salaries from industries surveyed by the Australian Bureau of Statistics.

3.3.2 The Economic Impact of Ignoring SMEs in the CPRS

Failure to address the costs of the CPRS on SME's will cause serious harm to the Australian economy based on its dependency on SMEs and the manufacturing sector. The economic framework set forth in Section 3.1.3 above explains the economic response of the uncompensated costs the CPRS create for manufacturing SMEs. To understand the economic impact if the CPRS is implemented without adequate assistance for SMEs, it is important to highlight the following economic costs:

- **Reduced incentives to investment.** Lower levels of investment in SMEs will reduce long-term employment, productivity, and innovation in the sector. The effect on investment is especially worrying during, and in the aftermath, of the current credit crunch brought on by the financial crisis
- **Transitional unemployment.** Displaced workers from firms that shutdown or are forced to eliminate jobs will add to the economy's growing unemployment and add substantially to the fiscal burden—or inadequacy—of adjustment assistance
- **Structural unemployment.** In some cases, employment from workers displaced by the CPRS will be more structural and persistent. There is a significant skills gap between the manufacturing sectors that will be disadvantaged by emissions trading and other less affected professional or service oriented sectors. It will take substantially more time for workers to be retrained and moved to other jobs. In other cases, a geographic realignment (as described in Section 2 below) driven by the incentives created by the CPRS, will add substantially to structural unemployment and regional economic hardships
- **Unemployed capital.** Part of what generates an economic contraction is a misallocation of capital. As businesses fail and manufacturing becomes unviable, much of the capital used by SMEs will only slowly be reallocated to other productive uses. For example, capital employed to make plastics and chemicals may not be easily fungible to other, low-carbon production processes.

4 Challenges in Designing Effective Climate Policy

Policymakers are faced with a number of competing challenges when designing effective climate change policy. In this section we explore options the Government has for achieving the appropriate balance between the environmental objectives and the need to limit the unintended economic consequences of an emissions trading scheme like the CPRS.

Section 4.1 explains why the economic and political costs of carbon leakage cannot be understated. We argue that adding even incremental costs to domestic firms has the potential to shift economic activity offshore. Leakage has the potential to destroy the economic viability of trade-exposed sectors, significantly slow Australia's economic growth and recovery from the current recession, and prevent the CPRS from achieving any net global environmental benefits in terms of greenhouse gas reduction. Avoiding carbon leakage is especially important given the Government's priority of encouraging global efforts to address climate change by signalling Australia's commitment to doing its fair share by implementing an effective emissions trading scheme.

In Section 4.2, we characterise Australia's trade exposure to highlight the risk that unilaterally imposed carbon pricing will generate large economic costs for limited environmental benefits. Australia's trade profile makes it likely that firms facing carbon prices beginning in 2011 will be forced to compete with international manufacturers that are not subject to carbon abatement costs. It is the threat of trade exposure and international competition discussed in this section that will lead to the unintended consequences of the carbon leakage.

In Section 4.3, we present the double-edged sword of carbon prices. We move from discussing the economic risk of *unilaterally* imposing high carbon prices to the environmental risk of keeping carbon prices too low. In order to be effective, carbon prices must be high enough to create the incentives for carbon abatement and restructuring toward an economy that is less carbon-intensive. If the CPRS doesn't get the carbon price right, the policy will generate little or no global environmental benefits with substantial economic costs.

Section 4.4 describes the compliance and transaction costs, and related unseen economic costs, that are often not accounted for when weighting the costs and benefits of emissions trading. These costs are especially burdensome under a scheme, like the CPRS, that requires many layers of compensation and protection to maintain economic competitiveness and prevent leakage.

Finally, in Section 4.5 we emphasis the importance of Australia's image in the international climate change policy debate. For Australia's policy to achieve its purported benefits, it is critical that domestic efforts catalyse carbon abatement by large international emitters and motivate broader adoption of carbon prices by Australia's international competitors. If the Government introduces a policy that generates leakage or fails to lead to carbon prices reflective of the environmental cost of greenhouse gas emissions, it risks being criticised for implementing a weak policy. International criticism of Australia's CPRS could further contribute to the global climate policy logjam.

4.1 The Risk of Carbon Leakage

The anticipated benefits of the CPRS critically depend on the assumption that carbon leakage will be minimal. However, as we will discuss in this section, the likelihood of leakage from the CPRS has been understated, and the economic, political and environmental risks of carbon leakage are high due to the uncompensated costs we have

identified that will disproportionately fall on Australia's trade-exposed SMEs. Leakage has the potential to destroy the economic viability of trade-exposed sectors, significantly slow Australia's economic growth and recovery from the current recession, and prevent the CPRS from achieving any net global environmental benefits in terms of greenhouse gas reduction. Avoiding carbon leakage by providing assistance to SMEs is especially important given the Government's priority of implementing an effective and economically sustainable scheme that signals Australia's leadership and motivates global efforts to address climate change.

4.1.1 Defining Carbon Leakage

Carbon leakage is defined as the movement of the emissions associated with economic activity offshore. Box 4.1 below provides a more detailed definition and explanation of carbon leakage in practice.

In Section 2, we showed that if Australia unilaterally imposes a carbon pricing scheme and fails to provide adequate protection, the carbon costs to trade exposed SMEs will be significant. The additional cost created by the CPRS will drive economic activity and carbon emissions offshore as other countries gain a competitive advantage. The resulting carbon leakage will harm domestic import and export competitiveness, while generating little net global environmental benefits. If economic activity relocates to countries with lower energy-efficiency and higher emissions-intensity processes, then leakage will tend to increase the accumulation of greenhouse gas.

Box 4.1: Carbon Leakage and Emissions Embodied in Trade

Carbon leakage occurs when changes in trade patterns lead to the movement of emissions associated with economic activity outside of a country's borders. The concept covers the emissions embodied in all trade; however, carbon leakage typically refers—especially in the context of climate change policy—to the export of emissions when it is attributed to a difference in regulated carbon prices between trade competing countries.

Recent literature has highlighted the challenge carbon leakage creates for developing credible and effective emissions reduction policy:

> *Recent emissions reductions by developed countries may lack credibility if production has merely been displaced to countries such as China. Moreover, in the current institutional context, production methodologies that encourage leakages through trade may do more to displace than to reduce emissions.*[35]

A hypothetical example of carbon leakage:

Australia and China each manufacture 1,000 units of auto components while using energy that emits CO2e. Technological efficiencies enable Australia to make each unit $0.05 cheaper than China. These efficiencies mean Australia holds a sizable international market share.

Assume Australia adopts an emissions trading scheme that imposes carbon costs equal to $0.10 per unit, while China adopts no such scheme, thereby keeping its production costs the same. In this scenario Australia loses its competitive advantage (its unit price is now up to $0.05 more than China). To the degree that demand is price responsive, China will capture an increased portion of the international market.

Australia's domestic CO2e emissions will have been reduced due to the lost production. However, because production has moved to China, there is no global reduction in greenhouse gas emissions. Moreover, because a less developed country like China often has less energy-efficient production processes, this could result in a net increase in global emissions.

Source: Castalia

Leakage occurs not only when businesses physically relocate, but also if consumption and investment trends shift toward markets without carbon prices. Some firms may relocate production, but it is more likely that leakage will occur by new entrants or the expansion of existing foreign competitors as they satisfy the demand that is currently met domestically. Box 4.2 below lays out the conditions necessary for carbon leakage to occur. These conditions are reprinted from Senate Standing Committee on the CPRS exposure draft with some slight, but consequential, revisions.

Much of the policy debate in Australia has proceeded on the assumption that this list of conditions is restrictive enough to prevent large amounts of leakage. In reality, the conditions are easily met in many sectors of today's economy. The information presented in this study shows that most manufacturing SMEs will meet the conditions for leakage.

[35] Pan, J., J. Phillips and Y. Chen. China's Balance of Emissions Embodied in Trade: Approaches to Measurement and Allocating International Responsibility. Oxford University Press, 2008.

Box 4.2: Conditions for Carbon Leakage to Occur

The report by the Senate Standing Committee on the CPRS exposure draft lays out the conditions that are necessary for carbon leakage to occur.[36] The conditions they report are presented below with some slight, but consequential, revisions:

- The [carbon costs from emissions pricing] in Australia are a significant portion of total costs
- There is no similar cost being imposed in [any competitive] alternative production centre
- There is unlikely to be similar [costs] imposed in [any competitive] alternative production centre for the life of the project [or within a reasonable investment cycle]
- There are no large relocation costs [or large entry costs or large costs to expand production by foreign competitors]
- Shifting production does not lead to offsetting increases in other ongoing costs (e.g. transportation or raw material costs)
- The production process in the alternative centre is [at least as] emissions-intensive.[37]

Source: Senate Standing Committee on Economics.

4.1.2 The Cost if Carbon Leakage is not Avoided

There are four primary consequences if an emissions trading scheme like the CPRS does not prevent carbon leakage. These consequences pose a very real threat to the ability of the CPRS to achieve the Government's policy objectives, despite opinions expressed by CPRS advocates that carbon leakage will be minimal. The economic incentives that drive carbon leakage are strong and many arguments that suggest carbon costs will create minimal leakage—like the comparison to exchange rate fluctuations—are not economically sound.

The four primary consequences if the CPRS does not avoid carbon leakage are:

- Adding carbon costs will reduce Australia's comparative advantage and reduce economic production as activity moves offshore
- The movement of activity offshore will displace workers and create high transitional costs
- The emissions trading scheme will generate limited environmental benefits
- No momentum will be gained toward encouraging emissions abatement internationally.

