

## SENATE SELECT COMMITTEE ON CLIMATE POLICY

### Using the Marginal Abatement Cost Curve (MACC) Approach to Identify Efficiency Opportunities

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Signed:   
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#### INQUIRY TERMS OF REFERENCE

*That a select committee, to be known as the Select Committee on Climate Policy, be established to inquire into and **report by 14 May 2009** on:*

- (1) (a) the choice of emissions trading as the central policy to reduce Australia 's carbon pollution, taking into account the need to:
  - (i) reduce carbon pollution at the lowest economic cost,*
  - (ii) put in place long-term incentives for investment in clean energy and low-emission technology, and*
  - (iii) contribute to a global solution to climate change;**
- (b) the relative contributions to overall emission reduction targets from complementary measures such as renewable energy feed-in laws, energy efficiency and the protection or development of terrestrial carbon stores such as native forests and soils;*
- (c) whether the Government's Carbon Pollution Reduction Scheme is environmentally effective, in particular with regard to the adequacy or otherwise of the Government's 2020 and 2050 greenhouse gas emission reduction targets in avoiding dangerous climate change;*
- (d) an appropriate mechanism for determining what a fair and equitable contribution to the global emission reduction effort would be;*
- (e) whether the design of the proposed scheme will send appropriate investment signals for green collar jobs, research and development, and the manufacturing and service industries, taking into account permit allocation, leakage, compensation mechanisms and additionality issues; and*
- (f) any related matter.*

## Executive Summary

This submission primarily addresses 1.a.i and 1.a.ii of the terms of reference with a lesser contribution to 1.e.

Marginal cost calculation methods are commonly used in business to manage production with the lowest marginal cost. These same methods can be employed for managing carbon pollution at the lowest economic cost.

Such an approach has been developed by Hatch. The methodology has been used with major emitters in Australia and overseas. It has provided them with a comprehensive understanding of the impact of energy price rises on their business and what can be done to improve energy efficiency.

The Marginal Abatement Cost Curve (MACC) generated for these firms quantifies the improvement in energy efficiency and emissions reduction that can be achieved and its associated cost. It provides a strategic roadmap for investment in energy efficiency and clean technology.

The MACC clearly indicates the energy/emission price at which investment in GHG abatement can no longer contain the increased cost. Beyond this point the only feasible option is to bear the additional emission costs until new technologies are developed to further improve energy efficiency.

Negotiations between business and the federal government on emissions trading have often been subjective due to a lack of hard data.

The negotiations around the free allocation of emission permits can be simplified by ensuring each applicant presents an audited MACC to the federal government. This ensures clarity of information in the negotiation process.

The government can then understand the real impact an emission trading scheme will have and target assistance to those areas that need it most- the industries with the highest marginal abatement costs.

The resulting targets established for emissions improvement can be tailored business by business (for major emitters) to create a long term incentive for investment in clean technology.

## The MACC Methodology

Marginal cost assessment methods are used extensively by strategic decision makers. Hatch has adapted the process for the assessment of marginal abatement costs for energy savings projects. The impact of energy costs have been evaluated through this method as well. We have used it with several major emitters internationally to establish their GHG MACC.

Figure 1 provides a sample MACC. Each bar on the graph indicates an activity that improves energy efficiency and reduces emissions. The width of the bar indicates the size of the benefit. An activity is defined as a discrete action with a cost associated to it. It may range from installing a new technology to rationalizing production and shutting down plants.

The vertical axis indicates the cost associated with each activity. Those below the horizontal axis have a negative cost and therefore are profitable. The activities above the axis require increasing energy or emission costs to make them economically attractive.

Using the example shown in

Figure 1, if the emission cost was \$20/T CO<sub>2</sub>-e then 1800kT of GHG abatement would be economic to implement.

The red line shows the general shape of a MACC. In our experience the MACC has three distinct areas:

1. Profitable Abatement, below the \$0/T CO<sub>2</sub>-e axis; We have consistently identified there are opportunities to improve energy efficiency with no price stimulus required. The reason for this is that energy efficiency has not been included as a top priority by many industries.
2. Potentially Profitable Abatement, just above the \$0/T CO<sub>2</sub>-e axis; Typically there is an inflexion point in the MACC at this point where several activities with significant abatement potential are located. These activities require the incentive of a small energy or emissions price increase to realize.
3. Unachievable Abatement; This is marked by the point at which the MACC profile becomes near exponential. Others have assumed a linear relationship for abatement from the inflexion point. We have found that as the low hanging fruit is exhausted the cost of further abatement increases at a near exponential rate.

