Introduction I

• Australia has made a significant contribution to climate science, and seen a succession of high quality reports and statements.
• Yet the national debate remains highly polarized; it is unlikely that a satisfactory bill will be passed before Copenhagen.
• This presentation will look at the economics of climate change policy in Australia now:
  • Where are we at?
  • How should we proceed?
• Focus on the role of the market and of market failures.
**Introduction II**

- This presentation starts from three premises:
  - that the world needs to hold peak warming to less than 2°C, to avoid the worst impacts of climate change;
  - that for advanced countries this means a reduction in emissions of 80% by 2050, with reductions of about 25% by 2020; and
  - that Australia should achieve comparable reductions in emissions, with most of those reductions being found within Australia.
- Our recent modelling (Briefing 1) supports the view <2°C view; I approach the CPRS from the perspective of achieving reductions of about 25% in Australia by 2020, relative to 2000.
- The key questions are
  - Does the CPRS provide a sound basis for achieving such a goal?
  - Does it contain high risks that such reductions cannot be achieved, or will only be achieved at a very high cost?

**Introduction III**

- It is often said that climate change is the ultimate market failure, because the social cost of carbon is not recognised
  - This is the rationale for a carbon price
- But other market failures are inadequately treated in the Australian debate:
  - The Garnaut Report had three chapters on market failures, but only support for R&D made it through to the main recommendations
  - The White Paper had little analysis of market failures per se, but three big programs (RET, EITE, and ESAS) addressing them
  - There has been little analysis of the adequacy of these measures in addressing the key market failures, and no published modelling of the CPRS with the final versions of the EITE and ESAS programs.
- Examine the reality of, and response to, market failures
Introduction IV

- The implementation of the CPRS has been complicated by several major changes in the overall context, one of which is the global financial crisis (GFC)
- The GFC developed fully after the White Paper was released (December 2008)
- In May 2009, the Government announced changes to the CPRS in response to the GFC:
  - Delay start by one year, to 2011-12
  - Fixed carbon price of $10 per tonne of carbon in 2011-12
  - Increased assistance to eligible energy intensive trade exposed industries for the first five years

(continued)

- It is now clear that Australia, and major developing countries of Asia, are recovering strongly
  - China will grow by 10% plus in year to December quarter 2009
  - Commodity prices are rising, as are Australian commodity exports
  - Improving outlook in some developed countries hit hard by the GFC
- It is likely that global emissions will, on unchanged policies, return to a growth rate of about 2% over 2010-2020, comparable to that over 1995-2005, as a result of:
  - The resumption of rapid growth in key developing countries
  - The coal-based nature of that growth, and its emissions intensity
  - The shift in the balance of global growth to these economies
- The consequences of this occurring would be severe, pushing the <2°C target beyond reach
Chart 1: Growth in total global GHG emissions, actual 1990-2005 and projected 2010-2030, post GFC (% per annum)

Introduction V

- The other major change is in the outlook for mining, especially for natural gas
- Renewed rapid growth in Asia is drawing further investment in coal and iron ore in Australia and elsewhere
- Major offshore gas deposits and coal seam methane will drive a new era in LNG export from Australia
- Mining investment now 5% of GDP, could reach 7-8%, with major gas projects (e.g. Gorgon, $43 billion) committed
- LNG production could jump from less than 20 Mt/a in 2009 to 100 Mt/a by 2020
  - This would mean emissions from LNG rising from about 10 MT CO₂-e to some 40-50 Mt CO₂-e by 2020, most of which would be covered by the EITE
- The fact must be taken account that implementing the CPRS may be in the midst of the biggest resources boom Australia has seen
Plan of the Presentation: Four Parts

1. Market failures, social costs and complementary policies
2. The impact of market failures in the CPRS
3. The basic arithmetic of the CPRS
4. Making emissions trading more effective: key issues
5. Conclusions
1. Market failures, social costs and complementary policies

