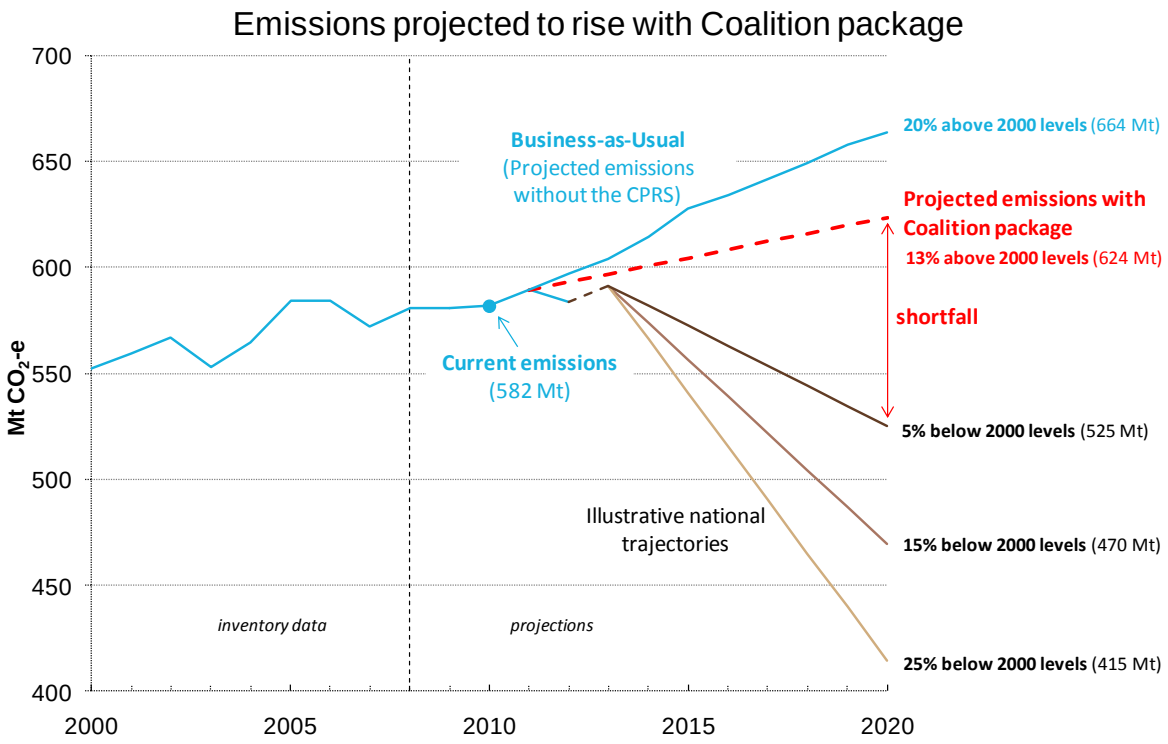
ANALYSIS OF COALITION CLIMATE CHANGE POLICY PROPOSAL

CONTENTS

EXECUTIVE SUMMARY

- The Coalition proposes establishing an Emissions Reduction Fund to support 140 million tonnes of abatement per annum by 2020 to achieve an emissions reduction target of 5 per cent below 2000 levels. The Fund would commence operation in 2011-12, and it is envisaged the Fund will invest an annual average of around $1.2 billion in direct CO_2-e emissions reduction activities through to 2020.
  - The Emissions Reduction Fund consists of two distinct elements: a 'baseline with penalty' scheme which would need to be legislated; and a grant based 'abatement purchasing' scheme which would have high administrative overheads for government and business.
- Experience with similar grant-based policies suggests average annual funding of $1.2 billion per annum (rising to around $2 billion in 2020) will not be sufficient to secure 140 million tonnes of abatement in 2020.
- The Department of Climate Change (DCC) estimates that, based on analysis of a range of evidence, it is unlikely that this level of funding could secure more than around 40 million tonnes in 2020, based on estimated expenditure of $2.1 billion in 2020, and even this may be a generous estimate of effectiveness.
  - This abatement arises mainly through the operation of the Emissions Reduction Fund.
  - Only minimal abatement, relative to business-as-usual for the economy as a whole, can be expected from the baseline and penalty element. If the penalty-based regime significantly affected behaviour, then this could be a source of additional abatement. However, the Coalition has stated that penalties are only expected to apply in exceptional circumstances, indicating that little abatement is likely to be driven by this part of the scheme, despite adding significant administrative complexity.
- If around 40 million tonnes of abatement were achieved, the Coalition's package would result in emissions 13 per cent above 2000 levels by 2020.
- The inclusion of soil carbon does not, in our view, change the fundamental conclusions above regarding the cost or abatement potential of the Coalition policy. Soil carbon purchasing would inherently involve higher administrative overheads than other abatement due to the multiplicity of small scale grants.


Emissions projected to rise with Coalition package
700
650
600
550
500
450
400
Mt CO2-e
2000
2005
2010
2015
2020
Business-as-Usual
(Projected emissions
without the CPRS)
20% above 2000 levels (664 Mt)
Projected emissions with
Coalition package
13% above 2000 levels (624 Mt)
shortfall
Current emissions
(582 Mt)
5% below 2000 levels (525 Mt)
Illustrative national
trajectories
15% below 2000 levels (470 Mt)
inventory data
projections
25% below 2000 levels (415 Mt)

ANALYSIS OF LIKELY ABATEMENT AND COSTS

INTRODUCTION

This section deals with determining estimates of likely abatement potential of the grant-based component of the Emissions Reduction Fund.

The Coalition proposes establishing an Emissions Reduction Fund to support 140 million tonnes of abatement per annum by 2020 to achieve a 5 per cent reduction target. The Fund will commence operation in 2011-12, and it is envisaged the Fund will invest an annual average of around $1.2 billion in direct CO_2-e emissions reduction activities through to 2020.

Experience with similar policies suggests this funding will not be sufficient to secure 140 million tonnes of abatement in 2020. The Department of Climate Change (DCC) estimates that, based on assumptions that are in fact likely to overestimate the level of abatement, this level of funding is unlikely to secure more than around 40 million tonnes in 2020, assuming expenditure of $2.1 billion in 2020.