Adding even small carbon costs to the production process can have the effect of seriously disadvantaging domestic producers and driving economic activity offshore. Some strong advocates for emissions trading have argued that the cost of carbon is too small to shift trading patterns.[38] Such an expectation does not acknowledge the dynamism of the global economy. In reality, there is a high probability that leakage will occur either

[36] Senate Standing Committee on Economics "Report on the Exposure Draft of the Legislation to Implement the CPRS." April 2009 p48.

[37] If the production process is at least as emissions-intensive then the net global environmental benefits are negative. However, even if the production process is less emissions-intensive, carbon leakage can cause reduction in domestic emission to give the illusion of benefits that are not achieved globally.

[38] See, for example, the arguments made by submissions published in Section 6: *Transitional Assistance* in the Senate Standing Committee on Economics "Report on the Exposure Draft of the Legislation to Implement the CPRS." April 2009.

in the short-run through price competition or in the longer run through a change in the flow of investment.

In today's highly integrated global economy, the price elasticity of demand for merchandise is relatively high, on average, and particularly high for some very competitive goods.[39] Moreover, in trade-exposed markets that are characterised by global price-taking,[40] profit margins are often thin and even small reductions in profitability can force businesses to shut down. Even if the additional carbon costs do not push operators to shut their doors in the short-term, the reduction in profitability will reduce the return on domestic investment. Less incentive to invest translates into lower levels of economic growth, employment, and innovation. Dynamic manufacturing industries require continued re-investment, and it is likely that such re-investment would occur outside Australia.

The False Comparison to Exchange Rates

Some commentators have argued that exchange rate fluctuation demonstrates that businesses can easily absorb additional carbon costs.[41] This view fundamentally misunderstands the realities of industrial organisation and the competitive pressures businesses face. Exchange rate uncertainty is already built into prices. The distribution of exchange rates means that, relative to the expected value, for every time the exchange rate works against Australian businesses, there is a time when it is in their favour. Inside that variation is an expected value and businesses that can't profitably price for that expected value (plus a premium for exchange rate risk) will have already located elsewhere. In contrast, a unilateral carbon price is an additional and ongoing cost. The additional carbon costs will be applied uniformly to production processes into the future. There may be some regulatory uncertainty or price fluctuation that creates a future carbon cost distribution, but the expected value of carbon costs will be a new cost, which will not be faced by international competitors unless other countries adopt a similar policies. As a result, carbon costs that look small relative to exchange rate fluctuation can be much more consequential.

4.1.3 Why Australia is Especially Vulnerable to Leakage

Australia is especially vulnerable to carbon leakage due to its dependence on international trade and its location to competitive Asia-Pacific economies. The next section (Section 4.2) discusses the risk of unilateral carbon pricing in the context of Australia's high trade exposure. The arguments laid out in the section demonstrate why keeping carbon leakage at an acceptable level in Australia is difficult and potentially costly, and why implementing an effective emissions trading scheme more challenging than, for example, in the United States or European Union.

---

[39] The price elasticity of demand is defined as the percentage change in quantity purchased as a result of a one percent change in the price of a good. Recent estimates of the price elasticity of Australian merchandise exports report values up to -2.2 (Norman, David. Modelling Manufactured Exports: Evidence from Australian States: Economic Research Department. Reserve Bank of Australia, April 2006.) However, price elasticity is often calculated from changes in a price index. As such, reported values may seriously underestimate the responsiveness of consumer behavior and trade flows to increases in the price of a single good. In other words, the price elasticity of particular goods will be significantly higher than the average price elasticity of a bundle of goods.

[40] Price-taking refers to a competitive market where individual businesses cannot control price. Instead, price is set by market equilibrium. Price-taking in a trade context, where the domestic price is equal to the global price, is termed import parity.

[41] For example, item 6.12 in the Senate Standing Committee on Economics "Report on the Exposure Draft of the Legislation to Implement the CPRS." April 2009 reprints a third-party submission claiming that "the argument that if emissions trading is introduced, there will carbon leakage and corporations will exit the country as 'absurd' [because] if they were that mobile, then they would be more likely to leave when our exchange rate was at US$90c."

Moreover, the accuracy of predictions that leakage from the CPRS will be minimal—as suggested, for example, in Treasury modelling—rests critically on the assumption that international climate change agreements will be achieved on a corresponding timeline. Unfortunately, international climate change negotiations have yet to give much indication of when—or if—global carbon pricing will be implemented. Even if major developed economy emitters adopt compatible carbon pricing mechanisms, it is highly unlikely that developing countries, such as China, would impose carbon pricing. This is particularly the case in the near-term especially in the middle of a global economic contraction. Also developing countries like China are the economies that pose the greatest competitiveness risk to Australia's trade-exposed sectors, especially the SME manufacturers highlighted in this study.

4.2 Australia's Trade Exposure Amplifies the Risk of Unilateral Carbon Pricing

It is important to recognise the differences between Australia and other countries pursuing an emissions trading scheme as climate change policy. In this section we discuss how Australia's uniquely high level of trade exposure makes unilateral carbon pricing an especially difficult policy to implement without generating significant carbon leakage and economic damage.

To date, few countries have experimented with mandatory emissions trading markets. The European Union has the only currently operational emissions trading scheme that is intended to comply with member states' Kyoto Protocol obligations. Other countries, most notably the United States, are moving slowly toward mandatory national markets for reducing greenhouse gas emissions.

Compared to these countries, Australia's unique geography and economic characteristics make it difficult to introduce an emissions trading scheme without seriously jeopardising competitiveness and long-term economic growth. Three conditions in Australia present challenges that increase the costs and limit the benefits that can be achieved with unilateral carbon pricing:

- Australia's economy and manufacturing SMEs in particular are more dependent on international trade
- Many of Australia's major trade partners are unlikely to adopt carbon pricing on the same timeline as the CPRS
- The CPRS coverage is more ambitious than ETS designs being pursued in other countries.

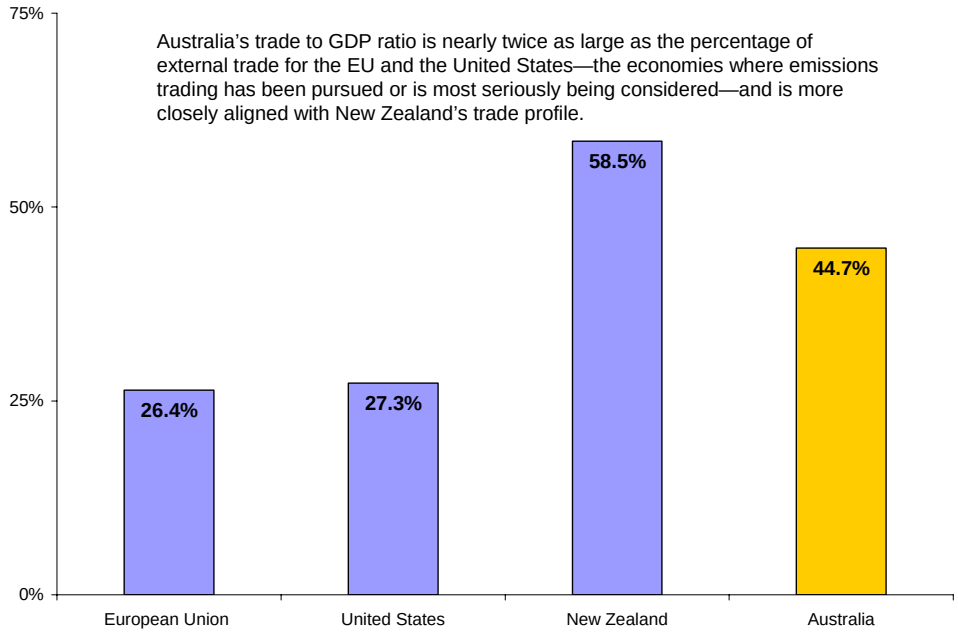
4.2.1 Australia's Economy is More Dependent on International Trade

Australia is significantly more dependent on international trade compared to other countries experimenting with emissions trading schemes. Putting a comprehensive emissions trading scheme at the centre of Australia's climate change policy pursues a strategy designed for dramatically different economies. Accordingly, the economic cost will be higher if the Government implements a CPRS that is not carefully designed to protect *all* vulnerable sectors of Australia economy from competitiveness risk, including SMEs.

A trade to GDP ratio measures the volume of international trade as a percentage of a country's total domestic production. Australia's trade to GDP ratio is roughly 45 percent. By contrast, the trade to GDP ratio for the European Union (as a whole) and the United

States is just over 25 percent[42] Figure 4.1 below shows a comparison of the trade to GDP ratios for the European Union, the United States, New Zealand and Australia.

Figure 4.1: Trade to GDP Ratios for European Union, United States, New Zealand and Australia



Source: World Trade Organization 2007 Country Trade Profiles[43] and Castalia

The greater reliance on internal trade among European Union member states and within the United States borders dramatically reduces the economic vulnerability of those countries to the cost disadvantages and uncertainty that carbon prices impose. Essentially, the European Union and the United States are like large free-trade zones. When they implement carbon pricing policies, it applies uniformly to all of their member countries and states. Because Australia's trade necessarily occurs beyond its borders, to be equally as effective with limited costs, the CPRS must be implemented on the same timeline as carbon pricing policies in countries that compete with Australia for international market share.