Four main sources of market failures

- Externalities: costs or benefits of an action are not fully borne by, or cannot be fully captured by, the agent
- Sunk costs: a non-operational expenditure that has been made and cannot be recovered, even if the firm goes out of business
- Coordination failures: occur when decisions of agents, or their activities, are interdependent and some factors hinder coordination
- Information asymmetries and principal/agent problems: occur when market participants have access to different information or when a principal is represented by an agent, who has different information or faces different incentives

Relevant examples of market failure

Power generation

- Sunk costs for new and existing plant
- Network development and coordination issues
- Social costs, eg regional impacts (externalities) from closures or new plant development

Transport

- Sunk costs (car purchase, rail infrastructure and systems, rolling stock)
- Coordination failures (passenger and freight infrastructure; multiplicity of agencies)
- Externalities (broader social costs and benefits, only partly internalised)
Table 1: The importance of sunk costs in power generation: Short-run marginal costs and capital costs, by type of generation

<table>
<thead>
<tr>
<th></th>
<th>SMRC (ex carbon)</th>
<th>SMRC (carbon at $50)</th>
<th>Capital cost per MWh/year ($/MMH/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black coal (super critical)</td>
<td>19.1</td>
<td>57.7</td>
<td>1951</td>
</tr>
<tr>
<td>CCGT</td>
<td>34.1</td>
<td>52.1</td>
<td>1101</td>
</tr>
<tr>
<td>Solar thermal</td>
<td>38.3</td>
<td>38.3</td>
<td>5050</td>
</tr>
<tr>
<td>Photovoltaics</td>
<td>11.6</td>
<td>11.6</td>
<td>7579</td>
</tr>
<tr>
<td>Wind</td>
<td>9.1</td>
<td>9.1</td>
<td>2450</td>
</tr>
<tr>
<td>Biomass</td>
<td>31.0</td>
<td>32.4</td>
<td>2250</td>
</tr>
<tr>
<td>Geothermal</td>
<td>7.4</td>
<td>7.4</td>
<td>5050</td>
</tr>
<tr>
<td>Coal USC plus CCS(95%)</td>
<td>23.8</td>
<td>26.0</td>
<td>4150</td>
</tr>
<tr>
<td>Gas CCGT plus CCS (95%)</td>
<td>39.8</td>
<td>40.8</td>
<td>2900</td>
</tr>
</tbody>
</table>

Chart 3: Limited impact of carbon prices on transport emissions
Relevant examples of market failure II

Building and related issues
- Sunk costs with existing buildings, systems and practices
- Principal/agent problems with owners and tenants
- Information issues
- Coordination issues across different actors in the planning system

Energy intensive trade exposed industries
- Failures of global market coordination

R&D and technologies
- Inability to capture full benefits
- Imperfect information and uncertainty

Chart 4: Prices and policies to address market failure: the key balancing issue

Reducing Emissions

Market Mechanisms: Prices
- Carbon price
- Emissions trading e.g. cap and trade

Market Failures: Complementary Policies
- Externalities
- Sunk costs
- Coordination failures
- Information asymmetries & principal agent problems

- Regulation and standards
- Taxes and subsidies
- Renewable requirements
- Infrastructure and planning
2. The impact of market failures in the CPRS

If market failures are severe, what impact do they have in the CPRS? What is the role of policies to address such failures?

A standard form of analysis uses a ranking of emissions reduction opportunities (technologies, processes etc) by cost, and by the carbon price at which they are brought into play.

The market price brings these into play in least cost order:

- If policy action brings (7) into play, this is a waste of money, as it would have been used anyway.
- If policy action brings (23) into play, this is doubly wasteful – the spending is wasted, and a lower cost option (16) is displaced

Thus complementary policies are either a waste of money, inefficient or both (Productivity Commission 2006?)