In arriving at this estimate of expected overall abatement the DCC considered both top-down analysis and bottom-up analysis. The application of multiple estimation methodologies enhances the confidence in the overall conclusion.

The estimate has been based on three different types of top down analysis.

- First, top-down analysis of two schemes that have been implemented in Australia.
  - DCC analysed the NSW Greenhouse Gas Abatement Scheme (GGAS), a scheme introduced by the New South Wales Government that experienced reasonably high take-up, but which was designed with weak additionality criteria (additionality refers to achievements beyond business-as-usual).
  - DCC also analysed the Australian Government's Greenhouse Gas Abatement Program (GGAP), a scheme that had strong additionality criteria but which experienced low take-up rates.
- Second, DCC considered the work of McKinsey and Company, taking account of the differences between theoretical abatement and that which is achievable given the realities of policy implementation
- Third, DCC considered the results of both domestic and international economic modelling of abatement costs.

These top-down estimates were then compared with sectorally-based bottom-up estimates of abatement potential.

These suggest an average cost of carbon of $50 per tonne in 2020 to be the minimum realistic average cost for such a program.

The inclusion of soil carbon does not in our view change the fundamental conclusion above. More detail on this issue is outlined at the end of this paper (see Supporting Information on Soil Carbon)**.**

TOP-DOWN ANALYSIS

Experience with existing schemes

NSW Greenhouse Gas Reduction Scheme (GGAS)

GGAS is a baseline and credit emissions trading scheme operating in NSW (since 2003) and the ACT. Liable parties (mostly electricity retailers) are required to purchase a number of NSW Greenhouse Gas Abatement Certificates (NGACs). NGACs can be created from a range of activities including low emissions generation, improved generation efficiency, energy efficiency and forestry. 'Abatement' under the scheme is defined as beating certain baselines. There is no investigation of whether that activity would have occurred in the absence of the scheme. That is, there is no assessment of whether this abatement is "additional" to business-as-usual.

However, it is possible to make an estimate of the amount of abatement that is truly additional, and these estimates have been published by DCC and, previously, the Australian Greenhouse Office as part of the projections of Australian greenhouse gas emissions.

Under GGAS, in 2008 abatement costs an average of around $40 per tonne for emissions reductions that would not have occurred in the absence of the scheme (this is equivalent to around $50 in 2020 dollars, assuming an inflation rate of 2.5 per cent a year).

- This figure represents an estimate of the total value of certificates surrendered in a year divided by an estimate of the number of genuinely additional tonnes of abatement delivered.

- This shows the average abatement cost for an economy-wide scheme designed along GGAS lines. (While the methodology is specific to the GGAS scheme, the average abatement cost is similar to that indicated by other top-down and bottom-up methods – see below.)

- It is evidence that schemes that aim to deliver cheap abatement with weak additionality criteria result in large proportions of funding going towards non-additional activity. This pushes up the cost per tonne of real abatement.

The estimated 2008 abatement cost has been estimated using the following information:

- The latest estimate of the annual abatement from GGAS was 4.7 Mt of real, ie additional, abatement per annum over the Kyoto period (Department of Climate Change 2008, Stationary Energy Sector Greenhouse Gas Emissions Projections 2007).

- In 2008, 21.5 million certificates under the scheme were surrendered by liable parties (IPART 2009)

Precise information of the total market value of certificates surrendered under GGAS is not available due to the lack of transparency regarding contract prices. However, a reasonable estimate of the value of certificates surrendered in 2008 indicates the total value of these certificates of around $200 million.

- This estimate is based on actual spot prices in 2008 (IPART 2009) and a sample of contract prices that has been confidentially provided to the Department. (This estimate takes into account prevailing spot prices in 2008, but also the fact that a large proportion of certificates are sold under long-term contracts for prices that are significantly higher than the spot price.)

The reason why this average cost per tonne of abatement is higher than the market price per certificate is that the GGAS scheme rewards a good deal of activity that would have occurred in any event – ie it was non-additional.

The GGAS scheme provides evidence of the average abatement cost for a program with weak additionality criteria. The advantage of weak criteria is that many projects are likely to find it worthwhile to participate in the program, including some genuinely additional activity. The disadvantage is that a large amount of non-additional activity is funded so that the average cost per tonne of real abatement increases significantly. It should be noted that applying the observed GGAS cost per tonne of abatement (in real terms) to estimate the likely cost of abatement for the Emissions Reduction Fund in 2020 is likely to underestimate the likely price per tonne that would need to be paid in a larger scheme with similar criteria. All studies indicate that the cost per tonne of abatement increases with the level of abatement that is sought. Scaling up from around 5 Mt to 40 Mt involves achieving eight times the level of abatement estimated to have been achieved under GGAS – on any reasonable basis, it is expected this would push up the abatement cost per tonne.

Greenhouse Gas Abatement Program (GGAP)

The GGAP was a Howard Government abatement purchasing scheme much like the Opposition proposal. It was established in 2000, with an allocation of $400 million which was to be expended over four years. The intent of the program was to purchase emissions reductions that would otherwise not occur during the Kyoto Protocol target period (2008 – 2012).

- GGAP projects are based on co-generation (the use of waste heat or steam from power production or industrial processes for power generation), energy efficiency, travel demand management, alternative fuels and coal mine gas technologies.

- The Program commenced in 1999-2000, and three funding rounds were held between 2001 and 2004, with thirteen projects funded and expected to deliver 3.8 million tonnes of abatement in 2010.

- The program terminated in June 2009, and there are currently no projects left to be completed.

- GGAP spent $132 million up until 30 June 2009 out of an original allocation of $400 million.

The GGAP scheme was different to the GGAS scheme in that it imposed strong additionality conditions to ensure that public funds were only expended on projects that would otherwise not have occurred. Experience from GGAP suggests that at the time of operation the cost per tonne of abatement was significantly lower than the GGAS estimates, but that there were strong limits on the amount of abatement obtainable at this lower price.