The MACC must be built through a bottom up approach in three steps:

- Identifying improvement activities in the business.
- Rationalizing the activities to eliminate competition between each other.
- Analyzing each activity to establish its emissions/energy and economic impacts.

## Using the MACC in Free Permit Allocation Negotiations

A corporation's audited MACC provides a clear picture of how much abatement it can achieve within an emissions trading scheme. The opportunities that are clearly profitable should be implemented by the business. Those that are marginal can be negotiated with the federal government. The unachievable abatement indicates where each business has no internal abatement options and is exposed to market prices for energy/emissions permits.

For businesses deemed to have trade exposure the limited free allocation of permits can be used to incentivize efficiency improvement. The free allocation is limited such that the business is encouraged to implement the profitable abatement.

By requiring each applicant for free permit allocation to present their corporate MACC, the federal government can fairly assess permit distribution.

The federal government can combine the MACCs' submitted to generate a national aggregate MACC for Australia. This provides a macro economic tool for managing Australia's national emission reduction target.

This MACC approach provides transparency in the short term thus enabling accurate long term target setting. Figure 2 shows a target setting chart based on the MACC in

Figure 1. The left hand axis shows the reduction in GHG emissions while the right hand axis indicates the required capital investment.

In calculating the red line, we assumed a decline in free permit allocation of 10% over ten years.

The black line is the forecast Business as Usual (BAU) emissions.

The blue line is the implementation of all activities with a cost of less than \$20/T CO<sub>2</sub>-e. To generate this graph the activities have been scheduled according to their implementation periods. The capital investments required have also been estimated. It shows that half a billion dollars is required over ten years to achieve the 10% reduction in emissions from today (equating to 16% reduction against BAU).

Figure 2 also indicates when emission permits are required and when a surplus is expected.

From a business perspective Figure 2 allows the business to budget for capital and operational expenditures on abatement permits.

From the government perspective by combining the trajectories of each corporation an accurate emission trading market forecast can be created. This enables the government to maintain permit price stability by regulating supply to match demand.

## The Current Energy Efficiency Opportunities (EEO) Program

The EEO program provides some understanding of the quantity of profitable abatement opportunities that exist amongst businesses that consume more than 0.5PJ per annum. However this is limited to those opportunities with a payback of less than 4 years.

EEO does not provide a comprehensive understanding of all savings opportunities, potentially profitable opportunities or presently unachievable opportunities. Nor does it provide any detail on the impacts of altered energy/emissions pricing on each business.

The EEO process provides the foundation for applying the MACC methodology. However the generation of the MACC requires several more steps and a more detailed analysis than the EEO program.

## Ongoing GHG Management with the MACC

Once a MACC is created it is easy to maintain. As a business changes or as new technologies become commercial, the activities on the MACC (fig 1) are updated and the target (fig 2) adjusted. This allows the business strategic decision makers to manage progress toward their energy efficiency/GHG abatement target and manage investment in energy efficiency technology.

The federal government could request the provision of an updated MACC at regular intervals. Intervals of several years could be required, perhaps matching the period between each round of free allocation. By doing this the government maintains the currency of information on the abatement performance and potential within Australian Industry.

By combining the MACC responses of all participants the government can:

- Track Australia's emission reduction performance better.
- Forecast progress against targets more accurately.
- Negotiate international commitments with more confidence.

## Conclusions

The Federal government is left at a disadvantage in regards to the development of the emissions trading scheme, due the lack of available industry data on energy savings opportunities. This is a

suboptimal result for all parties as the government is planning emission reduction targets with incomplete/inaccurate data.

The government is accused of either being too stringent or too lenient in its approach to business. Without detailed data from each business the government cannot ascertain the actual impact of altered energy/emission pricing.

By using the MACC methodology to enable transparent policy setting, the playing field between major industry emitters is levelled. Both industry and the government have a clear understanding of the costs involved to achieve particular targets.

The transparency of the impact on particular businesses allows a much fairer allocation of free permits to those businesses that are deemed to be trade exposed.

The scheme can be designed such that it is not overly onerous in its impacts on particular businesses or industries. But at the same time it can create enough incentive to encourage improvements in energy efficiency. This has the long term benefit of improving international competitiveness and safeguarding employment.

By maintaining the incentive to improve energy efficiency over time the government is supporting demand for innovation in energy efficiency. This has the potential to result in more employment opportunities as Australian businesses export their energy efficiency technologies and expertise to the world.