Chart 5: Emission reduction opportunities, ranked by cost/carbon price
The effect of introducing market failures – domestic carbon price

In Chart 5 we introduce market failures into the simple model of Chart 4, in a world in which there is no international carbon trading, so the carbon price is set in Australia. It is assumed that, because of market failures, some emissions reduction options are not available at the range of prices shown.

The effect of market failures in this case is:

- to raise the carbon price necessary to achieve the emissions reduction of 16 units of Chart 4, and
- to introduce higher cost, sub-optimal options

Hence effective complementary policies to eliminate the market failure would generate more cost-effective options at a lower carbon price.

Chart 6: The impact of market failures on the CPRS (no international trading)
The effect of introducing market failures – global carbon price

In Chart 6 the Australian carbon price is set by the world price, at the equilibrium level of Chart 4.

In this case the effect of market failures is to reduce the level of emissions reduction within Australia (to those available at the world price) and to increase overseas purchases of permits.

The effect of market failures in this case is:
- to shift the burden of emissions reduction from Australia to overseas purchases, and
- to cause lower cost options in Australia not to be pursued.

Hence effective complementary policies to eliminate the market failure would generate more cost-effective emissions reduction within Australia and lower overseas purchases.

Chart 7: The impact of market failures on the CPRS (carbon price set by world price)
3. The basic arithmetic of the CPRS

- The latest projections of Australian emissions to 2020 were published by DCC in August 2009, based on the 2009-10 economic projections and other relevant information.
- These are summarised in Table 3 by sectors, and in another format in Table 4. Changing economic and population outcomes may lead to upward revisions to these projections.
- In Table 5 these projections are revised only for higher LNG production, with emissions in the EITE sector assumed to grow by 5% per annum over 2010-20.
Table 2: Greenhouse gas emissions, Australia: 2000, DCC base case projections 2020 (Mt CO₂-e)

<table>
<thead>
<tr>
<th>Covered sectors</th>
<th>2000</th>
<th>2008</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stationary energy</td>
<td>175</td>
<td>200</td>
<td>192</td>
</tr>
<tr>
<td>Electricity generation</td>
<td>76</td>
<td>95</td>
<td>119</td>
</tr>
<tr>
<td>Direct combustion</td>
<td>33</td>
<td>39</td>
<td>57</td>
</tr>
<tr>
<td>Transport</td>
<td>39</td>
<td>42</td>
<td>47</td>
</tr>
<tr>
<td>Passenger vehicles</td>
<td>25</td>
<td>28</td>
<td>36</td>
</tr>
<tr>
<td>Commercial vehicles</td>
<td>10</td>
<td>11</td>
<td>13</td>
</tr>
<tr>
<td>Industrial processes</td>
<td>26</td>
<td>31</td>
<td>45</td>
</tr>
<tr>
<td>Waste (ex legacy)</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forestry</td>
<td>-15</td>
<td>-21</td>
<td>-7</td>
</tr>
<tr>
<td>Total covered sectors</td>
<td>369</td>
<td>425</td>
<td>510</td>
</tr>
<tr>
<td>Uncovered sectors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td>95</td>
<td>91</td>
<td>98</td>
</tr>
<tr>
<td>Legacy landfill/decomines</td>
<td>16</td>
<td>15</td>
<td>7</td>
</tr>
<tr>
<td>Land-use change</td>
<td>73</td>
<td>50</td>
<td>49</td>
</tr>
<tr>
<td>Total uncovered sectors</td>
<td>184</td>
<td>156</td>
<td>154</td>
</tr>
<tr>
<td>TOTAL</td>
<td>553</td>
<td>581</td>
<td>664</td>
</tr>
</tbody>
</table>

Table 3: DCC greenhouse gas emissions, Australia, projection summary (Mt CO₂-e)