4.2.2 Australia's Emissions-Intensive Competitors

In addition to a uniquely high dependence on trade, the profile of Australia's trade partners illustrate why Australia is especially vulnerable to the leakage defined and discussed above. About two-thirds of Australia's international trade occurs between China and Asia-Pacific countries where carbon prices are unlikely to be adopted in the foreseeable future. Moreover, the production processes in these countries are relatively less energy-efficient and more emissions-intensive. The relative efficiency increases the potential for significant carbon leakage and economic costs if Australia unilaterally

[42] World Trade Organisation. 2007 Country Trade Profiles.: http://www.wto.org/english/res_e/statis_e/statis_e.htm (Accessed May 2009)

[43] World Trade Organisation. 2007 Country Trade Profiles.: http://www.wto.org/english/res_e/statis_e/statis_e.htm (Accessed May 2009)

adopts carbon pricing without protecting domestic producers. Until there is a global acceptance of carbon pricing, there is little hope of a global reduction in emissions or for Australia to implement emissions trading without crippling the economy.

Australia's Competitors Are Not Pursuing Emissions Trading

Table 4.1 below provides the volume and geography of Australia's merchandise trade by country and country group for 2007-08. The table also lists the status of emissions trading for each country. Only Europe has a functioning carbon pricing mechanism in place. New Zealand's emissions trading scheme is passed, but is under review, and the United States is currently debating emissions trading legislation. All other countries, encompassing the large majority of Australia's trade, have not introduced or proposed a domestic carbon pricing mechanism. These countries are also unlikely to join multilateral agreements with a large carbon price tag, if at all, on the same timeline as the CPRS.

Table 4.1: Australia's International Merchandise Trade by Country Group

Country and Country Group[44]	2007-08 Exports $million	2007-08 Imports $million	ETS status?
European Union (27)	20,462	43,226	Yes
China	29,872	28,414	None
Japan	34,967	19,679	None
Southeast Asia-Pacific[45]	28,443	26,091	None
United States of America	10,602	24,325	Proposed
Korea, Republic of	14,240	6,163	None
New Zealand	9,529	7,044	Reviewing
MENA[46]	7,180	4,311	None
India	9,328	1,606	None
Rest of World	16,234	41,448	None
Total	180,857	202,307	--

Source: Australia Bureau of "Statistics International Trade in Goods and Services." March 2009.

As the World's largest emitter of greenhouse gases, China's climate change policy is likely to be very consequential to global abatement efforts and is indicative of the momentum of global negotiations. Recent announcements show that China will slowly implement a long-term climate change policy focused on:

- Improving energy efficiency
- Developing clean coal technologies, and
- Expanding carbon sequestration potential through afforestation.[47]

Essentially, China is pursuing a strategy that aims to invest in greenhouse gas abatement measures rather than implementing a carbon pricing mechanism. If this continues to be

[44] Groups are not mutually exclusive.

[45] Singapore, Thailand, Indonesia, Malaysia, Vietnam, Philippines, and Papua New Guinea.

[46] United Arab Emirates, Saudi Arabia, Turkey, Kuwait, Egypt, Iran, and Iraq.

[47] See, for example: Reuters. "China Says Developing Long-Term Climate Change Plan." 20 May 2009. http://uk.reuters.com/article/oilRpt/idUKPEK30825020090520 (Accessed 26 May 2009)

China's approach, the CPRS will burden Australia's manufacturers with unilateral carbon costs into the foreseeable future.

The Emissions-Intensity of Australia's Competitors

The relative efficiencies in the Australia's trading partners exacerbate the economic and environmental risk of unilateral carbon pricing. As a developed country, Australia's manufacturing sector is more energy-efficient than many of its trade partners with less developed economies. While the efficiency of domestic producers gives Australia a global competitive advantage, this is only a marginal one. In a world where a uniform price of carbon is applied, Australia producers would be likely to benefit, as their cost structures would be less affected than those of more emissions-intensive overseas competitors. In such a global carbon market, Australia's firms would increase their international competitiveness and could enjoy a sustainable future. However, if Australia unilaterally exposes its manufacturing sectors to the full carbon price, the effect is reversed. The carbon price of the CPRS will significantly affect competitiveness, and production and investment will move offshore as firms avoid the costs imposed by the CPRS.

4.2.3 The CPRS is One of the Most Ambitious Cap-and-Trade Schemes to Date

The CPRS would be the broadest mandatory greenhouse gas cap-and-trade regime to date, covering all emissions of all six greenhouse gases from stationary energy, transport, fugitive emissions, industrial processes, and waste sectors. Such comprehensive coverage ensures that the cost of greenhouse gas abatement is spread throughout the economy, but leaves little room to protect the sectors that drive Australia's economic prosperity, and it increases the likelihood of large-scale carbon leakage.

No existing or proposed emissions trading scheme includes all sectors and all greenhouse gases. The European Union ETS covers about 10,000 energy and industrial installations that account for less than 40 percent of total greenhouse gas emissions.[48] In contrast, the CPRS would cover around 75 percent of Australia's total greenhouse gas emissions.[49]

In addition to the limited coverage, several other factors have helped contain the economic cost of the EU ETS, including an initial learning and adaptation period in Phase I and an over allocation of emissions allowances. Proposals under debate in the United States are similarly cautious, primarily covering electricity generation and including liberal rules for the use of offsets.

Limiting the coverage and providing protection allows the European Union and the United States to concentrate on reducing emissions in select sectors of the economy that are less vulnerable to international competition. In comparison, the CPRS is much less targeted. Once scaled up, the CPRS will cover around 75 percent of domestic greenhouse gas emissions, including transport. This ensures that carbon costs will be felt throughout the economy in the form of higher costs for energy, transport and raw materials with embodied emissions. While the comprehensive coverage increases and spreads the incentives to reduce carbon-intensive activity, it also leaves Australia with limited opportunities to minimise the impact on competitiveness and increases the likelihood that emissions will leak overseas.

[48] European Commission. Q and A on the EU ETS. http://ec.europa.eu/environment/climat/emission/ets_post2012_en.htm (Accessed 26 May 2009)

[49] Australian Government. "Carbon Pollution Reduction Scheme. Australia's Low Pollution Future." White Paper Fact Sheets, December 2008..

4.3 The Challenge of Setting Carbon Prices and Protecting SMEs

The CPRS has been designed with measures, such as price caps and inter-temporal trading, which aim to limit economic costs and reduce the possibility of economic dislocations and carbon leakage. These measures are a welcome recognition of the tradeoffs between economic costs and environmental benefits in climate change policy. However, with a guarantee of low carbon prices in place, only limited climate change or energy policy objectives can be achieved. Understanding the importance of getting the price right will help the Government develop policy that is credible, but it also increases the need to adequately protect SMEs.

In this section we discuss three critical factors regarding carbon price caps:

- Low price caps are functionally equivalent to a low carbon tax, plus the additional compliance and transaction costs of emissions trading
- Low price caps may prevent the CPRS from being viewed as credible policy
- As we have discussed throughout this paper, high price caps increase the need to protect businesses like SMEs that will face uncompensated carbon costs.

4.3.1 A Low Price Cap is Equivalent to a Low Carbon Tax with Extra Costs

The CPRS would implement a carbon price cap that aims to limit the economic cost of the CPRS and provide some degree of price stability. It is useful to understand, however, that a low price cap is functionally equivalent to a low carbon tax with all of the additional costs of an emissions trading scheme.

After the May 2009 revisions, the CPRS now proposes implementing a price ceiling of $10 per tonne of emissions in the first year, followed by a $40 price ceiling that increases five percent annually. The price caps work as a safety valve: after setting the total amount of domestic emissions, if the market price for allowance exceeds the price cap, then the Government will increase the supply of allowances to lower the price. Additionally, the scheme allows for unlimited banking (holding allowances to retire in future periods) and limited borrowing (using allowance allocated for future years to retire for current emissions) to provide flexibility over when abatement must occur. While these measures add an amount of price stability, they also limit the amount of domestic greenhouse gas abatement that can be achieved while keeping the transaction and compliance costs high.

A rigid carbon price cap—particularly one as low as $10—is inevitably an ineffective climate policy. Keeping prices low removes the economic incentive for carbon abatement and prevents environmental benefits from being achieved. Functionally, a low, binding price cap is equivalent to a low carbon tax. Importantly, however, implementing emissions trading with price caps keeps all of the transaction, compliance and bureaucratic costs of mandatory carbon markets. These costs are discussed in more detail in Section 4.4 below.

4.3.2 A Low Price Cap Prevents the CPRS from Being Viewed as Credible Policy

Ultimately, Australia's contribution to total greenhouse gas emissions is small and no unilateral efforts will generate significant environmental benefits. Therefore, Australia's policy should work primarily to signal Australia's commitment to addressing climate change and to advance international efforts. (This policy priority is explored further in Section 4.5.) However, if prices are kept low, Australia's policy will be viewed internationally as a "*strawman*" and a *faux* attempt to address climate change. There is a significant reputation risk of entering post-Kyoto negotiations in the December 2009

Copenhagen Conference with a domestic policy approach that can be attacked as a weak attempt to address climate change.

4.3.3 A Higher Price Cap Increases the Need to Protect and Compensate SMEs

The absence of price caps—or sufficiently high caps—will allow the carbon price under an emissions trading scheme with ambitious targets to increase so that domestic carbon abatement goals are achieved. It also means the scheme will create large, unsustainable economic costs if implemented unilaterally. As we have discussed, the Australian economy is not prepared to deal with these costs, particularly in the midst of a domestic economic downturn, and with the current protection and compensation package in the CPRS, which does not provide adequate transitional assistance to vulnerable SMEs.