- The cost to the Government of abatement achieved under the above GGAP projects is estimated at less than $7 per tonne of CO_2-e (average nominal over the period 2001-02 to 2008-09). (ie 19.7 million tonnes of CO_2-e for a cost of $132 million, approximately $6.70 per tonne).

Early estimates of the program suggested that GGAP would be able to purchase larger quantities of abatement at low cost. This proved to not be the case.

- The GGAP program was heavily underspent relative to early estimates – as noted, only around $132 million is now expected to have been spent on GGAP projects out of the original $400 million allocated to the program.

- The abatement gained, around 20 million tonnes during the Kyoto period 2008 – 2012 (less than 4 million tonnes per annum), is less than half the quantum of abatement (11 million tonnes per annum) estimated early in the program's life.

- A significant reason for the lower take-up rate is that when businesses assess whether participating in the program is worthwhile, they must take account of the administration and compliance costs. With strict additionality criteria these costs tend to be high.

- Businesses must also factor in the risk that they proceed through the process and are unsuccessful. These considerations tend to make it unlikely that small abatement projects will be funded through such mechanisms as the partly fixed administration costs overwhelm the potential benefits.

The 2008 Wilkins Strategic Review of Australian Government Climate Change Programs found that (page 44):

- "The Greenhouse Gas Abatement Program (GGAP), struggled to find suitable projects to fund. Where GGAP grants were offered, the Government faced difficulties in concluding grant contracts, and some projects were found to be unviable once contracts had been signed.

- "The Coal Mine Methane Reduction program also appears to have had difficulty finding suitable projects and concluding grant contracts, even though fugitive methane emissions from coal mines was considered a potential area of low cost abatement.

- "On the basis of these experiences, it appears that project based abatement is difficult to achieve through a grants program – further demonstrating why the ETS is a superior approach to achieving large scale abatement."

<u>Analysis of McKinsey (2008) cost curve data</u>

DCC also considered analysis based on material produced by McKinsey. McKinsey has conducted analysis in a number of countries on the abatement potential at different abatement costs. This analysis has been widely interpreted as implying that much abatement can be achieved at relatively low cost. However, McKinsey themselves state that this is only the technical potential to abate and does not fully consider practical barriers to the uptake of this abatement or the necessary policies that may be required.

DCC's analysis of the likely abatement that can be achieved based on McKinsey data does not suggest a lower cost of abatement (through a grants program) than suggested by the GGAS analysis.

- The McKinsey cost curve (2008) indicates at face value around 120 Mt of abatement potential available at society wide cost of up to $25 per tonne in 2007 dollars. However, as McKinsey acknowledgement implies, real world implementation constraints would certainly limit actual purchases to well below this.

- To estimate the equivalent carbon price, or payment capable of motivating abatement action, it is necessary to adjust this 'present value' cost for differences in required rates of return. We understand the McKinsey 2008 cost curve uses a discount rate of 4 per cent. This is significantly below the discount rate that businesses use when assessing investment projects. Converting from a 4 per cent discount rate to a more reasonable 12 per cent rate of return requirement doubles the effective price to $50 per tonne in 2007 dollars.

- This estimate simply includes an adjustment for the discount rate that would be applied by a business. However, in addition to the adjustment that needs to be made for the cost of capital, allowance also needs to be made for any administration costs associated with achieving the abatement through grant funding. Furthermore, most businesses when assessing whether to invest in a project will apply a "hurdle rate" that is even higher than the discount rate that would be implied by the pure cost of capital. The hurdle rate represents an internal management discipline that captures issues such as the need to ration scarce management and leadership resources. Hurdle rates of 20 per cent are not uncommon.

- To estimate the amount of abatement which could reasonably be achieved from a tender-based grant scheme, feasible abatement is assumed to be one third of overall potential abatement, reflecting both that not all businesses are willing or interested in participation, and that grant funded abatement must meet appropriate additionality (which is likely to exclude much of the negative cost abatement) and documentation standards. This is consistent with the GGAP experience. Taking this estimate of feasible abatement and adjusting the price to reflect the required rate of return implies 40 Mt of abatement can be realised at a price of $50 per tonne in 2007 dollars, excluding administration costs.

    - Increasing this price per tonne to 2020 results in a price of around $70 per tonne in 2020 dollars.

- There is uncertainty about the ratio of feasible to potential abatement. However, analysis indicates that the cost of abatement is not particularly sensitive to this ratio because of the shape of the abatement curve.

- McKinsey (2008) also indicates that 210 Mt of technical abatement potential is available at a society wide cost of up to $50 per tonne. Applying the same logic implies that 70 Mt of this abatement could be obtained at a price of $100 per tonne (or around $140 per tonne in 2020 dollars), excluding administration costs. This is consistent with the general point that achieving higher levels of abatement will involve higher average costs.

Previous Economic Modelling of Australian Carbon Prices

Past economic modelling of domestic action has suggested that, without use of international permits, Australian carbon prices would be significantly higher than $50 per tonne. This increases the level of confidence that the above analysis is conservative.

- It is widely accepted in the literature that international trade in emissions permits lowers the cost of meeting a given emissions reduction target by enabling emissions reductions to be made where the costs of doing so are lowest (see Stern 2009: 144-149). This question was explored extensively in the 1990s and early 2000s in Australia and in fora such as the Organisation for Economic Cooperation and Development (OECD).

- Consistent with the analysis, economic modelling of a "no-trade" scenario by the Allen Consulting Group (2006) suggested carbon prices around $50 in 2020 dollars ($34 in 2005 dollars), but these rise to well over $250 in 2050 (in 2020 dollars) without access to international permits. Given that this analysis includes abatement achieved through changes in consumption in response to the carbon price, such as reduced growth in energy demand, the $50 should be treated as a lower bound estimate.

- Similar scenarios modelled in Hatfield-Dodds et al (2007) show lower long-run prices to achieve similar targets with international trade.

- A modelling comparison exercise reported in Perman et al (2003, page 324) found that, for Canada, Australia and New Zealand, the economic cost of making a given emissions reduction without trade would be more than double the cost of meeting the same target with trade between developed countries, and around five times higher than the cost under global emissions trading.