<table>
<thead>
<tr>
<th>Uncovered sectors</th>
<th>EITE</th>
<th>Transport</th>
<th>Other</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Mt CO₂-e)</td>
<td></td>
<td>CPRS</td>
<td>exposed</td>
</tr>
<tr>
<td>2000</td>
<td></td>
<td></td>
<td></td>
<td>554</td>
</tr>
<tr>
<td>2008</td>
<td>156</td>
<td>110 (a)</td>
<td>81</td>
<td>234 (b) 581</td>
</tr>
<tr>
<td>2020 (base)</td>
<td>154</td>
<td>158</td>
<td>96</td>
<td>256   664</td>
</tr>
</tbody>
</table>

(a) CSES estimate; Nov 2009 Treasury MYEFO has 2010 EITE emissions at 120 MtCO₂-e. (b) Residual
Scoping a 25% cut in emissions by 2020

Table 5 provides some scoping estimates of domestic Australian emissions by 2020 consistent with a 25% reduction on 2020

- Each of the three ‘non-exposed’ sectors are assumed to fall by only 5% relative to the base levels by 2020
  - Non-covered sectors because they are uncovered, and reductions in agriculture are difficult
  - EITE because the vast majority of emissions are covered by free permits
  - Transport because of market failures and very low price elasticity
- The result is that emissions in the exposed sectors (40% of 2008) need to be virtually eliminated by 2020
- Clearly these assumptions could vary, but the point would remain

Table 4: Revised GHG emissions projections to 2020, and implications for -25% case (Mt CO₂-e)

<table>
<thead>
<tr>
<th>Year</th>
<th>Uncovered sectors</th>
<th>EITE</th>
<th>Transport</th>
<th>Other CPRS exposed</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>184</td>
<td>na</td>
<td>75</td>
<td>295</td>
<td>554</td>
</tr>
<tr>
<td>2008</td>
<td>156</td>
<td>110</td>
<td>81</td>
<td>234</td>
<td>581</td>
</tr>
<tr>
<td>2020 (base)</td>
<td>154</td>
<td>179</td>
<td>96</td>
<td>256</td>
<td>685</td>
</tr>
<tr>
<td>2020 (-25% case)</td>
<td>146</td>
<td>170</td>
<td>91</td>
<td>7.3</td>
<td>415</td>
</tr>
<tr>
<td>Change on base case</td>
<td>-5.0</td>
<td>-5.0</td>
<td>-5.0</td>
<td>-97.2</td>
<td>-39.4</td>
</tr>
</tbody>
</table>
Implications of the concentration of emissions reductions in exposed areas

These areas are also subject to market failures, pushing up the price required for a given quantity response. The impact depends on the development of a global carbon market, and on the level of the world price:

- If there is no effective world price, then a very high domestic price will be necessary to achieve large reductions in these sectors.
- If there is a relatively low world price, there will be heavy purchases of foreign permits, and little emissions reduction within Australia.
- If the costs get too high the government of the day will abandon the -25% target.

But there are many risks involved in this set of options.

4. Making emissions trading more effective: key issues

Consistent with this discussion, many areas could be addressed where more effective action to address market failures might make the CPRS more efficient, and reduce the risks. Three are considered briefly here:

- The energy intensive trade-exposed industries scheme.
- Addressing market failures more effectively in power generation.
- Reducing emissions in transport.
The EITE scheme in a major resources boom

The EITE scheme provides for free issues of permits to energy intensive trade exposed (EITE) industries

- two levels (90% and 60%, declining at 1.3% pa)
- levels increased to 95% and 66% for five years because of GFC
- new entrants allowed, but issue of free permits capped at 5% activity growth
- if growth exceeds 5% the Government will fund additional permits

Given the scale of the emerging resources boom, this program implies substantial risks and needs to be revised. Perhaps:
- reduction in eligibility at 4% per annum, not 1.3% (Garnaut Report suggested 3% pa)
- inclusion of LNG at 90%, but with the higher clawback
- scrap the GFC additions

Chart 9: Share of permits allocated to the EITE sector, for different growth rates (per cent)
Addressing market failures in power generation