4.4 The Risk of Creating High Compliance and Transaction Costs

An emissions trading scheme introduces additional volatility, increases uncertainty and burdens the economy with high compliance and transaction costs. Despite the fact that an ETS is economically efficient and intellectually appealing in theory, in practice it can only be justified if the benefits exceed the high transaction and compliance costs that the system imposes on the economy.

In this section we discuss how the CPRS will generate high compliance and transaction costs, and increase price and regulatory uncertainty. It will be difficult for SMEs to cope with the additional uncertainty and associated costs, further emphasising the need for Australia to design and implement a scheme that provides adequate assistance to SMEs in order to prevent the costly unintended consequences we have identified. In addition, we show that the new carbon market will divert precious human resources away from other productive economic activities and cause resources to be consumed by rent-seeking activity and politicisation of the scheme. The Regulatory Impact Statement presented with the CPRS bill attempts to quantify the costs, particularly for hypothetical emissions-intensive firms with direct liability under the scheme. But it does not fully investigate the compliance costs for entities not directly covered the CPRS, such as SMEs, nor does it explore some of the indirect costs created by the economic incentives of an emerging market that we discuss below.

4.4.1 The Cost of Introducing a New and Volatile Market

Launching a mandatory emissions trading scheme will create a new market for a highly volatile financial asset. The new market will add significant uncertainty and high transaction costs to any efforts aimed at reducing or offsetting emissions. In an economy of Australia's size, the transaction costs and the risks associated with compliance imposed by an emissions trading scheme add significantly to the cost of meeting greenhouse gas obligations.

A cap-and-trade scheme functions by requiring firms to purchase and trade a financial instrument that captures the value of the right to emit greenhouse gases. Box 4.3 below describes Australian Emissions Units (AEUs), the unit of trade in the CPRS, and other emissions permits that would be available to liable entities under the CPRS. Any number of factors can cause the market value of these instruments to fluctuate wildly. The financial effects of the market risk can easily swamp the costs of any efforts to reduce emissions. This is because firms will be required to hold permits for all of their emissions, while emission reduction efforts will inevitably apply at the margin. From a business perspective, the consequences of getting the timing of purchase and the trading strategy wrong will outweigh the consequences of getting the technical decisions wrong. Not surprisingly, significant effort will be directed toward carbon trading and strategy, rather than into emissions reduction. This has been precisely the effect of the European scheme.

Box 4.3: AEUs: A New Volatile Financial Instrument

Emissions permits are financial instruments that firms are required to purchase—or are distributed at free or reduced cost. Firms then retire the permits to allow for a given level of emissions or to offset their emissions above the mandated target. The unit of trade created within the CPRS will be the Australian Emissions Unit (AEU). Each AEU will represent one tonne of carbon dioxide-equivalent (tCO2-e) emissions.

AEUs will be a distinct instrument, however other credits will be allowed in the CPRS under its current design. Linking the emissions trading scheme to international flexibility mechanisms designed to comply with the Kyoto Protocol means a variety of instruments can be traded and retired to offset obligations:

- Certified Emission Reductions (CERs) created through the Clean Development Mechanism
- Emission Reduction Units (ERUs) created through Joint Implementation
- Assigned Amount Units (AAUs) will not be allowed initially, but eligibility will reviewed after the initial phase.

Each type of carbon credit—and each individual emissions reduction project—contains a certain amount of delivery and compliance risk that creates considerable uncertainty and price volatility. For example, European Union Allowances (EUAs) generated in the EU ETS have traded as low as €7 to over €25 in just the past six months.[50]

Source: Castalia

4.4.2 The Danger of Adding Uncertainty to the Australian Economy

Australian businesses are already more exposed to financial volatility than many of their overseas competitors due to relatively high exchange rate volatility. Adding a further layer of financial volatility will increase risk and deter investment.

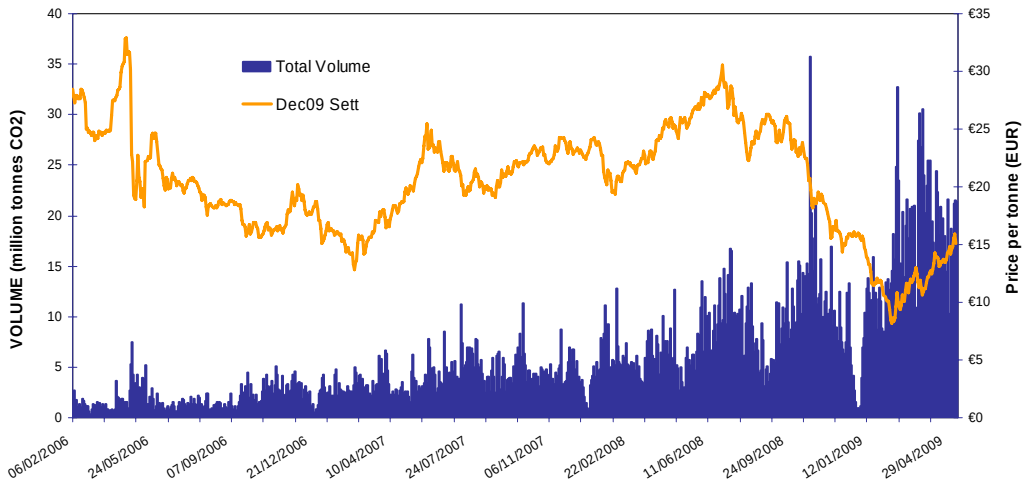
Some commentators have pointed out that for many Australian firms, the effects of the carbon price and its movements will be less significant than currency movements. This was mistakenly interpreted to mean that the CPRS would not matter. In fact, the financial risk caused by having to hold AEUs will add to the financial risk from the currency exposure.

While international linkages in the CPRS will lower the cost of emissions abatement on average, it will also add to volatility. This is because the carbon price in Australia will itself be influenced by currency movements, as well as by economic shocks in the rest of the world. Additionally, allowing foreign units in the CPRS will also force Australian businesses to confront regulatory uncertainty and market volatility associated with world climate change policy.

Figure 4.2 below shows the historic price and volume of trade in the largest carbon market currently operating, the European Union ETS. The price of EUAs in the EU ETS has fluctuated wildly from as low as €7 to over €25 in just the past six months.

[50] European Climate Exchange. http://www.ecx.eu/ (accessed May 2009)

Figure 4.2: European Union Allowance (EUA) CFI Price and Volatility



Source: European Climate Exchange[51]

4.4.3 Market Participation Consumes Scarce Resources

In addition to the costs generated by the market risk and volatility discussed above, participation in carbon markets—the need to trade—will create incentives that divert precious human resources away from the productive sectors of the economy, while generating little economic value.

It is common for the debate over climate change policy to emphasise the incentives of emitters. By contrast, the advocates of the emissions trading have avoided close scrutiny. Introducing a mandatory carbon market in midst of a global financial crisis opens the door for a variety of market players to profit from the design of an emissions trading scheme while generating limited value for the economy. The financial industry is already preparing to play a major role in emerging carbon markets. When the CPRS is enacted, there will be a rush of potential market participants seeking to profit from the volatility and uncertainty of a new carbon market. This will be especially true given the current financial environment and the expansive coverage and potentially aggressive caps of the CPRS.

In addition to carbon market participants developing, aggregating and trading carbon credits, a functioning emissions trading scheme also requires a complex bureaucracy to regulate and monitor compliance. As a result, participation in the market and management of the CPRS will divert precious economic resources, especially skilled labour, away from activities that drive economic growth through productivity and technology gains.

4.5 Australia's Success Depends on Credibility and Compatibility with International Policy

In introducing the CPRS exposure draft, the Government wisely emphasised the need for Australia's climate change policy to catalyse global efforts to abate greenhouse gas emissions. Here we discuss the impact international perception of Australia's policy will have on the momentum of multilateral climate change negotiations, and the importance of implementing a policy that is compatible with emerging international solutions. If the

[51] European Climate Exchange. http://www.ecx.eu/ (accessed May 2009)

CPRS is not carefully designed to ensure environmental benefits are achieved without causing unacceptable levels of economic harm, then Australia's policy will be vulnerable to criticisms and may hinder more than it help global progress to address the cost of climate change.

4.5.1 Why Australia's Credibility is Crucial

The international credibility of the CPRS is crucial if Australia hopes to achieve climate change objectives and mitigate the impact of greenhouse gas emissions. There are several important factors when considering international perception and the interaction between Australia's climate change policy and global greenhouse gas abatement efforts, including:

- On a per capita basis, Australia is a relatively large emitter of greenhouse gases
- Australia makes a small contribution to total greenhouse gas emissions globally, contributing just over one percent annually
- Australia is a part of the community of high-income, developed economies that have benefited from carbon-intensive consumption in the past
- Australia's environment and economy is one of the most vulnerable to the effects of climate change.

Combined, these factors underline the fact that—although Australia has an obligation to accept its share of the costs of mitigating the effects of climate change—Australia has a lot to gain, but can only make a small direct contribution to global carbon abatement efforts. In other words, Australia will be one of the largest beneficiaries if global efforts to abate greenhouse gas emissions prove successful, but even the most effective measures in Australia will do little to add to climate change mitigation. The Government has acknowledged this fact by emphasising that a primary objective of the CPRS is to develop the credibility and leadership that will advance a global solution to climate change.[52] Australia's largest contribution to global abatement of greenhouse gases must come from its ability to demonstrate leadership with effective, sustainable solutions to climate change.