- These results are broadly consistent with findings presented by Nordhaus (2008, page 120) for the shift from narrow global participation (akin to trade between developed countries only) to global participation involving nations accounting for 80-100 per cent of emissions.

Total Abatement Estimate

To obtain estimates of total abatement a number of further assumptions need to be made about the budget profile of the Coalition policy to 2020. To calculate the total quantum of available funds in 2020 we have assumed the ramp up of the program for the last five years of the scheme. We have assumed that program increases by equal amounts over the five years in a manner consistent with the average cost that the Coalition reports. The implication of this is that the program costs $2.08 billion in 2019-20.

Assuming around 40 million tonnes of abatement is achieved, the Coalition's package would result in emissions 13 per cent above 2000 levels by 2020.

These estimates effectively assume a nine-year program up to 2019-20. Subsequent comments by the Coalition have indicated that they intend a 10 year program to 2020-21. This would imply a lower peak spend per year and a correspondingly lower level of abatement in 2020 than indicated above.

BOTTOM-UP ANALYSIS

A "bottom-up" analysis of carbon cost and abatement potential supports the analysis outlined above.

A key issue in assessing the cost of abatement is whether the Government would be able to effectively price discriminate between different abatement projects. That is, whether the Government would be able to pay different amounts for different projects. There are broadly three reasons why sustained price discrimination is unlikely to be practical.

First, the Government is often at a substantial information disadvantage compared with the proponent of a scheme. Second, proponents tend to act strategically, which leads to a convergence of bids at the observed level of high bids from earlier funding rounds. Third, community perceptions of fairness may make it difficult to maintain large differences in the price paid for abatement projects (for example by paying farmers a different price for land management activities than provided to power generators for a change in the fuel mix).

The estimates contained in this bottom up analysis are reported on the basis that sustained price discrimination is possible. Accordingly, the cost estimates should be seen as a lower bound that is unlikely to be achieved.

Preliminary DCC assessment of the Coalition climate package announced on 2 February indicates that for the non-soil carbon components, the cost of abatement is likely to be around $50 per tonne excluding administration costs in 2020 if significant quantities of abatement are purchased. (This compares to the average of $15 per tonne including administration in the Coalition policy.)

Taking account of the difficulty of sustained price discrimination this would suggest a higher cost assumption was more reasonable, consistent with the $50+ per tonne estimates identified above. This again suggests that 40 Mt is a more realistic total abatement estimate.

Higher amounts of abatement would appear possible for a greater budget allocation, with an estimated maximum of 70 Mt available at a program totalling more than $4 billion in 2020. Under all circumstances the level of abatement is likely to fall well short of the 140 Mt required to meet the 5 per cent target.

The Department does not consider that it would be feasible to achieve the upper end of the aggregate potential abatement ranges shown in the table below, as this would assume maximum delivery is achieved for all items. Whilst it is possible that the upper end of the ranges may be achievable for some items, it is highly unlikely that all the best-case assumptions would come to pass at the same time.

If soil carbon on agricultural lands is included in estimates – that is assuming issues can be resolved to allow soil carbon abatement to be responsibly included in meeting Australia's target – it is very likely that Australia would still need to buy international credits to meet its 5 per cent reduction target.

Under all scenarios, the maximum abatement at any feasible cost is estimated at 120 Mt, less than the 140 Mt abatement gap to achieve the 5 per cent target. The higher end of the estimated range below is not only highly uncertain, it is likely only with much higher carbon prices and program costs (well over $4.2 billion without soil carbon in 2020). While including soil carbon would allow an increase in abatement to be achieved (although the extent of this increase is highly uncertain given the current state of knowledge – see next

section) there is no evidence that inclusion of soil carbon will substantially reduce the average cost per tonne. The $30 per tonne included in the table is an assumption by the Wentworth Group and does not have the same evidence base as the other estimates.

Taken together, this information suggests that the bottom–up modelling indicates that average abatement cost per tonne of $50 flowing from the top-down estimation methodologies remains an optimistic assessment of abatement costs.

(See table, "Estimated "Bottom-Up" Analysis of Potential Abatement and Costs", page 13)

TABLE: ESTIMATED "BOTTOM-UP" ANALYSIS OF POTENTIAL ABATEMENT AND COSTS

Measure	Potential abatement Mt in 2020			Cost per tonne	Cost to taxpayers
	Estimate in Coalition policy document	DCC estimate of maximum achievable without consumer price signal	Confidence in ability to achieve DCC estimate of abatement	Average cost per tonne in 2020 excluding administration costs	$b per year in 2020 excluding administration costs
Emissions Reduction Fund					
Soil carbon	85	6-53	low	>$30 (a)	0.2-2.1
Electricity	10-30	0-28	reasonable	$55-80	0.2-2.0
Forestry	12-15	5-20	reasonable	$40-70	0.2-1.4
Waste mine gas	4-8	4-8	reasonable	>$10	<0.2
Transport	3	not estimated	depends on policy detail	not estimated	0.1
Buildings and EE	20-30	5-12	depends on policy detail	>$20	0.2-0.5
Landfills	6-9	2-3	reasonable	>$10	<1.0
Potential abatement and costs, assuming effective price discrimination (b)					
Lowest cost measures, excluding soil carbon (c)		**20-40**		**$30-50**	**0.7-2.0**
All measures excluding soil carbon (c)		**40-70**		**$45-65**	**1.8-4.2**
All measures(c)		**25-120**		Not able to be estimated (d)	**0.9-6.1**
Other measures					
Solar roofs and urban forests	..	< 2	reasonable	na	not estimated

General Notes: Abatement estimates represent economically achievable abatement (rather than technical potential) at the average prices shown. Average cost and total cost to taxpayers represent payment to private agents, excluding administration costs. 2020 refers to 2019-20, consistent with Kyoto year accounting. Data based on public sources and DCC estimates, including forthcoming DCC projections.