## Recommendations

The implementation of an emissions trading scheme need not be a costly burden to industry. If applied using the MACC methodology, it may assist Australian Industry to be more competitive.

We recommend the following actions for the Senate Select Committee's consideration:

1. That major emitters be required to prepare and have audited a Marginal Abatement Cost Curve for their business. At the least, major emitters should be defined as those applying for allocation of free permits under the Emission Intense Trade Exposed clauses of the Carbon Pollution Reduction Scheme. This will provide a transparent mechanism for the federal government to fairly distribute the free allocation. It will ensure that businesses are not unduly disadvantaged but are provided with an incentive to improve energy efficiency and global competitiveness.
2. That the audited MACC of each major emitter be regularly updated and submitted to the federal government. This can form part of the application process for freely allocated permits in future.
3. That the government creates a national MACC and forecast of emission permit supply/demand based on the responses of each major emitter.

### CO2 Marginal Abatement Cost Curve (MACC)

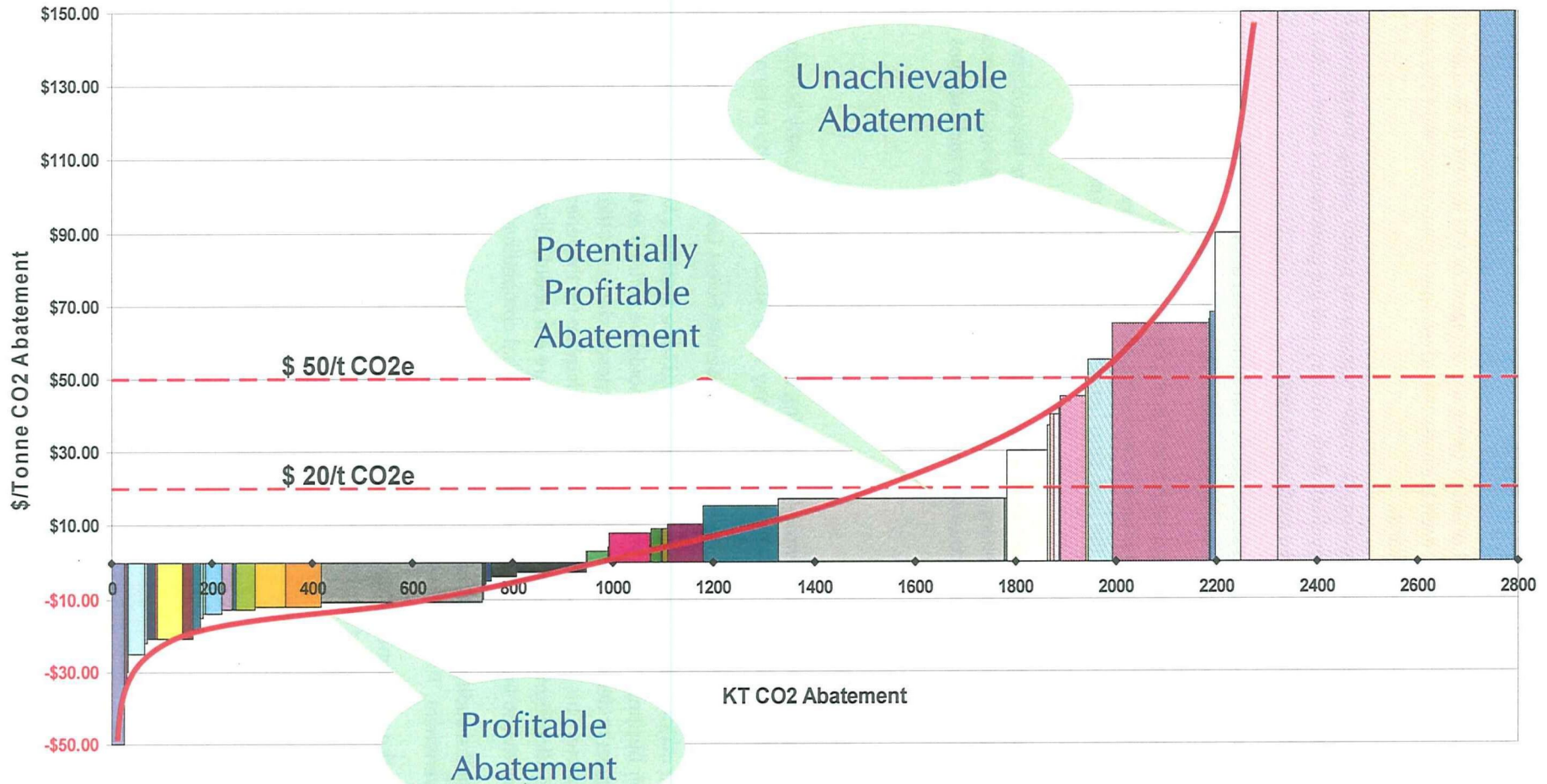


Figure 1: Sample of a Marginal Abatement Cost Curve (MACC)