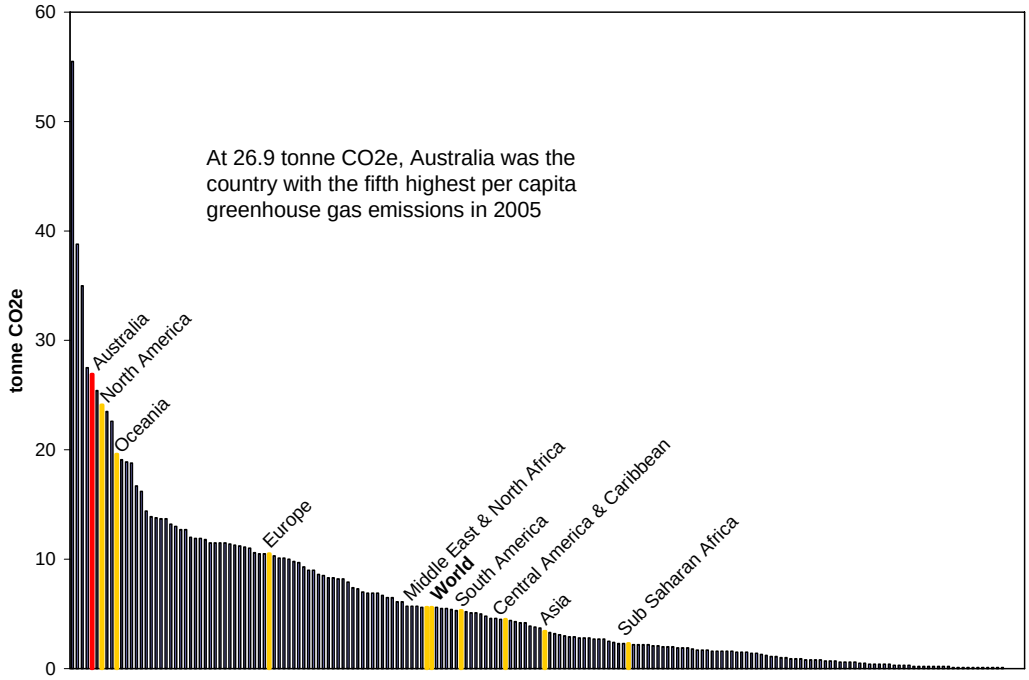
4.5.2 Careful Design Will Help the CPRS be More Effective and Sustainable

Climate change is a difficult challenge for which no policy can be perfectly designed. This is particularly true in a developed country like Australia with high per capita greenhouse gas emissions, but relatively efficient production processes. Despite the challenges, more careful consideration of the unintended consequences of the CPRS, including the uncompensated costs for SMEs, will help the Government's preferred policy to be more effective, more sustainable, and therefore more influential in international negotiations.

Figure 4.3 below shows that Australia was the fifth largest per capita emitters of greenhouse gas in 2005. As a result, and because of developed economy status, global negotiations look to countries like Australia to demonstrate leadership in climate change policy. However, the per capita emissions-intensity is driven by geography, climate, and energy resources, not by an inefficient manufacturing sector. This fact highlights the need for Australia to develop climate change policy that reduces emissions without handicapping the relatively efficient and important sectors of the economy. Doing so will allow Australia to lead global efforts with a more effective, more sustainable and therefore more credible policy.

[52] Australian Government "White Paper fact sheet: Australia Committed to Shaping a Global Solution." In "Carbon Pollution Reduction Scheme: Australia's Low Pollution Future." December 2008.

Figure 4.3: Per Capita Greenhouse Gas Emissions by Country 2005



Source: World Resources Institute[53] and Castalia

Establishing credibility with an effective, sustainable climate change solution will help Australia:

- Emerge as a leader in climate change policy upcoming multilateral negotiations, such as Copenhagen
- Catalyse international efforts, and
- Provide a stable and predictable business and investment climate that is compatible with international greenhouse gas policies.

The CPRS, in its current form, is not the right policy to accomplish these objectives. A weak ETS—one that generates little environmental benefits, or is economically unsustainable and forces the Government to reverse its promises—will make Australia especially exposed to criticism of empty rhetoric and inaction. This is a primary reason why the vulnerability of SMEs and the risk of creating leakage are issues that must be addressed.

4.5.3 The CPRS Must be Compatible with International Efforts

In addition to the points made immediately above, it is critical that Australia's policy is well aligned with emerging international climate change solutions. An emissions trading scheme that is not eventually compatible with other foreign schemes will dramatically increase uncertainty and price risk, and prevent the CPRS from being economically sustainable.

Moreover, if major economic players emphasise investment in energy efficiency and low-carbon technology, then Australia risks prematurely adopting unilateral carbon pricing.

[53] World Resources Institute 2009. http://www.wri.org/ (accessed, June 2009)

This will disadvantage Australian businesses and destroy economic resources instead of transferring resources to investments that achieve global carbon abatement.

5 Improving Australia's Climate Change Policy

This study shows that adopting the CPRS in its current form will significantly impact SMEs, damaging their viability and reducing their capacity to employ Australians. The Government's proactive policy response to the current economic downturn—comprising of its $10.4 billion Economic Security Strategy, $42 billion Nation Building and Jobs Plan, and the recent 2009-10 Budget—has rightly focussed on protecting Australian jobs. The adoption, therefore, of any policy which is likely to lead to damaging the viability of Australian businesses, increasing unemployment, and reducing wages is clearly contrary to the Government's strategy for securing Australia's economic recovery.

The current design of the CPRS understates the level of trade exposure faced by SMEs, and significantly underestimates the potential economic impact that would result from reduced SME activity. Crucially, the CPRS does not sufficiently recognise the contribution of SMEs to economic productivity and employment. If the CPRS is implemented in its current form, Australia risks imposing costs on SMEs which they will not be able to pass through to consumers, and for which they will receive inadequate assistance through the Government's proposed CPRS transitional assistance package. SMEs will therefore face a significant loss of competitive advantage, leading to a loss of economic productivity and reduced employment in Australia—for little or no result in reducing Australia's greenhouse gas emissions. If it is to avoid the potential economic consequences of inadvertently damaging SMEs through implementing its climate change policies, it is clear that the Government must amend the design of the CPRS to acknowledge and reduce the costs that the scheme will impose on SMEs.

It is possible for Australia to pursue climate change policies that mitigate unnecessary and avoidable costs to our economy, while also achieving Australia's climate change policy objectives. Specifically, we think that the Government can strengthen Australia's climate change policy framework by taking action in two areas:

- Extending the CPRS transitional assistance package to SMEs (Section 5.1)
- Pursuing complementary and compatible climate policy (Section 5.2).

5.1 Extending the CPRS Transitional Assistance Package to SMEs

Section 3 of this study outlined the Government's proposed CPRS transitional assistance measures for households, the electricity sector, and EITE industries. It also explained the process the Government has followed in amending its proposals for transitional assistance between the release of the Green Paper, the White Paper, and the introduction of the CPRS legislation in the Australian Parliament. As this study argues, adequate assistance for SMEs is the key omission from the Government's proposed transitional assistance package.

A review of the total transitional assistance package towards including adequate assistance for SMEs is therefore essential. The Government's recent decision, in May 2009, to delay the commencement of the CPRS by one year, and extend transitional assistance for EITE industries, shows the Government's understanding of the risks to Australia's economy from unilaterally implementing the CPRS without adequate transitional measures for Australian businesses in place. Like the Government has recognised EITE industries within its compensation package, failure to adequately assist SMEs will also damage our economy and increase unemployment as economic activity and emissions leak offshore, in return for few, if any, global environmental benefits.

As the Government continues to refine the CPRS, we think there are two approaches the Government could consider in extending coverage of transitional assistance to SMEs:

- Implementing a tax rebate for SMEs for CPRS costs
- Allocating free emissions permits to SMEs during the transition period applied to EITE Industries.

5.1.1 Implementing a Tax Rebate for SMEs for CPRS Costs

The Government should consider designing a specific tax rebate to assist SMEs in coping with the increased costs that will occur through the CPRS. Further research is required to design an appropriate framework for a specific tax rebate for SMEs, and is beyond the scope of this study. However, one option could be to design the tax rebate to compensate a business for a percentage of the average industry specific reduction in SME EBITDA, resulting from the increased costs created through the implementation of the CPRS. An arrangement of this type would effectively retain incentives for SMEs to target emissions abatement opportunities, while reducing the negative impact of cost increases. A tax rebate is also likely to be the most cost effective and least complex way of assisting SMEs while mitigating the risks related to implementing the CPRS.

Implementing a tax rebate of this type for SMEs will be cost neutral if the Government chooses to restructure the allocation of funding within the CPRS transitional assistance package to include adequate compensation for SMEs. This would improve the use of the revenue raised from the auction of emissions permits in offsetting the costs to our economy from implementing the CPRS.

5.1.2 Allocating Free Emissions Permits to SMEs During the Transition Period

A further option may be to extend transitional assistance to SMEs by allocating free permits to SMEs during the transitional assistance period applied to EITE industries, but based on specific thresholds designed for SMEs. In practice however, expanding transitional assistance to SMEs in this way will be highly complex and costly.

Important as the allocation of free permits are to the design of a sustainable ETS, there is a risk that expanding and complicating the protection and compensation measures in the CPRS will result in a scheme that is overly complex—leading to economic resources being wasted through high transaction and compliance costs, and rent-seeking from industry participants. While it is important to consider options in improving the transitional assistance package, we suggest that expanding the allocation of free permits should not be a preferred approach.