Specific notes

(a) $30 per tonne based on Wentworth Group assumption, which is not supported by other analysis or data

(b) The analysis suggests that with effective price discrimination between different types of abatement, achieving more than 40 Mt would require payments of up to $80 per tonne for some components excluding administration costs. The cost of abatement for 40-50 Mt is estimated to be above $45 per tonne – ie consistent with the price derived from the top down analysis.

(c) The upper end of the ranges shown is considered highly unlikely to be achieved as it requires the maximum feasible amount to be achieved for each sub-component and would be associated with the high end of the abatement cost range. The lower end of the range assumes the most optimistic (lowest) carbon prices and that the Fund is able to achieve and maintain a price differential between different supplier of abatement to 2020 and beyond.

(d) Average costs for soil carbon abatement are very sensitive to the actual management practices required and the details of international accounting rules. It is likely that relatively high administration costs for soil carbon will result in average costs including administration for the Fund as a whole remaining stable or increasing if significant amounts of soil carbon are included. If 40-50 Mt of soil carbon is available at $30 per tonne in 2020 this would reduce the average cost shown by around $5 per tonne relative to all measures excluding soil carbon, before taking account of administration costs.

Table: Sources and assumptions

Emissions Reduction Fund

Experience indicates that grant programs are only able to access a fraction of the estimated technical abatement potential. Reasons for this include that abatement must be able to demonstrate that it meets additionality and other eligibility tests for funding, the payment on offer must be attractive in relation to the abatement actions required, these actions must be compatible with values and core business of the proponent, and proponents must be willing to engage with Government funding processes and take on various implementation risks and transaction costs. (More detail on administrative elements is outlined in the next section.)

Soil carbon

High estimate of potential abatement is based on CSIRO (2009) estimates of "attainable abatement", which include 50 million tonnes for rangelands/grasslands and 3 million tonnes for cropping. Low estimate assumes only 10 per cent of this abatement is captured for rangelands and grasslands at this price (reflecting that the management changes involved reduce other farm income due to lower stock numbers or pasture improvement costs, which may be between $100 and $700 per hectare), and 30 per cent is captured for cropping (reflecting relatively lower costs of required management change). Carbon cost based on Wentworth Group (2009) assumption, and treated as a lower bound as this assumption is not supported by any analysis or references. Further detail on soil carbon is provided at the end of this document.

Electricity generation

Abatement amounts and costs in 2020 are based on three point estimates, drawing on DCC estimates, ACIL Tasman (2009) and MMA (2008):

- use of gas to displace coal without capital works at the existing facility where this would be cheapest: <1 million tonnes at $68 per tonne in 2020 prices;

- use of gas to displace coal without capital works to cut emissions by 5 per cent at the fourteen power stations with the highest coal costs: 5.2 million tonnes at $79 per tonne in 2020 prices;

- early retirement of brown coal capacity equivalent to Hazelwood and Yallourn, and replacement with combined cycle gas turbines (CCGT) with an operating subsidy to meet cost differential: up to 24 million tonnes at $56 per tonne in 2020 prices.

Forestry

Abatement estimates based on Australian Government (2008), ABARE (2009) and DCC projections for two carbon price scenarios, assuming investor confidence and transaction costs are broadly similar to those anticipated under the CPRS legislative framework (this is considered optimistic). Low abatement estimate consistent with MYEFO CPRS-5 carbon price of $43 per tonne in 2020 and pro-rata carbon price for the -25 target ($71 per tonne).

Waste mine gas

Coalition estimates of abatement potential are broadly consistent with data on abatement from existing technologies used in DCC projections. Data from industry stakeholders

suggests that costs per tonne vary significantly across mines, making average costs difficult to estimate.

Transport

Coalition estimates of abatement potential are considered plausible if the Emissions Reduction Fund is able to generate innovative options for reducing emissions. Cost is based on Coalition estimates of abatement and average cost per tonne in 2020.

Buildings and Energy Efficiency

There is widespread consensus that significant abatement is available from energy efficiency and building improvements at low or negative cost, but that price based mechanisms are unlikely to be fully effective in capturing this abatement (this issue will be explored rigorously by the Government's Energy Efficiency Taskforce). The abatement estimate shown of 5-10 Mt is based on DCC projections, drawing on Australian Government (2008) and McKinsey (2008), and are considered an optimistic estimate of energy efficiency abatement generated through a grant program working in isolation, without an electricity price signal.

McKinsey (2008) shows 49 million tonnes of abatement in the buildings sector. As all of this appears to be negative cost, much of this abatement would be expected to be excluded on the "additionality" grounds outlined in the Coalition's policy document (that is, the requirement that abatement actions are beyond what firms would do under business as usual).

Landfill, compost and recycling

Estimates of abatement from landfill, including reductions in waste due to recycling, are based on DCC estimates at prices equivalent to at least the MYEFO CPRS-5 carbon price of $43 per tonne in 2020. Costs per tonne have not been estimated but assume effective price discrimination allows an average purchase price of $15. With higher prices, additional abatement might be able to be achieved from legacy waste emissions.

Other Measures

Solar Roofs

The Coalition's proposal aims to create an additional 1 million solar energy homes, installing either solar panels or solar hot water systems by 2020.

- An extra $1,000 rebate would be provided for either solar panels or solar hot water systems until 2020. The program would be capped at 100,000 rebates per year and would therefore be capped at a total cost of $100 million per year.

Providing one million rebates over 10 years does not necessarily mean there will be an extra million solar energy homes. Many will install solar panels or a hot water system anyway given existing support through the Renewable Energy Target (RET), Commonwealth and State rebates and regulation, and feed-in tariffs.

If an extra one million systems were supported over ten years, it would provide a relatively small amount of abatement of between 0.9 Mt and 1.8 Mt of abatement in 2020.

The subsidy could cost taxpayers from around $70 to over $100 per tonne of abatement in 2020. This is the cost of the subsidy, not including the cost borne by households installing solar systems.

Urban trees

The Coalition proposes to plant an additional 20 million trees by 2020 to establish urban forests and green corridors. This will provide only limited abatement, estimated at less than 1 Mt in 2020. The Coalition acknowledge this would only involve a small total land area, estimated to be 20-40,000 hectares (or 200-400 square kilometres).