## CO<sub>2</sub> SAVINGS AND INVESTMENT REQUIREMENTS

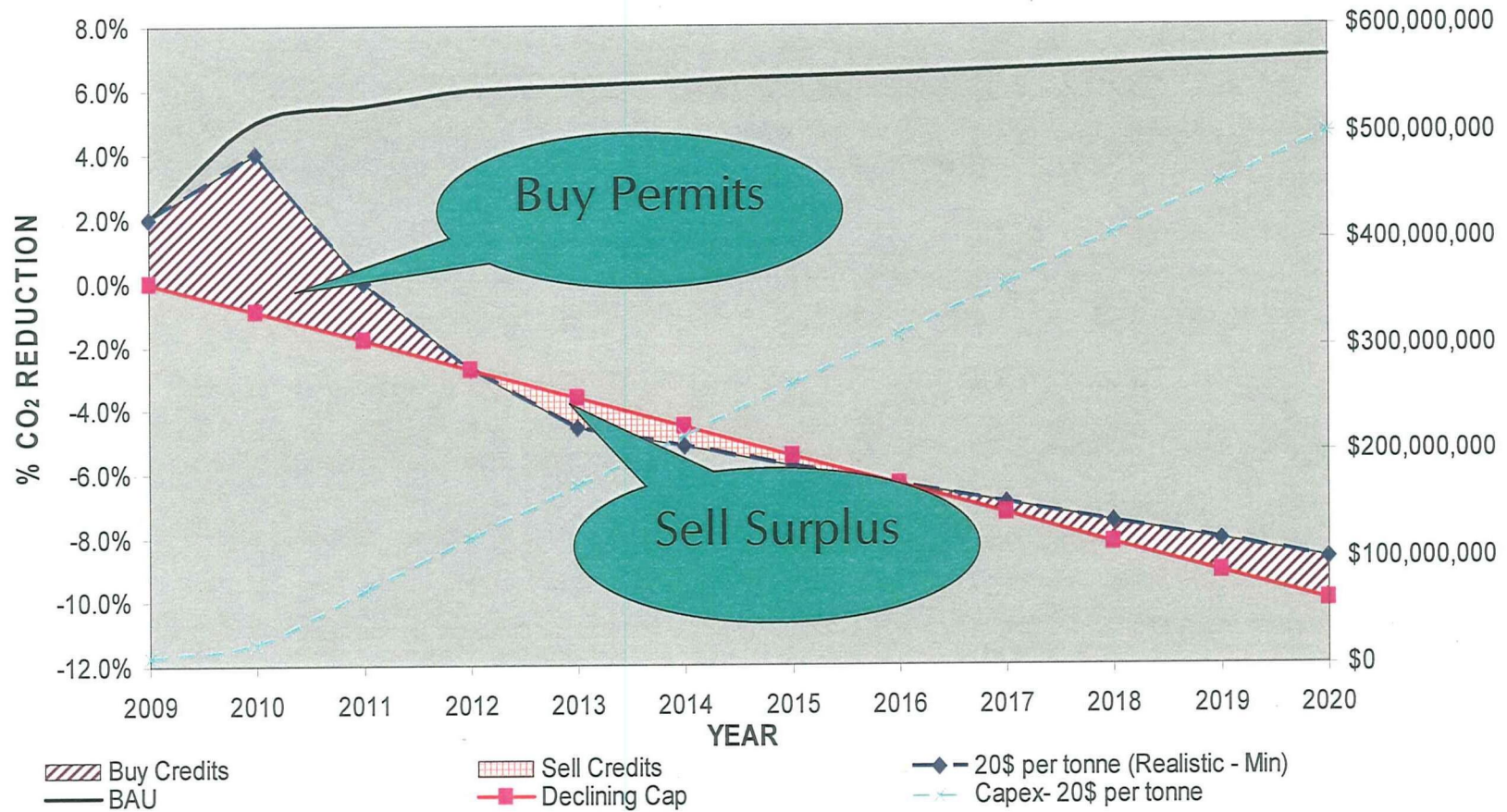


Figure 2: Target Setting using the MACC