5.2 Pursue Complementary and Compatible Climate Change Policy

The international debate on how to manage the challenge of reducing global greenhouse gas (GHG) emissions is evolving quickly. As we approach the December 2009 Copenhagen Conference, where a replacement for the Kyoto Protocol will be debated, it is important that Australia looks to implement climate change policies that are both complimentary and compatible with a global approach—in a way which builds on Australia's position as a global leader in tackling climate change.

In achieving this objective, it is essential that we understand the policy responses of other countries in mitigating their GHG emissions. We make the following observations on international climate change policy responses:

- Technology investment and innovation is critical to carbon abatement
- Forestry and soil carbon sequestration is likely to play an increasingly important role in global emissions reductions efforts
- The few countries that are experimenting with ETS have designed them as interim steps to an international response.

5.2.1 Technology Investment and Innovation is Critical to Carbon Abatement

Investment in technology and innovation is critical to the success of international efforts to mitigate global GHG emissions. To this end, Australia's major trading partners are investing significant resources in research and development of low emissions technologies. For example:

- China is planning a $450 billion stimulus package to expand renewable energy use, including wind and solar power, building on previous solar and wind energy investments[54]
- A study by IDC Industry Insights found that the recent stimulus package implemented by the United States of America (the American Recovery and Reinvestment Act 2009) is likely to produce $77.6 billion in clean technology investment over the next five years[55]
- Japan's Ministry of Environment estimates that Japan's market for environmental products and services is expected to reach $418 billion by 2010
- The Indian Government is investing in its renewable energy sector, specifically in waste-to-energy and bio-fuels projects.

Australia is also promoting investment in low emission technologies. Australia was a founding partner of the Asia-Pacific Partnership on Clean Development and Climate (APP), which is focused on accelerating the development and deployment of clean energy technologies. Member countries, including China and the United States, account for over half of the world's economy, population, and energy use.[56] The 2009-10 Australian Budget includes $4.5 billion in funding for clean technology projects, including industrial scale carbon capture and storage projects, solar generation projects and leading edge technology research.[57] Australia is also investing in developing clean coal technology in China.[58]

These initiatives and investments are an effective means of Australia to playing a leading role in international efforts to reduce global greenhouse gas emissions. In particular, complementary investments, such as Australia's investment in carbon capture and storage projects, solar energy demonstration projects, and other renewable energy projects, effectively utilise Australian innovation and technical expertise, which has been responsible for some of the most recent developments in clean energy technology.

As we move towards a new global agreement, Australia can therefore continue to play a leading role by pursuing climate change policies which invest in technological research and innovation and which:

- Prioritise the human resource and renewable resource advantage Australia has

---

[54] China Clean Energy Network . "China plans $440bn Stimulus for Green Energy." AFP 2009 http://www.chinacleanenergy.cn/english/contents/55/3660.html. (accessed May, 2009).

[55] IDC Industry Insights.. "American Recovery and Reinvestment Act Expected to Stimulate More Than $100 Billion in Technology Spend in Energy, Healthcare, and Government" 2009 http://www.energy-insights.com/EI/getdoc.jsp?containerId=prUS21745709 (accessed May, 2009).

[56] Asia Pacific Partnership on Clean Development and Climate. http://www.asiapacificpartnership.org (accessed May, 2009).

[57] Senator The Hon Penny Wong, Senator the Hon Kim Car, The Hon Peter Garrett. "Joint Media Release: $4.5 Billion Clean Energy Initiative." 2009. http://www.environment.gov.au/minister/garrett/2009/pubs/budmr20090512i.pdf (accessed May 2009).

[58] Senator The Hon Penny Wong. "Media release: Australia And China Strengthen Co-Operation On Climate Change." 2008 http://www.environment.gov.au/minister/wong/2008/pubs/mr20081118a.pd (accessed May 2009).

- Develop cost-effective low-carbon alternatives rather than increasing the cost of existing carbon-intensive technology
- Allow Australia to emerge as an economic leader in a global low-carbon economy

As this study argues, moving to implement an emissions trading scheme will not necessarily add to Australia's credibility in the upcoming international climate change negotiations. However, new Australian innovations in clean technology, particularly in clean energy generation, will certainly enhance Australia's global reputation.

Additional innovative measures to support low carbon objectives

There are also additional innovative opportunities to pursue supportive, low-cost regulatory and fiscal measures to achieve mid-and long-term emissions goals, which the Government should consider implementing, or expanding.

Examples of targeted regulatory interventions that can put Australia on a path toward greater efficiency and energy conservation include:

- Expanding investments by the Commonwealth and State Governments to improve public transport and road infrastructure
- Encouraging the transition to a more fuel efficient vehicle fleet through, for example, incentives for smaller vehicles and vehicle emissions standards
- Continuously implementing incentives for energy efficiency and adoption of new technology as it becomes available.

5.2.2 The Important Role of Forestry and Soil Sequestration in Global Emissions Abatement

Land use, land use change, and forestry represent a significant proportion (6.9 percent) of Australia's net greenhouse gas emissions.[59] As such, forestry and land management offer a practical and least cost means to reduce Australia's net greenhouse gas emissions. Encouraging afforestation and improved land management practices will not distort economic incentives and slow growth. In addition, most activities involved in forestry and land management have other benefits, which are not dependent on the progress of international climate change negotiations. It is also increasingly evident that forestry and soil carbon sequestration are likely to play an increasingly important role in global emissions reductions efforts.

Although previously contentious, the debate on the role land use should play in global greenhouse gas reductions efforts is beginning to turn in favour of carbon sequestration in trees and soil. A recent UNFCCC[60] study found that forests have the potential to absorb one-third of anthropogenic carbon emissions. Forestry and agriculture land management will become a greater component of efforts to reduce greenhouse gases in the future, as the ability to measure and verify soil sequestration improves.

[59] Australian Government. "Carbon Pollution Reduction Scheme. Australia's Low Pollution Future." White Paper Fact sheets, December 2008. Chapter 6, p3.

[60] United Nations Framework Convention on Climate Change. "National Greenhouse Gas Inventory Data for the Period 1990-2006." Subsidiary Body for Implementation. Twenty-ninth session. FCCC/SBI/2008/12, November 2008.

A centralised approach will be more effective than the CPRS at promoting carbon sequestration

In theory, the ability to create emission permits from land use change in Australia could promote greater carbon sequestration. The problem is that alongside the stream of revenue that could come from carbon sequestration, forestry businesses and farms would under the CPRS and Kyoto rules also accrue a contingent deforestation liability. If real prices for carbon are expected to rise (due to more stringent future targets), the liability on the books of the forestry developer could offset the stream of revenue. This would make it difficult to finance such projects. In addition, it is difficult for forestry developers to diversify fire and other involuntary deforestation risks, and there are no insurance products available.

As a result, carbon forestry projects require high rates of return to make such projects viable. As a result, few projects are likely to proceed. However, the Government could achieve significant afforestation through a centralised effort. This could involve leasing land and funding afforestation and improved soil management activities in Australia. For example:

- The Government could identify vacant Commonwealth and State land and lease additional marginally productive land from private owners to plant commercial forests and increase carbon sequestration
- Additional land not available for commercial forestry could be leased to plant native trees with carbon sequestration, biodiversity and potential tourism benefits
- The Government could provide incentives for improved soil management practices that increase carbon storage, reduce erosion and limit deforestation

The costs of these types of activities could be covered through a low carbon levy. Such a levy would establish the concept of carbon having a cost, without causing economic distortions.

Australia can also promote international afforestation

Australia can also promote afforestation internationally, particularly within its sphere of influence in Asia and the Pacific, as part of its contribution to reducing global greenhouse gas emissions. This could be done through expanding existing programmes, such as the Indonesia-Australia Forest Carbon Partnership, and other initiatives through the Government's International Forest Carbon Initiative.[61]

5.2.3 ETS Proposals in Other Countries are Interim Steps to Developing an International Response

As Australia considers the design of the CPRS, it is important to recognise the differences between Australia and our major trading partners in pursuing an emissions trading scheme as climate change policy.

To date, few countries have experimented with mandatory emissions trading markets. Adopting an ETS is not central to the climate change policy response in most countries. In fact, as we illustrated in Table 4.1, apart from Australia and the European Union (which has the only operational ETS) only two other countries are currently publicly considering adopting an ETS:

61 Department of Climate Change. "International Forest Carbon Initiative" 2009. http://www.climatechange.gov.au/international/publications/fs-ifci.html (accessed May 2009)

- **The United States is moving slowly toward mandatory national markets for reducing greenhouse gas emissions.** However the Waxman-Markey Comprehensive Energy Bill,[62] which proposes and cap-and-trade scheme, is still in the early stages of being considered by the United States Congress. Its eventual design is far from certain and it is unlikely to be agreed to by Congress in its current form. However, it is clear that the eventual makeup of an ETS in the United States will be less ambitious than the CPRS. There are already indications that the Waxman-Markley Bill will include provisions for the ETS to freely allocate 85 percent of emission permits, and that the scheme will include domestic carbon offsets. In contrast the Australian Government plans to auction between 70 to 75 per cent of emissions permits through the CPRS. In addition, it has deferred a decision on including domestic carbon offsets in the CPRS until 2013[63]

  It seems unlikely that the United States will implement an ETS in the near future. The United States will therefore likely focus on implementing other climate change policies, such as technology investment, to reduce greenhouse gas emissions and, on reducing its dependence on foreign resource imports for energy generation

- **The New Zealand Government has tried on three separate occasions to implement an emissions trading scheme.** The scheme has undergone several major revisions to reduce its potential impact in the New Zealand economy and the scheme is currently under review by a Select Committee of the New Zealand Parliament. New Zealand is unlikely to have legislation for its ETS passed through the New Zealand Parliament before the December 2009 Copenhagen Conference

- **The European Union has the only currently operational emissions trading scheme that is intended to comply with member states' Kyoto Protocol obligations.** The scheme started with a limited coverage of industry sectors and has only slowly increased this coverage

- **Other countries, including China and Japan, are not considering implementing an ETS at this time,** favouring alternative climate change policies such as investment in renewable generation and the development of low emissions vehicles.