The total area of land that the Coalition proposes for tree planting for the life of the urban forests and green corridors measure represents about one tenth of the annual rate of deforestation as reported in Australia's national greenhouse gas inventory.

RET banding

The Coalition propose creating a band of up to 6,000 gigawatt hours by 2020, to be reserved for large renewable energy projects (over 50 megawatts) or for emerging technologies such as solar, geothermal, tidal and wave projects over 10 megawatts.

- The yearly profile of the band in the years up to 2020 is not articulated. Details of the band are to be settled with the Clean Energy Council and representatives of the renewable energy industry.

Banding within the RET would favour more expensive technologies over cheaper technologies such as wind.

To the extent the banding brought forward generation from emerging technologies before it would otherwise occur under the RET, it would increase the cost of the RET for households and businesses, without reducing emissions or the total amount of renewable energy.

Due to the large size of the expanded targets, the RET is already expected to pull through a range of technologies including wind, biomass, solar and geothermal energy.

The RET is complemented by significant direct support for the development, commercialisation and deployment of emerging renewable technologies.

- For example, the $4.5 billion Clean Energy Initiative announced as part of the 2009-10 Budget includes $1.6 billion to support research and development of solar technologies, as well as $560 million to establish the Australian Centre for Renewable Energy.

ASSESSMENT OF THE COALITION'S PROPOSED MECHANISMS FOR ACHIEVING EMISSIONS TARGETS

The Coalition's Emissions Reduction Fund can be thought of as two distinct schemes: a legislated 'baseline/penalty' scheme to allow for penalties for firms exceeding 'business as usual' emissions; and a grant based abatement purchasing scheme.

As to the first, the regulatory detail is likely to be highly complex. The scheme would also involve high levels of business uncertainty both in the period before finalisation and on an ongoing basis. This is because:

- Setting of baseline for each and every emitter would be complex and time consuming.
- Rules for expansion would be complex and would likely create business uncertainty.

It is also the case that this regulatory complexity is not associated with any abatement outcomes – it arises from simply attempting to ensure "business as usual" emissions (ie pre purchase) are not exceeded.

The grant based abatement purchase scheme would involve very high transaction costs on a 'per tonne' basis for the following reason:

- Purchasing large scale abatement is administratively complex (involving detailed contractual arrangements for each project) compared to a clear market-based legal framework such as the CPRS.
- It is not clear whether the Emissions Reduction Fund will be able to 'price discriminate' between providers (that is pay different costs of abatement to different providers).
- Arrangements would be particularly complex in the case of soil carbon, where many small scale grants could be expected and achievable abatement potential has yet to be scientifically proven.

<u>Complexity and cost-effectiveness of the legislated program</u>

The imposition of penalties would require new substantial legislative powers. The NGERS legislation does not empower collection of the required information or the imposition of penalties for variations in emissions above a baseline.

Penalising abatement above a baseline is legislatively complex.

- If penalties are to apply to emissions above a baseline, then baselines would need to be set for all potentially liable parties, which appear to be all mandatory NGERS reporters. This would be an enormously difficult task. Through the EITE program, the Government has hands-on experience in setting baselines. The Government has made good progress in finalising arrangements for the small subset of activities that are eligible for EITE assistance – attempting to replicate this for all liable parties would be enormously time-consuming and difficult. Non-EITE industries are also more likely to be characterised by complex multiple product plants where intensity measures are particularly difficult to define.

The Coalition has not specified how baselines would be set.

- Baselines could be set on the level of absolute tonnes of emissions reported by each entity, say in 2007-08. (On a literal reading of the Coalition's policy document, this appears to be what is proposed.) Of itself, this would be simple. However, if this interpretation were correct, then every firm that increased its emissions would need to justify that the increase fell within the rules, or would face a penalty. This would mean that all firms expanding production would be at risk of facing penalties unless they were significantly improving their efficiency. It seems highly unlikely given the tone of the rest of the Coalition policy document that this could be intended.

    - To operationalise a penalty regime based on absolute emissions baselines, rules around when an increase in emissions for an entity does not incur a penalty would be required. Rules would need to avoid potentially efficient processes of industry rationalisation, and to deal with data anomalies. For example, if the baseline emissions were artificially low due to a shut-down period for major periodic maintenance, there would need to be rules to allow production (and emissions) to increase to 'normal' levels.

    - The Coalition has stated that penalties would not be applied to new entrants or to business expansions operating at best practice. This means that best practice baselines would need to be set for a potentially very wide range of activities. Until baselines are set, it would be difficult for any business to expand production or make investments with confidence.

    - For example, if a firm were operating at 80 per cent capacity and then expanded with the same technology to 100 per cent capacity, then this firm would face a penalty unless they happened to be already at best practice. For many firms this would not be the case as efficiency often depends on the age of the plant and only the newest plants are likely to be at best practice. If firms had best practice baselines (as well as their own baselines) calculated differently for each "vintage" of capital, and for each different technology (some products can be prodiced using competing technologies), this would increase the number of calculations and the administrative complexity by a significant factor.

- Baselines could be set on the basis of emissions intensity. (Although this is not specified in the policy document, Mr Abbott's launch speech and the comparisons with GGAS and Canada suggests that this is what is intended.) This would be enormously difficult: NGERS does not currently provide all of the relevant data. Units of output would need to be specified for each facility, and emissions allocated to each type of output. (NGERS does not always capture output.) Rules surrounding the allocation of emissions to outputs would need to be devised – NGERS does not attempt to allocate emissions to products. Again, separate 'best practice' baselines would need to be set for new entrants and business expansions. This is a highly contested concept, meaning that there would be high levels of uncertainty for business as to which interpretation of 'best practice' would be applied to their particular circumstances.

    - Some may argue that the CPRS requires some intensity calculations. However, the range of calculations is much more limited as the CPRS EITE regime only uses historical emissions intensity, does not attempt to define best practice and applies to a subset of liable firms.