These are very important and complex, and much discussed. The two major programs (ESAS and RET) seem to be flawed. Perhaps:

- tie ESAS payments to rapid change in energy generation profiles in the region
- use a variant of the Mountain proposal (Briefing 2) or another approach
- revise the Renewal Energy Target scheme to more effectively address market failures (Briefing 4)

Reducing emissions in transport

Transport emissions are dependant on many factors, and an integrated program of non-price measures is necessary:

- Advanced emissions standards for all vehicles types, regularly updated with world’s best practice
- Coordinated investment in rail and public transport infrastructure
- Incentives for firms to invest in advanced track, vehicles and system
- Concerted efforts to achieve modal shift

Modelling undertaken by CSES for the CRC on Rail Innovation suggested that substantial reductions in transport emissions could be achieved by 2020 by such measures:

- Changing the transport mix also has major net social benefits
5. Conclusions

- The CPRS proposal before the Parliament will make it very difficult to achieve a 25% reduction in Australian emissions (mainly within Australia) by 2020.
- The main issues are that:
  - Emissions from, and permits given to, the EITE industries are likely to grow rapidly.
  - Transport has a low price elasticity, and emissions are unlikely to fall rapidly without other policies.
  - This is true also of other sectors, such as buildings.
  - A significant proportion of emissions, mainly from agriculture, are uncovered.
- These facts mean that virtually all of the burden of adjustment will fall on industries providing about 40% of current emissions:
  - Emissions in these industries must be virtually eliminated by 2020.
  - Many of which also suffer from market failures.
  - The limitations of RET and of ESAS as approaches to market failure in electricity generation will limit the speed of emissions reductions.
**What should we do?**

The risks implied by the current CPRS, and its constraints on future action, suggest that it should not be passed as it stands

- If there are ineffective global markets, the costs of achieving major emissions reductions will be very high
- If there is a relatively low global carbon price, there may be little reductions in emissions within Australia
- There are financial risks for the budget, from low sales of domestic emissions with household compensation fixed (and possible funding of EITE permits beyond 5% growth)

Amendments to the CPRS – such as to increase the ETIE concession or to increase free permit levels provided under the ESAS – will further increase these risks

These risks arise from two main factors

- Massive changes taking place in the global context and its implications for Australia (eg resources boom)
- The inadequate treatment of market failures in the overall approach

**Achieving a viable outcome**

In 1999 a substantially majority of the Australian population supported a republic, but

- The supporters were divided between two models: direct election or appointment by Parliament
- As a result the 1999 referendum was lost

In 2009 a majority of the Australian people support strong action on climate change, but

- The supporters of such action (the Government, the environmental movement and the Greens) are divided about the nature and timing of that action
- Negotiations are primarily with those who seek to weaken the legislation further
- As a result the option of agreed action before Copenhagen may be lost

Post Copenhagen it is vital to rebuild a coalition focused on urgent action, based on

- A revised emissions trading scheme with modified EITE and ESAS schemes, and a commitment to the bulk of reductions being in Australia
- A comprehensive, national program of policies to address market failures, so as to increase the level of emissions reduction for a given carbon price
Key issues for a revised climate program

The key issue is to revise elements of the CPRS and to support it with systematic non-price programs to reduce emissions:

- Australia’s target for 2020 to be a reduction of emissions of -25% relative to 2000, but reduced by emissions from increases in LNG exports.
- No more than 25% of the cut in emissions to be through purchases of offshore permits.
- Reduction in EITE eligibility to be at say 4% per annum, not 1.3%; GFC increases scrapped; LNG to be at 90%.
- ESAS revised to drive immediate shift, within regions, from coal intensive power generation, and methods for supporting renewables also revised.
- The CPRS supported by a comprehensive, national programs to address market failures, especially in transport, buildings and agriculture, to increase emissions reduction for a given carbon price.

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