Australia's higher dependence on trade than most countries, and the greater relative exposure of our most productive industries to international competition, makes the challenge of introducing a viable emissions trading scheme particularly acute. The Government should recognise that the economic effects of the scheme remain poorly understood. The politics of climate change debate have created an unfortunate duality, where governments trying to introduce emissions trading schemes deliberately understate the likely economic impacts to get the scheme past the voters, while the affected interests may often overstate the effects. We believe it would be dangerous for Australia to remain stuck in that mind-set.

---

[62] Also known as the American Clean Energy And Security Act of 2009

[63] Australian Government. "Carbon Pollution Reduction Scheme. Australia's Low Pollution Future." White Paper Fact sheets, December 2008. Chapter 6, p64.

It is unhelpful that the desire to minimise the unintended consequences of emissions trading is often characterised as rent seeking. While, of course, firms seeking protection are looking after their own interests, it is in the national and even global interest to avoid leakage.

The results of this study show that there is much work yet to be done on the design of the CPRS to achieve the right balance between the intended environmental benefits, and the unintended economic consequences.

6 References

Asia Pacific Partnership on Clean Development and Climate. http://www.asiapacificpartnership.org (accessed May, 2009).

Australian Bureau of Statistics. "Australian Bureau of Statistics Business Register, Counts of Businesses. Summary Tables." Catalogue Number 8161.0.55.001, June 2004.

Australian Bureau of Statistics. "Australian Industry 2005-2006." Catalogue Number 8155.0, November 2007.

Australian Bureau of Statistics. "Australian Industry 2007-2008." May 2009.

Australian Bureau of Statistics. "Counts of Australian Businesses, Including Entries and Exits." Catalogue Number 8165.0, December 2007.

Australian Bureau of Statistics. "International Trade in Goods and Services." Catalogue Number 5368, March 2009.

Australian Bureau of Statistics. "Small Businesses in Australia 2001." Catalogue Number 1321, October 2002.

Australian Government. "Australia's Low Pollution Future: The Economics of Climate Change Mitigation. (Summary)." ISBN: 978-0-642-74483-8, 2008.

Australian Government. "Carbon Pollution Reduction Scheme. Australia's Low Pollution Future." White Paper Fact sheets, December 2008.

Parliament of the Commonwealth of Australia, House of Representatives. " Carbon Pollution Reduction Scheme Bill 2009: Explanatory Memorandum" http://parlinfo.aph.gov.au/parlInfo/download/legislation/ems/r4127_ems_9f8adb44-3606-4c86-8352-31a761dab7e7/upload_pdf/329357.pdf;fileType=application%2Fpdf (accessed 20 June, 2009)

Australian Greenhouse Office. "National Greenhouse Gas Inventory Analysis of Recent Trends and Greenhouse Indicators 1990-2005." Department of Environment and Water Resources, September 2007.

Australian Treasury Department. "Australia's Manufactures Exports." Submission to the House of Representatives Economics, Finance and Public Administration Committee public inquiry, August 2006.

The Bureau of Infrastructure, Transport and Regional Economics (BITRE). "Australia Inter-capital Rail Freight Performance Indicators for 2006-07." Information Paper 62: Department of Infrastructure, Transport, Regional Development and Local Government. June 2008.

The Bureau of Infrastructure, Transport and Regional Economics (BITRE). "Australian Transport Statistics." Department of Infrastructure, Transport, Regional Development and Local Government, June 2008.

The Bureau of Infrastructure, Transport and Regional Economics (BITRE). "Freight Rates in Australia 1964-65 to 2007-08." Information Sheet 28 Department of Infrastructure, Transport, Regional Development and Local Government, October 2008.

Business Council of Australia. "Modelling Success: Designing an Emissions Trading Scheme That Works." August 2008.

China Clean Energy Network. "China Plans $440bn Stimulus for Green Energy." (2009), http://www.chinacleanenergy.cn/english/contents/55/3660.html (accessed 29 May, 2009).

Department of Climate Change. "Transport Sector Greenhouse Gas Emissions Projections 2007." February 2008.

Department of Climate Change. "International Forest Carbon Initiative" 2009. http://www.climatechange.gov.au/international/publications/fs-ifci.html (accessed 29 May 2009)

Dr Brian Fisher, Dr Stephen Beare, and Stephanie Szakiel. "The Employment Effects in the Australian Minerals Industry from the Proposed Carbon Pollution Reduction Scheme in Australia." edited by Prepared for: Minerals Council of Australian Bureau of Statistics, Project code: 0030.289: Concept Economics, May 2009.

Framework Convention on Climate change. "National Greenhouse Gas Inventory Data for the Period 1990–2006." FCCC/SBI/2008/12: United Nations, November 2008.

Golaszewski, R. "Network Industries in Collision: Aviation Infrastructure Capacity, Financing and the Exposure to Traffic Declines." *Journal of Air Transport Management*. Volume 9, Issue 1, pp 57-65. January 2003.

Hummels, David. *Have International Transportation Costs Declined?* University of Chicago Graduate School of Business, July 1999.

IDC Industry Insights. "American Recovery and Reinvestment Act Expected to Stimulate More Than $100 Billion in Technology Spend in Energy, Healthcare, and Government." 2009. http://www.energy insights.com/EI/getdoc.jsp?containerId=prUS21745709 (accessed May 2009)

McLennan Magasanik Associates. "Impacts of the Carbon Pollution Reduction Scheme on Australia's Electricity Markets." Ref: J1565: Report to Federal Treasury, 11 December 2008.

Minerals Council of Australia. "Senate Select Committee Inquiry into Climate Policy." April 2009.

Norman, David. *Modelling Manufactured Exports: Evidence from Australian States*: Economic Research Department. Reserve Bank of Australia, April 2006.

Pan, J., J. Phillips and Y. Chen. *China's Balance of Emissions Embodied in Trade: Approaches to Measurement and Allocating International Responsibility*. Oxford University Press, 2008.

Senate Standing Committee on Economics. "Report on the Exposure Draft of Legislation to Implement the Carbon Pollution Reduction Scheme." April 2009

Senator The Hon Penny Wong, Senator the Hon Kim Car, The Hon Peter Garrett. "Joint Media Release: $4.5 Billion Clean Energy Initiative." 2009. http://www.environment.gov.au/minister/garrett/2009/pubs/budmr20090512i.pdf (accessed May 2009).

Senator The Hon Penny Wong. "Media release: Australia And China Strengthen Co-Operation On Climate Change" 2008. http://www.environment.gov.au/minister/wong/2008/pubs/mr20081118a.pd (accessed May, 2009).

Total Environment Centre Inc. "Freight Transport and Climate Change: Exposures and Opportunities." July 2008.

World Resources Institute 2009. http://www.wri.org/ (accessed, June 2009)

World Trade Organization. "Country Trade Profiles, 2007" http://stat.wto.org/CountryProfile/WSDBCountryPFHome.aspx?Language=E (accessed May 2009)

United Nations Framework Convention on Climate Change. "National Greenhouse Gas Inventory Data for the Period 1990-2006." Subsidiary Body for Implementation. Twenty-ninth session. FCCC/SBI/2008/12, November 2008.

Appendix A: Acknowledgements

The following industry and business membership organizations provided helpful input to this study:

Australian Chamber of Commerce and Industry (ACCI)

ACCORD Australasia Ltd (Advocate for Consumer, Cosmetic, Hygiene & Specialty Products Industry)

Australian Food and Grocery Council

Australian Shipowners Association

Chamber of Commerce and Industry Queensland

Chamber of Commerce and Industry Western Australia

New South Wales Business Chamber

Plastic and Chemicals Industries Association

Shipping Australia Ltd

Tasmanian Chamber of Commerce and Industry

Victorian Automobile Chamber of Commerce

Victorian Employers' Chamber of Commerce and Industries

Appendix B: Cost Analysis Questionnaire

The following is the questionnaire Castalia used to conduct the analysis of the impact the CPRS will have on the cost structure of SMEs.

Introduction to the Questionnaire

For this study we are gathering cost and price data to prepare representative financial cost models for three small and medium size business sectors:

- Equipment and machinery manufacturing
- Food processing
- Plastics and chemicals manufacturing.

The models we create will help us understand the cost structure of businesses within these sectors. From this, we will be able to evaluate the range of impact the CPRS will have on costs and competitiveness for businesses like yours.

To ensure that our models contain the information we need and are as accurate as possible, we ask that you provide:

- Financial income statements and balance sheets from the most recent reporting period
- The breakdown of cost and price data in the enclosed questionnaire for one to three of your primary products or product classes.

We understand that your business may produce several products and have a complex manufacturing process. To simplify the analysis, we ask that you complete the questionnaire for one or two of your primary products, or one to two of your primary product classes (a grouping of similar products that use the same basic manufacturing process).