- To be relevant for either purchasing abatement or penalising emissions, baselines would need to be adjusted over time. This greatly increases investment uncertainty faced by businesses.

- The Coalition has stated that the level of penalty would be decided after consultation with industry.

Purchasing large-scale abatement is administratively complex.

The Coalition has stated that firms that reduce their emissions below their baselines would be able to offer this abatement for sale to the government. Likely implications of this approach are:

- Efforts to reduce complexity (mainly by creating simplified rules for proving financial additionality) would likely lead to a significant proportion of 'business as usual' abatement being funded. This raises the average cost per tonne of actual abatement delivered under the program – GGAS is the most obvious example where the number of tonnes funded through the program is significantly larger than the number of additional tonnes of abatement delivered.

- By contrast, more rigorous processes to ensure additionality significantly add to administrative and compliance costs. It would also likely lead to smaller quantities of abatement than expected being delivered – GGAP is the most obvious example of these problems. Even with rigorous rules, it is likely that some abatement will be funded that is not truly additional, and some abatement will be incorrectly classified as economic in its own right, and will not be funded.

- Self assessment of potential proposals will involve costs even when the information leads businesses not to proceed. At low costs per tonne, many will judge it not worth investing in seeing whether they are eligible, reducing the amount of abatement that could be achieved.

Administrative aspects of purchasing abatement

The proposed criteria for purchasing abatement under the Emissions Reduction Fund are likely to increase the average cost of abatement funded under the scheme compared with what would be delivered for the same carbon price under the CPRS. This is because of the complexity of recognising additional abatement real world circumstances, and the accountability elements inherent in a grant based scheme

- Applicants and the Government will need to spend money addressing and assessing how the project meets all of the criteria.

- The criterion that the project must deliver additional practical environmental benefits means that the Government will be trying to buy at least two benefits with one policy. It ignores the proper role of regulation or other markets for other environmental goods. Some projects are likely to involve conflicting environmental impacts: some benefits and some costs. The application of this criterion, including guidance on how tradeoffs are to be assessed, significantly increases the uncertainties faced by investors and the complexity of administration.

- The criterion that no costs must be passed on to consumers means there will be no price-induced changes in consumer behaviour that have not been administratively

purchased by the Government. Furthermore, business will require additional payment to compensate them for the risk that they are found to have passed on costs to consumers, and the risks of cost overruns that cannot be passed on.

- The requirement to protect Australian jobs could be difficult to interpret in practice for real-world business situations, but could conceivably preclude any projects that reduced labour requirements at a particular site (which is often associated with new capital investment)

- The interaction of self assessments to determine whether to bid, the transfer of risks to bidders related to cost-overruns (which cannot be passed on to consumers), and the costs of preparing a bid mean that it is quite likely that a substantial share of bids will come from companies which were going to undertake the project anyway (but can make it look as though they were not).

- A grant fund relies on contracted arrangements for each and every project to provide assurance of delivery and durability over time. Experience from GGAP suggests that the administering of these contracts is very time consuming and costly on the part of the Government and proponents.

The Government's planned offsets program, for agricultural and other emissions not covered by the CPRS, will face similar challenges in ensuring additionality and some degree of administrative complexity. However, given the broad coverage of the CPRS, the offset scheme is significantly narrower in scope and would be, if passed, backed with a legislative framework designed to reduce compliance/assurance costs.

<u>Purchasing abatement under the Emissions Reduction Fund, and interactions with legislated baselines</u>

The two elements of the Coalition scheme interact in practice, and design elements of the legislated baseline and penalty scheme would be critical to the feasibility of purchasing modest amounts of abatement.

If baselines are set on the basis of historic average absolute emissions, then these baselines would be of limited value for the purposes of funding abatement. Reductions in emissions from simply producing less product would otherwise be rewarded. If another firm picked up this market share, and was deemed to be operating at 'best practice', then no penalty would apply. Therefore, 'abatement' would have been rewarded when in fact there may have been no actual reduction in emissions in the economy. In practice reducing emissions below such a baseline would play no real role in determining whether abatement had occurred.

If baselines are set on the basis of historic average emissions intensity, then this would be more useful for purchasing abatement than absolute emissions baselines. However, unless the baselines moved over time, they would give little if any guidance to the Emissions Reduction Fund as to whether the abatement was additional. Most industries have been reducing their emissions intensity over time, and would be expected to continue to do so even without a carbon constraint. Setting a fixed historic baseline would not reflect this underlying trend, and so most firms would be able to identify 'abatement' against this criterion. Again, since it would be so easy to demonstrate 'abatement' on this basis, in practice, it would be unlikely to be a sound basis for the purchasing program. (If it were to provide the basis - as in GGAS - then the scheme would reward significant non-additional abatement.) In addition, the business-as-usual estimates in the emissions projections already take account of these trend

improvements and therefore the abatement task is greater than 140 million tonnes in 2020 if these are not correctly accounted for.

Both unchanging historic average emissions baselines or intensity baselines would therefore give little or no guidance as to whether genuinely additional abatement had occurred.

Can the Emissions Reduction Fund Price discriminate?

The Coalition's document suggests that different categories of abatement will be available to the Government at different prices, and that the Government would not be required to pay each bidder prices that reflect prices that reflect the ruling 'economy wide' cost of abatement. In practice, this would be very difficult to achieve due to the operation of the tender market and perceptions of fairness among project proponents.

The Government could run the tender process in two main ways: it could pay all successful bidders the same price for each tonne of abatement (a single price tender), or it could pay according to the price that each company included in its funding bid ('pay as bid'). While a pay as bid tender sounds as though it might result in a successful degree of price discrimination by the government, in practice, bidders would be likely to operate strategically to thwart this plan. For example, if farmers realised that the government is likely to have to pay for more abatement at $40 per tonne if their offer of soil carbon sequestration is not selected, then farmers would have no incentive to bid in this abatement at $8 per tonne (even if this was economic) – they would 'shade' their bids, and offer in soil carbon at prices higher than the actual costs incurred. This is borne out in practice in multi-round environmental tenders in Australia and internationally, where quickly bids converge to close to the highest bid from previous rounds.