The remainder of this note contains item-by-item instructions for completing the enclosed questionnaire. Note the following:

- Each item in the questionnaire contains a number to left that is cross-referenced with the instructions below
- Please use the comments section to provide details or clarification on the data you provide so that we understand exactly what you are reporting.

Instructions for Completing the Questionnaire

1 Basic Product Information

1.1 **Reporting period**—Indicate the start and end dates for the information you are providing in this questionnaire

1.2 **Product name**—Provide the name of the product (or class of products) for which you are completing the questionnaire

1.3 **Product description**—Provide a brief description of the product (or class of products)

1.4 **Unit measure**—What is the unit measure you are using for your products in this questionnaire (e.g. do you measure your product by item, case, weight, volume)?

2 Product Price and Sales

2.1 **Total units sold for export**—Indicate the total quantity of products for export. If you only sold products domestically, leave this item blank

2.2 **Sale price of product for export**—Indicate the price you received for the products you sold for export. If you only sold products domestically, leave this item blank

2.3 **Total units sold domestically**—Indicate the total quantity of products for domestic sale

2.4 **Sale price of product sold domestically**—Indicate the price you received for products sold domestically.

3 Raw Materials and Other Direct Input Costs

3.1.1 **Unit measure of input**—Provide a descriptive name of the raw material or direct input that you purchase to manufacture your product

3.1.2 **Total volume purchased**—Indicate the total volume you purchased of the raw material or direct input during the reporting period

3.1.3 **Unit price of input**—Indicate the unit price you paid for the raw material or direct input

Please repeat this for up to five of your raw materials or other direct inputs. Leave extra rows blank. If you have additional direct inputs, please include them in the "Other Costs" total.

4 Labour Costs

4.1 **Total managerial employees—**Indicate the total number of professional and managerial staff that your business employs. Professional and managerial staff is defined as those manage other employees or manage a non-manufacturing component of your operations such as sales and marketing. Please estimate only the number of staff employed in manufacturing the product for this questionnaire

4.2 **Average cost per managerial employee—**Indicate the average cost per managerial employee. Labour costs include salary and non-fringe benefits.

4.3 **Total administrative employees—**Indicate the total number of administrative staff your business employs. Administrative staff is defined as those non-managerial employees who are not directly involved in manufacturing of goods. Please estimate only the number of staff employed in manufacturing the product for this questionnaire

4.4 **Average cost per administrative employee—**Indicate the average cost per administrative employee. Labour costs include salary and non-fringe benefits

4.5 **Total operational employees—**Indicate the total number of operational staff your business employs. Operational staff is defined as those directly involved in the manufacturing process. Please estimate only the number of staff employed in manufacturing the product for this questionnaire

4.6 **Average cost per operational employee**—Indicate the average cost per operational employee. Labour costs include salary and non-fringe benefits.

5 Energy Costs

5.1 **Total quantity of electricity**—Indicate the total quantity of electricity (in GWh)

you purchased during the reporting period

5.2 **Cost of electricity**—Indicate the total amount you paid for electricity during the reporting period

5.3 **Amount of renewable electricity**—Indicate the amount (if any) of your total electricity purchased that was generated from wind or other renewable energy sources

5.4 **Cost of renewable electricity**—Indicate the total amount you paid for the energy you purchased from renewable sources

5.5 **Total quantity of gas**—Indicate the total quantity of gas (if any) you purchased during the reporting period

5.6 **Cost of gas**—Indicate the total amount you paid for gas during the reporting period

5.7 **Other energy costs**—Indicate the total amount you paid for any other energy purchases you made during the reporting period (e.g. if you purchased any coal, diesel or petrol for non-transportation use like, for example, running generators). Provide a comment describing this total. Please provide a comment that explains these costs.

6 Transportation Costs

6.1 **Mode of transport for export**—Indicate the mode of transport you use to deliver products for export (e.g. truck freight, rail or air). Leave this item blank if you only sell products domestically

6.2 **Distance to port**—Indicate the average distance to the port where you deliver your products for export. Leave this item blank if you only sell products domestically

6.3 **Total units delivered for export**—Indicate the total number of units that you sold and delivered for export. Leave this item blank if you only sell products domestically.

6.4 **Cost per unit for transport**—Indicate the cost per unit for transportation of the product that you produce and sell for export. Leave this item blank if you only sell products domestically

6.5 **Mode of transport for domestic sales**—Indicate the mode of transport you use to deliver products to sell domestically (e.g. truck freight, rail or air)

6.6 **Distance to domestic outlet**—Indicate the average distance to the destinations where you deliver your products for sale domestically

6.7 **Total units delivered for domestic sales**—Indicate the total number of units that you sold and delivered for sale domestically

6.8 **Cost per unit for transport domestically**—Indicate the cost per unit for transportation of the product that you produce and sell domestically.

7 Assets Employed in Manufacturing of this Product

7.1 **Book value of assets**—Provide the total value of all assets used to produce this product

7.2 **Net depreciation of assets**—Indicate the net depreciation you claimed on these assets during the reporting period

7.3 **Asset life**—Provide an estimate of the length of time, from their initial purchase, until these assets would need to be replaced

8 Other Costs

This section should include any other expenses that go into your total manufacturing and operating costs. Please provide a brief description in the comments section that explains these costs if they are significant.

ACCI-CPRS Questionnaire

		Cross-reference
Reporting period:		1.1
Product name:		1.2
Product description:		1.3
Unit measure		1.4

numerical input

non-numerical input

Revenue and Cost Data

2. Product Price and Sales				
Total units sold for export	units	0	2.1	
Sale price of product for export	$/unit	0.00	2.2	
	Subtotal	$0.00		
Total units sold domestically	units	0	2.3	
Sale price of product sold domestically	$/unit	0.00	2.4	
	Subtotal	$0.00		
	Total units sold	**0**		
	Total product sales	**$0.00**		
3. Raw Materials and Other Direct Input Costs				
Descriptive name of input 1:			3.1.1	
Unit measure of input 1			3.1.2	
Total volume purchased of input 1	units	0.00	3.1.3	

Unit price of input 1	$/unit	0.00	3.1.4
	Input 1 subtotal	-	
Descriptive name of input 2:			3.2.1
Unit measure of input 2			3.2.2
Total volume purchased of input 2	units	0.00	3.2.3
Unit price of input 2	$/unit	0.00	3.2.4
	Input 1 subtotal	-	
Descriptive name of input 3:			3.3.1
Unit measure of input 3			3.3.2
Total volume purchased of input 3	units	0.00	3.3.3
Unit price of input 3	$/unit	0.00	3.2.4
	Input 1 subtotal	-	
Descriptive name of input 4:			3.4.1
Unit measure of input 4			3.4.2
Total volume purchased of input 4	units	0.00	3.4.3
Unit price of input 4	$/unit	0.00	3.4.4
	Input 1 subtotal	-	
Descriptive name of input 5:			3.5.1
Unit measure of input 5			3.5.2
Total volume purchased of input 5	units	0.00	3.5.3
Unit price of input 5	$/unit	0.00	3.5.4
	Input 1 subtotal	-	
	Total cost of raw materials and other direct inputs	**$0.00**	
4. Labour Costs			
Managerial staff			
Total number of managerial employees	employees	0	4.1
Average cost per managerial employee	$/employee	0.00	4.2
	Managerial cost subtotal	-	
Administrative staff			

Total number of administrative employees	employees	0	4.3
Average cost per administrative employee	$/employee	0.00	4.4
	Administrative cost subtotal	-	
Operational staff associated with the manufacturing process			
Total number of operational employees	employees	0	4.5
Average cost per operational employee	$/employee	0.00	4.6
	Operational cost subtotal	-	
	Total cost of labor	**$0.00**	
5. Energy Costs			
Electricity			
Total quantity purchased	GWh	0.00	5.1
Total cost of electricity purchased	$	0.00	5.2
Amount of electricity purchased from renewables	GWh	0.00	5.3
Total cost of renewable electricity	$	0.00	5.4
Gas			
Total quantity purchased	GJ	0.00	5.5
Total cost	$	0.00	5.6
Other energy costs	$	0.00	5.7
	Total cost of energy	**$0.00**	
6. Transportation Costs			
Export transportation--finished product to port of export			
Mode of transport	mode		6.1
Distance to port	kms	0	6.2
Total number of units delivered for export	units	0	6.3
Cost per unit to transport	$	0.00	6.4
	Subtotal	$0.00	
Domestic transportation--finished product to domestic outlet			

Mode of transport	mode		6.5	
Distance to outlet	kms	0	6.6	
Total number of units delivered domestically	units	0	6.7	
Cost per unit to transport	$	0.00	6.8	
	Subtotal	$0.00		
	Total cost of transport	**$0.00**		
7. Assets Employed in Manufacturing this Product				
Book value of assets	$	0.00	7.1	
Net depreciation of assets	**$**	**0.00**	7.2	
Asset life of primary assets	years	0	7.3	
8. Other Costs				
Total of all other costs	**$**	**$0.00**	8.1	

T: +1 (202) 466-6790
F: +1 (202) 466-6797
1700 K Street NW Suite 410
WASHINGTON DC 20006
United States of America

T: +61 (2) 9231 6862
F: +61 (2) 9231 3847
Level 10, 1 Castlereagh Street
SYDNEY NSW 2000
Australia

T: +64 (4) 913 2800
F: +64 (4) 913 2808
Level 2, 88 The Terrace
PO Box 10-225
WELLINGTON 6143
New Zealand

T: +33 (1) 45 27 24 55
F: +33 (1) 45 20 17 69
7 Rue Claude Chahu
PARIS 75116
France

---------- www.castalia-advisors.com