The Government might be able to successfully price discriminate if it could credibly divide its abatement purchasing fund into segments, and identify that it is only prepared to pay a certain amount for (or buy a certain amount of) particular types of abatement. Even so, particularly in areas where the likely sellers of abatement are concentrated, strategic bidding is still likely, to put pressure on the Government to change its rules. Moreover, it would be easy for groups being paid low prices for abatement (such as farmers) to claim that they were being unfairly discriminated against, when others (such as electricity generators) were being paid over four times as much per tonne, even though all tonnes were of equal value to the atmosphere.

The consequence of not being able to successfully price discriminate is that higher prices per tonne would be paid for most categories of abatement, resulting in less abatement purchased with the available funds. This would support the 'top-down' abatement estimates outlined above (which do not rely on price discrimination) though DCC's 'bottom-up' estimates assume price discrimination is possible. This supports our view that the 40 Mt estimate of abatement is well based.

SUPPORTING INFORMATION ON SOIL CARBON

The Coalition proposes to use the Emissions Reduction Fund to support up to 85 million tonnes (Mt) per year of CO_2-e abatement through soil carbon by 2020, with an initial purchase of 10 Mt in 2012-13.

It should be noted that soil carbon on agricultural lands does not count towards our Kyoto target.

- Under current international rules, changes in soil carbon arising from natural events such as drought create a risk of substantial spikes in our national inventory. For example, in the 2003 drought, 46.3 Mt CO_2-e were released from soils (almost 10 per cent of national emissions that year). If soil carbon was counted, this variability would create an unacceptable risk that Australia would breach its international emissions target. As a result, the previous Government decided not to count voluntary land management activities, and the current Government reaffirmed this decision.

- Government policy is to work to improve international accounting rules to take better account of natural variability with the aim of enabling agricultural and forest lands to contribute more towards meeting our targets in the future, without unacceptable compliance risks.

Assuming the successful resolution to these issues, it must still be recognised that estimates of the potential for management action to build soil carbon levels vary widely.

- Many estimates are based on overseas work which does not take account of different Australian conditions, including low rainfall and variable climate. CSIRO analysis indicates actual abatement is likely to be far less than some proponents claim.

DCC estimates that a realistic maximum attainable abatement would be 53 Mt in 2020. This is based on CSIRO (2009) estimates of "attainable abatement" between 2010 and 2050, and includes 50 Mt for rangelands/grasslands and 3 Mt for cropping.

- Capturing the maximum attainable abatement (53 Mt) would require land management changes that would reduce productivity and management flexibility for farmers, and a substantial carbon price or subsidies (well above $10 per tonne).

DCC estimates a lower bound of 6 Mt of abatement in 2020. This assumes only 10 per cent of the attainable abatement is captured for rangelands and grasslands at the price indicated in the table above, and 30 per cent is captured for cropping. The detail of these calculations is outlined below.

Australia's potential to permanently increase soil carbon levels is highly uncertain due to our low rainfall and variable climate. In addition, the permanence of any gains in soil carbon is highly uncertain.

- It would be difficult, therefore, to rely on abatement from soil carbon to meet national emission targets given our current state of knowledge.

Rehabilitation of rangelands

Improvements in soil carbon come from either reducing livestock numbers, with an associated loss of income, or from improving pastures. Both actions involve cost. For example, the loss of income to the grazier from reducing grazing pressure has been estimated to cost $85 per hectare pasture (NSW DPI 2009). Pasture improvement has been estimated to cost between $100-$700 per hectare for each treatment which would need to be repeated each few years. Pasture improvement also has a high failure rate, and often uses added fertiliser, which causes non-carbon greenhouse gas emissions and reduces overall greenhouse gas benefits.

CSIRO (2009) indicates average sequestration potential from reducing grazing intensity in Australian conditions to be around 0.3 tonnes of CO_2-e per annum per hectare. This would suggest much of the carbon abatement potential could come at costs significantly higher than $100 per tonne (ie, much higher than the estimates used in the "bottom-up" analysis above).

CSIRO estimated 50 Mt CO_2-e of attainable abatement per year nationally, ie 50 per cent of the technical potential from reduced stocking due to reduced stocking rates and the need for pasture improvement. Achieving such abatement would require action on about 450 million hectares – over half of Australia's land mass.

CSIRO revised down the Garnaut Report's estimate of abatement potential for mulga lands from 250 Mt CO_2-e per year to just 20 Mt per year.

Uncertainty stems from a number of sources: For example:

- CSIRO notes a global study that found that in 8 out of 22 data points in the Asia-Pacific showed that reduced grazing resulted in losses of soil carbon rather than gains.
- In low rainfall areas, slowly accumulated soil carbon can be lost during dry periods.
- Grasses and shrubs are fire-prone. Building up this plant material to increase soil carbon would worsen fire intensity and frequency, potentially increasing greenhouse gas emissions.

Crop soil carbon

Soil carbon on croplands is usually built through 'no-till' and associated improved management of crop residues (e.g. not burning crop stubble).

CSIRO estimated a national potential of 25 Mt CO_2-e annually, but suggests only around 10 per cent of this potential (2.5 Mt) is realistically attainable. We have assumed 3 Mt of abatement, or a little more than 10 per cent in the above estimates.

CSIRO reports that studies in Queensland and the Northern Territory have failed to show consistent soil carbon gains from 'no-till'.

- In fact, some studies suggest losses. Australia's soils and climate mean that positive results obtained in North American studies do not translate to Australia.

A national synthesis of 'no-till' data for the Australian Greenhouse Office in 2004 (Valzano et al, 2005) showed a variable effect, with 'no-till' generally reducing the rate of loss, rather

than building soil carbon, and that even this limited effect was only apparent in higher rainfall areas (above 550mm/year on average).

- Only about 25 per cent of Australia's cropping lands receives more than 550 mm annual rainfall.

- CSIRO notes that full adoption of no-till practice would reduce management flexibility for farmers, e.g., to manage plant diseases and herbicide resistance.

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